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Coinvestment and risk taking in private equity funds

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Non-technical summary

General partners (GP) raise and manage private equity funds and therefore make the investment decisions for the fund. GPs are compensated with a mix of fixed and variable fees. A typical compensation structure is a two percent annual management fee on the fund's capital and a 20% carried interest on the profits above a certain threshold (Metrick and Yasuda, 2010). In addition, many GPs charge transaction fees and monitoring fees to their portfolio companies (Phalippou, 2009).

This fee structure creates an option-like payoff, with little downside to the managers of the fund. Since the GP's ability to raise future funds also depends on the current performance, the incentives to generate high returns is even stronger than it may first appear (Chung et al., 2012). Extant evidence suggests that corporate managers with large stock option holdings tend to take more risk (Coles et al., 2006; Knopf et al., 2002; Shue and Townsend, 2013). If the GP compensation structure encourages excessive risk taking, it could potentially have an adverse effect on fund value.

To counteract incentives to gamble with the fund's money, managers are typically required to co-invest their own money in the portfolio companies alongside the private equity fund. This "skin in the game" forces the GP to participate in any losses incurred by the fund. A typical GP in the US is required to invest 1% of the fund's capital, corresponding to a \$3.6 million investment (Robinson and Sensoy, 2013). While a large co-investment mitigates incentives for excessive risk taking, it may also make a risk-averse manager too conservative, foregoing valuable investment opportunities with high risk.

In this paper, we are the first to examine how the co-investment affects the investment decisions of private equity fund managers, namely we show that a higher co-investment fraction is associated with less risky portfolio companies (lower assets beta) and a higher degree of debt financing. Importantly, the co-investment fraction is a significant determinant of investment risk only when adjusted for the fund manager's wealth. This emphasizes the importance of wealth data in research examining the effect of variable compensation on the incentives to take risk.

We start our analysis by developing a simple theoretical model, in which the selection of a target firm and the decision on deal financing are made simultaneously. Fund managers can choose between firms with different risk and have to decide how much debt to use in the acquisition, the rest of the consideration being equity contributed from the fund. Firms with relatively high risk have higher expected cash flows, but also have a higher probability of default. For tractability, we assume that firm value is independent of the capital structure, ignoring potential benefits from debt tax shields and reduced agency costs (Jensen, 1986; Modigliani and Miller, 1958).

There are three main predictions of our model. First, the GP's incentives to invest in risky projects are declining in his required co-investment share. That is, a higher beta induces the GP to be more conservative in his project choice. Second, having chosen a less risky project, a higher co-investment share induces the GP to use more debt financing. Third, wealth reduces the negative utility associated with risk; these effects are more pronounced the less wealthy the GP. A measure, which relates the co-investment level to the wealth of the GP, takes up both effects.

We then take the model predictions to the data, using a unique, hand collected sample of 62 portfolio company investments made by 20 Nordic leveraged buyout funds between 2000 and 2010. This data, provided by the Private Equity Centre at NHH, is created by combining information from three sources: (i) a list of portfolio company investments provided by the Norwegian Venture Capital Association, (ii) the public websites of Nordic buyout funds, and (iii)

the Argentum private equity market database. We limit the analysis to firms in Norway, where the manager's taxable wealth is public information, as are the financial statements of firms after going private. The wealth data allows us to estimate the incentives provided by the co-investment, not only in percent and dollar amount but also as a fraction of the manager's total wealth. This is an important empirical contribution of this paper. Thereby, the effect of the co-investment becomes evident only after controlling for the fund manager's wealth. The required co-investment proportion varies substantially across the 20 funds, ranging from zero to 15% of the fund's equity investment, and with an average of 3.7% (median 1.5%). When measured as a fraction of the wealth at the time of the investment, the average GP personally invests 93% (median 48%) of his total wealth in the fund.

We are able to show, both theoretically as well as in our empirical analysis that funds with a higher co-investment requirement tend to acquire target firms with lower asset beta and use more leverage. That is, firms with stable cash flow that can safely operate with higher leverage without jeopardizing their ability to service the debt. Axelson et al. (2013) show that buyout leverage is determined primarily by economy-wide credit conditions. We add to their evidence by showing that the fund manager's personal co-investment also helps explain portfolio company leverage in the cross-section.

We further each look at relationship between a target firm's equity beta and the GP's co-investment. The higher the equity beta, the higher overall risk as it corrects firm risk for leverage. We find a negative correlation between the equity beta and the co-investment, again suggesting that the overall effect of project risk dominates the leverage effect, showing that the manager's risk appetite is lower the more he has to invest of his own funds.

Finally, we investigate whether we can find effects at the portfolio level, as well. We look at the relative size of deals and find that the higher the relative co-investment fraction, the smaller the relative size each individual deal. This finding suggests that the incentive effect of a higher co-investment is not limited to the deals itself but has a broader effect on the GP's decision-making process. This finding may also shed light on one curious aspect of our analysis. We do not find that GPs with a high co-investment select firms with lower absolute risk. Rather these GPs seem to select firms with lower systematic risk. However, given that we find a diversification effect at the portfolio level, GPs still opt for more diversification, but the pattern is somewhat different from what we may suspect initially.

Overall, our evidence suggests that limited partners effectively reduce fund managers' incentives to take risk by requiring them to co-invest in the portfolio companies. Whether this reduction in GP risk appetite is optimal or not goes beyond the scope of this paper. Limited partners ultimately care for the risk-adjusted net-of-fee returns, something, which we do not examine here. In our framework, we treat the co-investment fraction as exogenous. Obviously, fund managers may design a compensation structure at the outset – when raising the fund – that fits their own risk preferences. In such case, the co-investment fraction and the investment risk may simply both be a result of the fund manager's risk preferences. Thus, an alternative interpretation of our evidence is that limited partners could infer the GP's risk preferences from the co-investment fraction and pick funds with risk profiles that fit their investment strategy.

Coinvestment and risk taking in private equity funds*

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Abstract

Private equity fund managers are typically required to invest their own money alongside the fund. We examine how this coinvestment affects the acquisition strategy of leveraged buyout funds. In a simple model, where the investment and capital structure decisions are made simultaneously, we show that a higher coinvestment induces managers to choose less risky firms and use more leverage. We test these predictions in a unique sample of private equity investments in Norway, where the fund manager's taxable wealth is publicly available. Consistent with the model, portfolio company risk decreases and leverage ratios increase with the coinvestment fraction of the manager's wealth. Moreover, funds requiring a relatively high coinvestment tend to spread its capital over a larger number of portfolio firms, consistent with a more conservative investment policy.

Keywords: Private equity, leveraged buyouts, incentives, coinvestment, risk taking, wealth

JEL Classification: D86, G12, G31, G32, G34.

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1 Introduction

Private equity funds are raised and managed by a general partner (GP), who makes the investment decisions for the fund. GPs are compensated with a mix of fixed and variable fees. A typical compensation structure is a two percent annual management fee on the fund's capital and a 20% carried interest on the profits above a certain threshold (Metrick and Yasuda, 2010). In addition, many GPs charge transaction fees and monitoring fees to their portfolio companies (Phalippou, 2009).¹

This fee structure creates an option-like payoff, with little downside to the managers of the fund. Since the GP's ability to raise future funds also depends on the current performance, the incentives to generate high returns is even stronger than it may first appear (Chung *et al.*, 2012). Extant evidence suggests that corporate managers with large stock option holdings tend to take more risk (Coles *et al.*, 2006; Knopf *et al.*, 2002; Shue and Townsend, 2013). If the GP compensation structure encourages excessive risk taking, it could potentially have an adverse effect on fund value.²

To counteract incentives to gamble with the fund's money, managers are typically required to coinvest their own money in the portfolio companies alongside the private equity fund. This "skin in the game" forces the GP to participate in any losses incurred by the fund.³ A typical GP in the US is required to invest 1% of the fund's capital, corresponding to a \$3.6 million investment (Robinson and Sensoy, 2015).⁴ While a large coinvestment mitigates incentives for excessive risk taking, it may also make a risk-averse manager too conservative, foregoing valuable investment opportunities with high risk.

In this paper, we are the first to examine how the coinvestment affects the investment decisions of private equity fund managers.

We start by developing a simple theoretical model, in which the selection of a target firm and the decision on deal financing are made simultaneously. Fund managers can chose between

¹Phalippou (2009) estimates the average annual fees to 7% of the private equity fund's capital.

²See, for example, Thanassoulis (2012), where large bonus payments triggered by competition for banker talent increase the default risk.

³Edmans and Liu (2011) argue that inside debt provides an efficient solution to agency problems, since its payoff depends not only on the incidence of bankruptcy but also on firm value in bankruptcy.

⁴In the US, GPs must invest at least one percent of the fund's capital in order for the carry to be taxed as capital gains (Gompers and Lerner, 2001).

firms with different risk and have to decide how much debt to use in the acquisition, the rest of the consideration being equity contributed from the fund. Firms with relatively high risk have higher expected cash flows, but also have a higher probability of default. For tractability, we assume that firm value is independent of the capital structure, ignoring potential benefits from debt tax shields and reduced agency costs (Jensen, 1986; Modigliani and Miller, 1958).

The fund manager is required to coinvest a fraction β of the equity in the firm and receives a performance based carried interest α on the cash flows above a certain threshold. Since firm value is independent of the capital structure, β has no direct effect on the leverage decision. However, because the GP is risk averse and derives negative utility from downside risk, β has direct implications for the choice of project risk. The fund manager selects investments by trading off the project's expected cash flows against the negative utility associated with higher risk. *Ceteris paribus*, managers with a higher coinvestment will invest in less risky firms.

The incentive effect of α is more straightforward. Since leverage increases the payoff to equity in the good states, managers will choose more debt the higher is α . The optimal leverage depends, among other things, on the firm's debt capacity. High-risk firms have greater default risk and therefore higher expected bankruptcy costs. Because managers with a relatively high coinvestment share prefer to invest in projects with less risk, the debt capacity and the marginal value of additional debt will be increasing in β . As a result, for a given α , funds with a higher coinvestment share will finance their portfolio companies with more debt.

We then take the model predictions to the data, using a unique sample of 62 portfolio company investments made by 20 Nordic leveraged buyout funds between 2000 and 2010. We limit the analysis to firms in Norway, where the manager's taxable wealth is public information, as are the financial statements of firms after going private.⁵ The wealth data allows us to estimate the incentives provided by the coinvestment, not only in percent and dollar amount, but as a fraction of the manager's total wealth. This is an important empirical contribution of this paper. As shown below, and consistent with a declining risk aversion in wealth, the effect of the coinvestment becomes evident only after controlling for the fund manager's wealth.⁶

⁵Norway's tax system makes it attractive to have holding companies to be located in Norway, in contrast to Sweden or Denmark

⁶Robinson and Sensoy (2015) fail to find any relationship between the fund-level net-of-fee performance and the GP coinvestment, perhaps because they lack data on GP wealth. Becker (2006) shows that corporate boards in Sweden tend to provide higher variable incentives to wealthy CEOs.

The required coinvestment proportion varies substantially across the 20 funds, ranging from zero to 15% of the fund's equity investment, and with an average of 3.7% (median 1.5%). When measured as a fraction of the wealth at the time of the investment, the average GP personally invests 93% (median 48%) of his total wealth in the fund.

Our empirical tests confirm the model predictions. Funds with a higher coinvestment requirement tend to acquire target firms with lower asset beta and use more leverage. That is, firms with stable cash flow that can safely operate with higher leverage without jeopardizing their ability to service the debt. Axelson *et al.* (2013) show that buyout leverage is determined primarily by economy-wide credit conditions. We add to their evidence by showing that the fund manager's personal coinvestment also helps explain portfolio company leverage in the cross-section.⁷

We further each look at relationship between a target firm's equity beta and the GP's coinvestment. The higher the equity beta, the higher overall risk as it corrects firm risk for leverage. We find a negative correlation between the equity beta and the coinvestment, again suggesting that the overall effect of project risk dominates the leverage effect, showing that the manager's risk appetite is lower the more he has to invest of his own funds.

Finally we investigate whether we can find effects at the portfolio level as well. We look at the relative size of deals and find that the higher the relative co-investment fraction, the smaller the relative size each individual deal. This finding suggests that the incentive effect of a higher co-investment is not limited to the deals itself but has a broader effect on the GP's decision making process.

This finding may also shed light on one curious aspect of our analysis. We do not find that GPs with a high coinvestment select firms with lower absolute risk. Rather these GPs seem to select firms with lower systematic risk. However, given that we find an diversification effect at the portfolio level, GPs still opt for more diversification, but the pattern is somewhat different from what we may suspect initially.

Overall, our evidence suggests that limited partners effectively reduce fund managers' incentives to take risk by requiring them to co-invest in the portfolio companies. Whether this

⁷See also Colla and Wagner (2012), who find that buyout leverage increases with firm profitability and decreases with cash flow volatility.

reduction in GP risk appetite is optimal or not goes beyond the scope of this paper. Limited partners ultimately care for the risk-adjusted net-of-fee returns, something which we do not examine here.⁸

In our framework, we treat the co-investment fraction as exogenous. Obviously, fund managers may design a compensation structure at the outset—when raising the fund—that fits their own risk preferences. In such case, the co-investment fraction and the investment risk may simply both be a result of the fund manager’s risk preferences. Thus, an alternative interpretation of our evidence is that limited partners could infer the GP’s risk preferences from the co investment fraction and pick funds with risk profiles that fit their investment strategy.

The paper proceeds as follows. Section 2 sets up and discusses our theoretical model and its predictions. Section 3 describes the data, while Section 4 presents the empirical results. Section 5 concludes.

2 Model

2.1 Model set-up

To analyze the incentive effects of the private equity manager’s co investment, we propose a model that combines a project choice with a capital-structure decision. Specifically, we consider a buyout fund’s selection of target company and the amount of debt with which the acquisition is financed.

The private equity fund can choose among a set of firms that vary in their degree of risk. Investing in a firm leads to three potential outcomes: high, medium and low. The cash flows x in each outcome are, respectively, $R + \Delta$, R and $R - \rho$. The high and low outcomes arise with probability $0.5q$, while the probability of the medium outcome is $(1 - q)$. A higher q increases the likelihood of the high and the low outcome. Hence, q can be interpreted as a measure of firm risk. We assume that $\Delta > \rho$, a zero discount rate, and risk neutral investors, so the expected value of the firm $V(q) = R + 0.5q(\Delta - \rho)$ is increasing in the risk measure q .

Concurrent with the selection of a target firm, the fund manager has to decide on how to

⁸For evidence on private equity fund returns, see, e.g., Kaplan and Schoar (2005), Phalippou and Gottschalg (2009), Groh and Gottschalg (2011), Driessen *et al.* (2012), Harris *et al.* (2014), Higson and Stucke (2012) and Phalippou (2012).

finance the investment I . This is tantamount to choosing a capital structure for the newly acquired firm. Specifically, the GP has to choose the amount of debt D , with the remainder of the purchase price $(I - D)$ being equity from the buyout fund.

Creditors receive the principal plus interest $D(1 + r)$ as long as the firm's cash flows exceed this amount. We let $R > D(1 + r) > R - \rho$, so the firm defaults on its debt in the low state. In default, creditors receive $R - \rho$ and the equity is worth zero. For tractability, we ignore potential benefits from the tax shield of debt and reduced agency costs, so firm value V is independent of leverage.

2.2 The incentive scheme of the fund manager

In our model, the GP is compensated with the components typically observed for private equity funds. First, he receives a fixed management fee M from the limited partners. Since we ignore future fund raising efforts, this fixed fee has no impact on his investment decisions, as shown below.

Second, the GP receives a performance based payment equal to a fraction $\alpha \in (0, 1)$ of the cash flows to equity exceeding a normal return e . We assume that e is a non-risk adjusted return, with $e > r$. Letting e be exogenous maps industry practice, where the hurdle rate typically is set when the fund is raised, well before the fund manager starts selecting portfolio companies.

The carried interest thus pays the fund manager $\alpha(x - C) > 0$, where $x - C$ is the cash flow in excess of C , the payments to creditors and the hurdle return paid to limited partners:

$$C(D) = D(1 + r) + (I - D)(1 + e) = I(1 + e) - D(e - r). \quad (1)$$

For $C \leq x$, the carried interest is zero.

To make debt financing attractive, we assume that $\Delta + \rho - R > D(1 + e)$. That is, the sum of the cash flow upside and downside $\Delta + \rho$ exceeding the mean return is larger than the hurdle rate reduction due to debt financing. For simplicity, we also set the cash flow in the medium outcome equal to the hurdle equity return, $R = I(1 + e)$.⁹ These assumptions ensure

⁹This assumption could be relaxed without changing the implications of the model.

that the all-equity financed firm has a positive net present value (NPV).¹⁰ They further imply that, in the medium state and with debt financing, $x - C = D(e - r) > 0$ and the GP receives a carry.

Third, in addition to the management fee and the carry, the GP is required to co-invest his own money alongside the fund. This co-investment relaxes the limited-liability constraint of the fund manager and forces him participate in the downside risk. Specifically, the GP contributes the fraction $\beta \in (0, 1)$ of the fund's equity investment and receives a fraction β of the realized equity value, where the value of the leveraged firm is:

$$V^D(q, D) = 0.5q[R + \Delta - D(1 + r)] + (1 - q)[R - D(1 + r)] \quad (2)$$

We allow creditors to observe firm risk q , depicting the notion that the demand for credit occurs after the target has been selected. The creditor charges an interest rate r that allows him to at least break even:

$$0.5qD(1 + r) + (1 - q)D(1 + r) + 0.5q(R - \rho) \geq D \quad (3)$$

With a competitive market for loans, the creditor's participation constraint in Eq. (3) is strictly binding. In our model, project risk and capital structure are decided simultaneously. Since creditors can observe the GP's selection of target firm, we assume that q is contractible and let creditors account for q in setting the loan contract terms. Using the binding participation constraint 3 of the creditor allows us to rewrite 1 to

$$C(D) = I(1 + e) - De + \frac{0.5qD}{1 - 0.5q} - \frac{0.5q(R - \rho)}{1 - 0.5q}. \quad (4)$$

While debt funding increases the equity returns in the high and medium states, it does not come without a cost to the GP. In case of default, the manager incurs a reputational loss. We let the personal bankruptcy costs B be increasing in the creditor losses and convex in the face value of debt. Furthermore, we rely on the notion that the failure of a risky firm causes less reputational losses than that of a more mature and stable firm. Hence, we let

¹⁰The NPV of the all-equity firm is $V(q) - I$. With $R = I(1 + e)$, $V - I = Ie + 0.5q(\Delta - \rho) > 0$ since $\Delta > \rho$.

$B(q, D) = \lambda D^2/q$, where $\lambda \in (0, 1)$ is an exogenous liquidation cost.

We further assume that the private equity manager shows some degree of risk aversion and derives negative utility from downside risk. We depict this negative utility $k(q) = 0.5cq^2$, where $c \in (0, 1)$ captures the fund manager's sensitivity to risk or his degree of risk aversion. In our setting, k is more pronounced the higher the risk of the venture. Since the GP realizes downside risk only from his co-investment, this cost is assumed to be proportional to β (see Bolton *et al.* (2011) for a related approach). Moreover, in our empirical analysis below—and in line with much of the extant literature—we assume c to be decreasing in wealth w (i.e. $c(w)$ with $\partial c/\partial w < 0$), implying that wealthier fund managers are less risk averse.¹¹

2.3 The analysis

Having outlined the incentive structure of the GP, we now derive the implications for his choice of project risk and leverage. The objective function of the fund manager is:¹²

$$\begin{aligned} V^{GP}(q, D) = & \beta(V^D(q, D) - (I - D)) + \alpha(V^D(q, D) - C(D)|x > C) \\ & - 0.5qB(q, D) - \beta k(q) + M. \end{aligned} \quad (5)$$

Inserting the binding creditor constraint from Eq. (3) into the function for the value of the leveraged firm and substituting for the functions of C , B and k , the GP's objective function can be rewritten as:

$$\begin{aligned} V^{GP}(q, D) = & \beta(0.5q(R + \Delta) + (1 - q)R + 0.5q(R - \rho) - 0.5cq^2 - I) \\ & + \alpha[0.5q(R + \Delta - C + (1 - q)(R - C))] - 0.5\lambda D^2 + M \end{aligned} \quad (6)$$

Furthermore, when choosing the level of project risk and debt financing, the GP faces two opposing effects that he has to trade off against each other. Higher q is associated with, on the one hand, larger expected cash flows and, on the other hand, greater negative utility k related to risk aversion. Similarly, higher leverage D is accompanied by higher expected carry as

¹¹See, for example, Rabin (2000).

¹²For tractability, we ignore the portion of the carry that the GP has to pay from his ownership stake β in the target firm. With $\alpha = 0.20$ and $\beta = 0.01$, this portion will be small in comparison with the other components of the GP's payoff and could safely be ignored without altering the results.

cheaper debt replaces more expensive equity, but also by greater expected costs of bankruptcy B .

Since, from Eq. (1), $\partial C/\partial D = -(e - r)$, the first-order condition of the GP's choice of debt is:

$$\frac{dV^{GP}}{dD} = -\lambda D + \alpha((1 - 0.5q)e - 0.5q) = 0 \quad (7)$$

and the first-order condition for his choice of risk is:

$$\frac{dV^{GP}}{dq} = \beta(0.5(\Delta - \rho) - cq) + 0.5\alpha(\Delta + \rho - D(1 + e) - R) = 0. \quad (8)$$

Solving these two equations yields:

$$D(q, \alpha) = \frac{\alpha(1 - 0.5q)e - 0.5}{\lambda} \quad (9)$$

and

$$q(D, \beta, \alpha) = \frac{(\Delta - \rho)}{2c} + \frac{\alpha(\Delta + \rho - D(1 + e) - R)}{2c\beta}. \quad (10)$$

Note that leverage and project risk are complements to each other. That is, D is a function of q in Eq. (9) and q is a function of D in Eq. (10). Notice also that the two dimensions of risk, D and q , operate in opposite direction. Higher project risk leads the private equity manager to choose lower leverage and vice versa.¹³ Our two choice variables are in this sense risk-substitutes. This tradeoff between project risk and leverage which can be already be seen in the first-order conditions is a key mechanism in our model.

An important consequence of this complementarity is that exogenous parameters may affect the choice of risk and leverage directly, via the respective first-order condition, as well as indirectly, through the other choice variable. For example, the carry α affects both D and q directly, and therefore also indirectly. In contrast, the coinvestment share β has a direct effect solely on q and hence only an indirect effect on the leverage choice.

We derive the comparative static effects of the coinvestment share by totally differentiating

¹³This follows from $\frac{dD}{dq} = -\frac{\alpha e - 1}{2\lambda} < 0$ and $\frac{dq}{dD} = -\frac{\alpha(1+e)}{2c\beta} < 0$.

the first-order conditions. From Eqs. (7) and (8), we get:

$$\frac{dD}{d\beta} = \frac{(cq - 0.5(\Delta - \rho))(0.5(1 + e))}{\Gamma} > 0 \quad (11)$$

and

$$\frac{dq}{d\beta} = \frac{-\lambda(cq - 0.5(\Delta - \rho))}{\Gamma} < 0, \quad (12)$$

where $\Gamma > 0$ is the determinant of the Hessian matrix of the two endogenous variables.¹⁴

Recall from above that we let $\Delta + \rho - R > D(1 + e)$, so that debt financing increases the cash flow to equity in the good states. For the first-order condition with respect to q in Eq. (8) to be satisfied, it follows that $cq > 0.5(\Delta - \rho)$. Thus, at the optimum, the cost of a marginal increase in project risk is higher than the marginal benefit from the point of view of the risk-averse GP. Consequently, an increase in β has a negative effect on q and a positive effect on leverage. The economic intuition hence, is that coinvestment makes the GP to own a higher fraction of the portfolio firm. Given the risk-aversion of the GP, this higher degree of ownership in the firm induces the GP to choose a lower risk firm, i.e. to reduce q . Since, our two choice variables are substitutes, the GP, in turn, decides to lever up the firm more.

In a second step, we analyze the wealth effects on our two risk dimensions. By taking the negative relation between c and w into account we find by totally differentiating Eqs. (7) and (8):

$$\frac{dD}{dw} = \frac{(0.5\beta q(1 + e)(\partial c/\partial w))}{\Gamma} < 0 \quad (13)$$

and

$$\frac{dq}{dw} = \frac{-\beta q \lambda (\partial c/\partial w)}{\Gamma} > 0, \quad (14)$$

Hence, an increase in wealth has just the opposite effect on the two risk measure. Wealthier GPs are less risk reverse and hence invest in riskier project which they, however, lever up less.

To sum up, there are three main results of our model that will guide our empirical testing strategies below. First, the GP's incentives to invest in risky projects are declining in his

¹⁴ Γ is the determinant of the D-q matrix of the second derivatives stemming from Eqs. (11) and (12). Since Γ is the product of two second-order conditions that are negative, it must be positive. In our case, the non-zero cross derivatives imply that the direct effects dominate the indirect effects, which is a relatively standard assumption.

required coinvestment share. That is, a higher β induces the GP to be more conservative in his project choice. Second, having chosen a less risky project, a higher coinvestment share induces the GP to use more debt financing. Third, wealth reduces the negative utility associated with risk, these effects are more pronounced the less wealthy the GP. A measure which relates the coinvestment level to the wealth of the GP takes up both effects. We now turn to an empirical examination of these implications.

3 Sample selection and description

3.1 Sample selection

We start by manually assembling a list of all leveraged buyout transactions in Norway between 1991 and 2010. This list, provided by the Private Equity Centre at NHH, is created by combining information from three sources: (i) a list of portfolio company investments provided by the Norwegian Venture Capital Association, (ii) the public websites of Nordic buyout funds, and (iii) the Argentum private equity market database.¹⁵ We are able to identify a total of 142 buyout transactions targeting 134 unique Norwegian firms.

In Norway, all firms—public and private—are required to file their financial statements with the Norwegian corporate registry (“Brønnøysundregistrene”). By manually matching the target firm names to the corporate registry, we are able to identify the record in the year of the buyout transaction for 117 firms. We retrieve the annual financial statements and ownership information during the period 1997 to 2012 for these firms.

The fee structure of the private equity fund is generally confidential information, found in the fund’s Investment Memorandum. We are able to get privileged fee information from a large limited partner for 68 of the transactions. We are able to match 62 of these 68 firms with public firms and obtain an asset beta for each of these 62 firms. The appendix contains a comparison of the characteristics of the 62 firms we ultimately include in the sample with the 51 firms with missing fee data.¹⁶

As shown in the appendix, the average firm included in the sample has slightly larger total

¹⁵The Argentum market database can be accessed at <http://www.argentum.no/en/Market-Database/>.

¹⁶As explained further down below, we have to exclude eight firms for which we have the GP’s co-investment.

assets and is acquired by a fund of higher sequence number managed by a somewhat older private equity firm. However, other characteristics such as fund size, firm profitability, asset tangibility, industry, and market conditions, are not significantly different across the two groups so we are not concerned that our sample differs substantially from the firms we were unable to include. The information necessary for a transaction to be included in our sample is that we know the GP's co-investment fraction, fund age, and fund size. We have this information for twenty funds. We also receive information about the management fee, the percent carry, the hurdle rate and any clawbacks for fourteen funds.¹⁷ The difference can be attributed to the fact that the LP in question declined to invest into some of the funds in our sample but retained the fund-raising prospectuses.

Norwegian corporate law prevents an acquiring firm from servicing the acquisition debt with the target firm's cash flows.¹⁸ For this reason, buyout transactions are typically structured in two steps. First, the buyout fund levers up an empty holding company used as an acquisition vehicle. Second, as a generally accepted practice, the holding company merges with the portfolio company about 12 months after the acquisition.¹⁹ To account for this practice, we consider the transaction leverage to be the total debt across the portfolio company and its holding company. We therefore track the ownership for each firm to the point where the ultimate parent is the buyout fund itself. In our sample, 32% of the firms are owned directly by the private equity fund, 31% of the firms have one holding company above them, while the remaining 27% have two or more levels of holding companies. We retrieve the balance sheets for all holding companies registered in Norway to compute the total debt used in the transaction.

Finally, to retrieve data on the wealth of the general partners, we first identify all relevant partners and associates from the buyout funds' websites. We drop professionals that join the firm after the fund's investment phase and do Google searches for professionals that have left. For private equity firms with part of its deal team located outside Norway, we limit our analysis

¹⁷Nordic funds often pay carry on a deal-by-deal basis as the fund exits its investments. If a fund that paid carry to its GP subsequently underperforms, the clawback requires the GP to return the excess carry paid out. Also, in contrast to the US, Nordic funds do not charge transaction and management fees from their portfolio companies.

¹⁸"Aksjeloven §8-10. Kreditt til erverv av aksjer mv".

¹⁹We are grateful to Tore Rynning-Nielsen at Herkules Capital for helping us understand the intricacies of Norwegian buyouts.

to the professionals living in Norway, for a total of 120 (out of 243 world-wide) individuals.²⁰

We then obtain the historical tax records for all the professionals from the Norwegian tax authorities. The tax records disclose their taxable wealth. This information is used below to compute the required co-investment as a fraction of the GPs' total wealth. There are two caveats with this data. First, while most assets are marked-to-market, real estate is an exception and generally has a tax assessment below 30% of its market value. This prevents us from identifying the exact level effect of wealth on risk taking, but rather examine differences in the cross-section. Second, since we are unable to identify the exact deal team, we assume that all professionals or partners in a private equity firm have equal responsibility for the fund's investments.²¹ This assumption introduces noise in the wealth estimate that should work against us. Also, we winsorize the relative GP at 5x wealth.

3.2 Sample description

The 62 portfolio companies in the sample are acquired by 20 different buyout funds raised between 2000 and 2010 by 11 unique Nordic private equity firms. Table 1 presents summary statistics for the 20 buyout funds. The fee structure is quite standard with an average carry of 18% (median 20%), management fee of 2% (median 2.0%) and equity hurdle rate of 8% (median 8.0%). Data on these fees are missing for almost one-third of the funds. However, because there is virtually no cross-sectional variation, we ignore these fees in our empirical analysis below.

The variable of particular interest to our study, the required co-investment β , averages 3.1% with a median of 1.5% of the consideration, ranging from zero to 15% across the different funds. We assume that the proportion of the fund invested in Norway equals the fraction of the private equity firm's professionals that reside in Norway. With this assumption, the average co-investment in Norway is \$17.8 million (median \$5.45 million) per fund. The average fund in the sample is managed by a private equity firm with 8 partners or 17 professionals. The mean wealth of these partners is \$3.2 million (median \$1.3 million) in the year of the investment.

²⁰Private discussions with a limited partner suggest that the professionals residing in Norway are responsible for the local deals.

²¹Since the professionals' wealth largely depends on the success of earlier funds raised by the private equity firm, there is likely a relatively large correlation in the wealth of professionals within the same firm.

The corresponding number for all professionals is \$1.9 million (median \$1.5 million).

Compared to Robinson and Sensoy (2015) there is more dispersion in Norwegian GPs' co-investment. Robinson and Sensoy (2015) find that on average buyout funds own 2.38% of their fund. This is somewhat lower than the 3.1% we report.

We then compute several measures for the co-investment relative to wealth. The first measure, *GP % Investment Current Fund*, is the ratio of the dollar total co-investment for the fund and the combined wealth of the fund's professionals averaged over three years prior to the investment.²² We use the co-investment in the fund and not the individual target firm because the fund manager's risk aversion will be determined by his total co-investment amount. For the average firm, the professional has to invest 113% of his wealth (median 43%). We repeat this exercise using only partners who are responsible for the co-investment ("*Partners Only*") with the mean at 117% and the median at 43%. The variable *GP % Investment Current Fund Partner Only* is our main measure for the co-investment fraction of the GP's wealth, used in most of the empirical analysis below.

The table also provides general information about the funds. Our sample includes on average 3.1 firms per fund. The funds in the sample are relatively large, with an average (median) size of \$942 (\$325) million. The typical fund is a follow-up fund and on average the fourth fund raised by the private equity firm.

Table 2 shows characteristics of the 62 sample firms. All variables are defined in Tables 13 and 14. The portfolio company investments are from the period 2000 to 2010. At year-end of the transaction, leverage was on average 62% (median 64%). Total assets size is \$120 million. The sample firms have relatively low profitability, with a return on assets of 3%. A substantial fraction of the firms (42%) are in the technology industry.

Table 15 provides a comparison between the firms in our sample and those buyout deals for which we lack information about the GP's investment. The deals in our sample are somewhat more recent and the firms in our sample are somewhat larger (regressing time on size shows a trend towards larger deals in recent years). Beyond that only GP age is significantly different and most likely is also caused by the small difference in the sampling period

As a measure of project risk, we estimate asset beta for the portfolio companies. To

²²We use the three-year average to smooth large variations in the taxable wealth.

estimate this asset beta, we run a propensity score estimator that looks at all listed firms on the Oslo Stock Exchange in a particular year and finds the best fit to our buyout target. There are about 250 listed firms on the Oslo Stock Exchange in any given year.²³ We run yearly a regression where we match on the firms' profitability, return on assets, (log) size, fixed asset ratio and industry (at the one-digit level). We allow each control firm to be used across multiple deals. Including sales growth does not change our results.

We use nearest neighbour matching with replacement and assign five matches to each firm. For each matching firm, we estimate equity beta using monthly returns over an 24 month rolling window against the Oslo Main Index. We then delever these equity betas and compute the average asset beta by averaging over the individual asset betas of the five matching firms. Two treatments are not on common support but our results below do not change if we include these deals and hence we keep them in the sample. The average asset beta of our portfolio firms is 0.47 (median 0.46). This is consistent with the relatively low asset beta of 0.33 of buyout portfolio companies in the US found by Driessen *et al.* (2012).

4 Empirical Analysis

We next set out to test our model. The two main implications to be tested are that leverage and project risk are increasing in the co-investment fraction. We will then test whether what the combined effect of project risk and leverage risk predicts. Finally, we check the effect of the GP's co-investment on the deal size in order to see if GP's with a higher co-investment percentage reduce deal size.

Table 3 shows a univariate comparison of the co-investment-to-wealth measures across groups of firms double-sorted on asset beta and leverage. Our theory predicts that the co-investment fraction for the low beta/high leverage group should be higher than that of the high beta/low leverage group. The table supports this prediction. In the top panel, for example, using *Current Fund GP Percentage Partners Only*, $\beta=0.44$ for high beta/low leverage group vs. $\beta=1.407$ for the low beta/high leverage group, the difference being significant at the five percent level. The same pattern appears for the partners' co-investment-to-wealth measures

²³Our return data are from NHHs Brsproject.

in the table.

We next move on to a cross-sectional examination of the model predictions.

4.1 Project risk

Our model predicts that GP's with a higher co-investment fraction choose to invest in projects with less risk. We test this notion by regression the GP co-investment on the portfolio company asset beta. The regression model contains the same independent variables as the leverage regressions above.

In table 5, we regress the firm's asset beta on the different definitions of the GP's relative co-investment fraction. We use *Relative GP Investment Current Fund Partners Only* as a measure for the co-investment-to-wealth ratio. Standard errors are clustered by private equity fund. We also use robust standard errors but do not find any changes. The regression model contains additional variables that may affect the firm's risk. These variables include three broad categories of control variables: macro, firm and GP specific characteristics. The firm-specific characteristics are firm size (log of total assets,), sales relative to firms size, firm profitability measured by the firm's return on assets and fixed asset ratio. We also add a control for the firm's industry by including a dummy variable indicating NACE category 7. To control for the macro environment, we either include a dummy variable for the deal year or we directly control for Nibor and Credit Spread. We further control for the fund size, the fund's sequence number (in our sample) and the private equity firm's founding year.

The variable *Relative GP Investment Partners* is negative and highly significant in all specifications. Consistent with our model, a higher co-investment fraction is associated with lower project risk, here measured as the firm's asset beta. In contrast, the absolute co-investment percent is unable to explain the cross-sectional variation in asset beta. Again, it is essential to control for wealth in order for the GP's co-investment to explain his choice of project risk. That is, without controlling for the level of wealth, there is little information in the GP percentage itself regarding the fund manager's risk appetite.

To gauge the economic impact of this results we note that the average asset beta is 0.47, while the coefficient estimate is 0.047. A one standard deviation increase (1.33) in the relative co-investment fraction reduces asset beta from 0.47 to 0.34.

Overall, the regression suggests that the GP's co-investment relative to his wealth is a significant determinant for the choice of asset beta, while the absolute co-investment lacks any explanatory power.

4.2 Leverage

Our model predicts a positive relationship between leverage and the GP's co-investment percentage. Table 6 next regresses the full model on leverage, using the different measures for the GP's co-investment-to-wealth ratio. Standard error are clustered by private equity fund. Column (1) includes all the independent variables listed above. As shown in the table, all the various specifications (columns (1)- (4)) of the co-investment relative to wealth produce positive and significant coefficients.

That is, the higher the GP co-investment, the higher the portfolio company's leverage, as implied by our model. The debt ratio further tends to be higher for older private equity firms. Consistent with much of the extant literature, firm leverage is decreasing in the proportion of tangible assets and profitability, and increasing in firm size.

To gauge the economic impact of this results we note that the average leverage ratio is 0.62. A one standard deviation increase (1.33) in the relative co-investment fraction would increase the leverage ratio from 0.62 to about 0.75.

In columns (5) to (8), we replace the relative GP co-investment with the absolute co-investment and the percentage co-investment, i.e. the fraction of the fund's investment that the general partner have to contribute. As shown in the table, both measures are consistently insignificant. That is, without controlling for the level of wealth, there is little information in the GP percentage itself regarding the fund manager's risk appetite.

Overall, table 6 is consistent with the notion that that the GP co-investment relative to his wealth is a significant determinant for the choice of leverage, while the absolute co-investment lacks explanatory power.

4.3 Total risk

Our analysis has so far shown that on the one hand, GPs with a higher relative co-investment select less risky firms. But on the other hand, these firms tend to be higher levered. What

about the overall effect? We use each deal's equity beta to measure total risk for the deal.

Table 7 shows coefficient estimates for a regression of equity beta on the GP's relative co-investment. Standard error are clustered by private equity fund. Column (1) includes all the independent variables listed above. As shown in the table, all the various specifications of the co-investment relative to wealth produce positive and significant negative coefficients. It appears that overall risk is lower the higher the GPs relative co-investment in his fund. In columns (7) and (8), neither the absolute co-investment percent, nor the dollar amount has any significant impact on the leverage choice, consistent with the results on asset beta and leverage.

To gauge the economic impact of this results we note that the average leverage ratio is 0.69, while coefficient estimate is -0.15. A one standard deviation increase (1.33) in the relative co-investment fraction would decrease the equity beta from 0.69 to about 0.49.

4.4 Project Size

Does a higher co-investment also lead to more diversification of the GP's wealth? GP's have various ways in order to achieve this aim. A simple way would be to reduce non-systematic risk by investing into projects with lower absolute volatility. As discussed in the introduction we do not find such an effect (as measured by the comparables' daily standard deviations).²⁴ There is however a second way to diversify the portfolio. Instead of selecting more projects with lower absolute volatility, GPs might simply invest into more but smaller deals. Why might GP's prefer this type of diversification? GP's generally are not passive investors like a mutual fund manager but are expected to actively influence the firms they are invested into. If there is a link between GP ability and a certain type of industry or firm type then GP's might be reluctant to invest into projects where they would have a reduced ability to influence the firm.

If our conjecture is correct, we would expect to see that higher personal risk leads to more diversification in the form of more but smaller investments. In table 8 we investigate this relationship. We regress the relative co-investment percentage on each firm's total assets divided by fund size. We call this variable "Ticket Size". We find that there is a negative

²⁴To conserve space we omit the relevant tables.

correlation between co-investment amount and ticket size, consistent with our conjecture.

This finding suggests that GPs prefer to correct for lower personal diversification caused by a higher relative-co-investment percentage by investing into more deals rather than by lowering total risk. This result may also suggest that a pure portfolio-theoretic approach to portfolio risk may neglect the fact that GPs tend to be specialized in their skills and hence there may be limits to their desire to diversify away certain types of risk.

4.5 Wealth effects

In this subsection we explore whether additional aspects of the GP's wealth affect the the GP's decisions to take on risk. We begin this analysis by exploring whether it is the GP's absolute level of wealth that is driving our results. Tables 9, 10, 11 and all 12 show that the coefficient for *Partner Average Wealth* is insignificant in almost every specification and it is not the absolute level of wealth that influences risk taking.

Next we consider if changes in the GP's wealth affect his desire to take on risk. We compute the change in wealth from the year prior to the year of the deal and include it in the regression. We interpret this as evidence how changes to the GP's wealth portfolio influence his risk choice. Given that on average a large fraction of the GP's wealth is invested in his funds this variable should also be a reasonable proxy for previous fund returns (especially distributions). *Partner Year on Year Wealth Change* in table 9. 10, 11, and 12 is not significant apart from the model two and three in table 9. We interpret this as evidence that there is no influence of wealth changes in the GP's portfolio on systematic risk taking. Moreover the estimated coefficient is positive, not negative. This result is interesting as it also indicates that past losses do not seem to lead to an increase in current risk taking. This result essentially rules out a risk shifting channel that would run from wealth losses to increased portfolio risk.

Finally we include our standard relative GP percentage measures to see if they survive the inclusion of these additional controls and we find that (apart from asset beta) they do not seem to be affected by these additional variables.

A final note is due on the number of observations. As we include wealth changes we lose one observation where we do not have information about the GP's wealth in the year prior to the deal.

5 Conclusion

In this paper, we examine how the requirement for a co-investment by a private equity fund manager affect his incentives to make risky investments for the fund. We first develop a model, which predicts that a higher co-investment reduces the appetite for project risk while at the same time increasing the appetite for leverage. We then take the model predictions to the data, using a unique sample of Norwegian private equity transactions. The Norwegian institutional setting allows us to control for the fund managers' wealth, which may have important implications for risk aversion.

The predictions of our model are borne out in the data. Cross-sectional regressions show that a higher co-investment fraction is associated with less risky portfolio companies (lower assets beta) and a higher degree of debt financing. Importantly, the co-investment fraction is a significant determinant of investment risk only when adjusted for the fund manger's wealth. This emphasizes the importance of wealth data in research examining the effect of variable compensation on the incentives to take risk.

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Table 1: **Summary Statistics**

The table shows summary statistics for the sample of 20 buyout funds that have partners bases in Norway. The GP characteristics are measured in the year of fund's inception - with the exception of number of portfolio firms. The firm characteristics are from the fiscal year following the buyout. All variables are defined in Appendix Table 2. *Relative coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction.

Variable	Obs	Mean	Median	Std. Dev.	Min	Max
Panel A: Fund Characteristics						
Total Number of employees	20	16.6	10	17.95	4	83
Total Number of Partners	20	8.45	7	4.25	3	21
Total Average Wealth All Employees (in \$m)	20	3.22	1.53	4.27	0.03	17.33
Total Average Wealth Partners (in \$m)	20	1.92	1.31	2.05	0.02	6.82
Number of Portfolio Firms in Sample	20	3.1	3	1.619	1	7
Panel B: Dependent Variables						
Rel. coinv. all	20	1.138	0.425	1.730	0	5
Rel. coinv. partners	20	1.177	0.426	1.740	0	5
Absolute GP Investment (in \$m)	20	17.83	5.45	26.17	0.00	88.33
Absolute GP Percentage	20	0.031	0.015	0.043	0	0.15
Panel C: Fund Characteristics						
GP Age	20	9.65	8.5	6.53	1	20
Fund Size (in \$m)	20	942	325	1700	53	5883
log(Fund Size)	20	21.491	21.389	1.314	19.57	24.29
Fund Sequence Number	20	3.65	3	2.35	1	8
Fund Inception Year	20	2004	2004	4.30	1989	2008
Carry	11	0.18	0.2	0.05	0.02	0.2
Management Fee	14	0.02	0.2	0.00	0.013	0.023
Hurdle Rate	12	0.08	0.08	0.00	0.07	0.08
Fund Duration	14	9.64	10	0.93	7	10

Table 2: **Summary statistics of firm characteristics and required coinvestment**

The table shows summary statistics for the sample of 62 Norwegian portfolio companies, acquired by Nordic buyout funds between 2000 and 2010. The GP characteristics are measured in the year of the buyout. The firm characteristics are from the fiscal year following the buyout. All variables are defined in Appendix Table 2. *Relative coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction.

	N	Mean	Median	Std.dev.	Min	Max
Panel A: Dependent Variables						
Asset Beta	62	0.473	0.459	0.298	-0.29	1.237
Leverage Ratio	62	0.618	0.641	0.276	0.02	1.325
Equity Beta	62	0.691	0.586	0.538	-0.47	2.747
Ticket Size	62	0.410	0.586	0.487	0.01	2.431
Panel B: Fund characteristics						
Rel. coinv. all	62	0.893	0.427	1.32	0	5
Rel. coinv. partners	62	0.932	0.476	1.33	0	5
Absolute GP Investment Amount (in \$m)	62	13.02	5.90	20.67	0	88.33
Absolute GP Investment Percentage	62	0.037	0.015	0.049	0	0.15
GP Age	62	9.903	8	5.955	1	21
Panel C: Firm characteristics						
Fund Size (in \$m)	62	652	315	1232	53	5883
log(Fund Size)	62	21.3	21.4	1.152	19.6	24.3
Fund Sequence Number	62	3.6	3	2.129	1	8
Total Assets (in \$m)	62	119.7	67	223	2.10	1717
log(TA)	62	12.86	12.91	1.157	9.44	16.15
Fixed Asset Ratio	62	0.08	0.004	0.149	0	0.554
RoA	62	0.03	0.072	0.243	-1.66	0.315
Firm Volatility	62	0.03	0.031	0.016	0.011	0.078
Industry Control	62	0.42	0	0.497	0	1
Panel D: Macro characteristics						
Credit Spread	62	5.65	4.742	3.042	2.702	10.27
Nibor	62	4.23	3.58	1.507	2.21	7.19
Year	62	2007	2007	2.285	2000	2010

Table 3: **Univariate comparison of the required coinvestment**

The table shows the average coinvestment for firms in a double sort on asset beta (vertical) and leverage (horizontal). The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. Panel A shows the *Relative coinvestment*, defined as the total required coinvestment for the fund as a fraction of the professionals' (columns (1) to (3)) or partners' (columns (4) to (6)) total wealth averaged over the three years prior to the buyout transaction. All variables are defined in Appendix Table 2. At the bottom of each panel is a one-sided t-test that the difference in mean between firms with high asset beta/low leverage and firms with low asset beta/high leverage is positive. The p-value for the t-test is in parenthesis. The number of observations for each subsample is shown in square brackets.

	All professionals			Partners only		
	High leverage	Low leverage	Total	High leverage	Low leverage	Total
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Relative coinvestment						
High beta	0.991 [15]	0.444 [17]	0.701 [32]	1.069 [15]	0.480 [17]	0.756 [32]
Low beta	1.407 [16]	0.745 [14]	1.098 [30]	1.431 [16]	0.765 [14]	1.120 [30]
Total	1.206 [31]	0.580 [31]	0.893 [62]	1.256 [31]	0.609 [31]	0.932 [62]
Difference in mean			-0.963			-0.951
p-value			(0.045)			(0.048)

Table 4: Coinvestment and total risk

The table shows correlations for the independent variables in our sample. The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Rel. coinv. partners	1													
Rel. coinv. all	0.9976	1												
Absolute GP Investment Amount	0.3007	0.3183	1											
Absolute GP Investment Amount	0.0404	0.031	-0.0063	1										
GP Age	0.2878	0.2912	0.2428	0.0171	1									
log(Fund Size)	0.2067	0.2231	0.6681	-0.5522	0.1706	1								
actualsequ e	0.3563	0.3616	0.2632	0.0677	0.7833	0.2064	1							
log(TA)	0.3032	0.3113	0.3099	-0.2027	0.0249	0.4378	0.0758	1						
Fixed Asset Ratio	0.0644	0.0572	-0.047	0.0501	0.139	-0.0009	0.1	0.1975	1					
RoA	-0.0057	0.0001	0.0316	-0.3478	0.0919	0.2289	0.0875	0.3802	0.1051	1				
Firm Volatility	-0.1873	-0.1908	-0.1602	-0.0149	0.1377	-0.0483	0.0271	-0.3432	0.1646	-0.1804	1			
Industry Control	0.2017	0.2129	0.1569	-0.078	0.1191	0.0633	0.0719	-0.0162	-0.1165	0.0002	0.0414	1		
Credit Spread	-0.1873	-0.192	0.0438	-0.1353	0.1113	0.1213	0.0985	-0.1899	0.0294	0.025	0.6766	0.0449	1	
Nibor	-0.2147	-0.2231	-0.0724	0.1774	-0.1424	-0.1957	-0.1574	-0.1337	-0.2714	-0.1503	0.3633	-0.0271	0.5464	1

Table 5: **Coinvestment and project choice**

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of asset beta. The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	Dependent Variable: Asset Beta							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rel. coinv. partners	-0.0490*		-0.0463**					
	(0.0235)		(0.0212)					
Rel. coinv. all		-0.0539**		-0.0497**				
		(0.0225)		(0.0205)				
Absolute GP Investment Amount					-2.80e-10		-0	
					(3.32e-10)		(4.61e-10)	
Abolsute GP Investment in %						0.108		-0.0881
						(0.867)		(1.076)
<i>Fund characteristics:</i>								
GP Age	-0.0111	-0.0111	-0.0241**	-0.0238**	-0.0106	-0.0115	-0.0252***	-0.0252**
	(0.00995)	(0.00993)	(0.00911)	(0.00904)	(0.0102)	(0.00992)	(0.00877)	(0.00899)
log(Fund Size)	-0.0120	-0.0127	-0.0131	-0.0141	0.00607	-0.0143	-0.0225	-0.0259
	(0.0317)	(0.0319)	(0.0351)	(0.0352)	(0.0350)	(0.0429)	(0.0633)	(0.0388)
Fund Sequence Number	0.0533*	0.0540*	0.0794**	0.0794**	0.0452	0.0430	0.0720**	0.0724*
	(0.0271)	(0.0268)	(0.0337)	(0.0332)	(0.0291)	(0.0312)	(0.0335)	(0.0355)
<i>Firm characteristics:</i>								
log(TA)	-0.0398	-0.0382	-0.00887	-0.00759	-0.0566	-0.0552	-0.0199	-0.0194
	(0.0435)	(0.0432)	(0.0351)	(0.0351)	(0.0433)	(0.0449)	(0.0362)	(0.0340)
Fixed Asset Ratio	0.182	0.185	0.295	0.294	0.182	0.173	0.271	0.271
	(0.348)	(0.348)	(0.398)	(0.398)	(0.342)	(0.346)	(0.393)	(0.397)
RoA	-0.0810	-0.0855	-0.238	-0.240	-0.0628	-0.0350	-0.205	-0.208
	(0.0901)	(0.0881)	(0.195)	(0.195)	(0.106)	(0.0996)	(0.200)	(0.182)
<i>Macro Controls:</i>								
Credit Spread	0.00635	0.00618			0.00954	0.0106		
	(0.0126)	(0.0127)			(0.0118)	(0.0126)		
Nibor	-0.0242	-0.0246			-0.0168	-0.0254		
	(0.0325)	(0.0323)			(0.0388)	(0.0336)		
Constant	1.224**	1.221**	0.633	0.634	1.015	1.454*	0.993	1.065
	(0.492)	(0.498)	(0.534)	(0.531)	(0.658)	(0.702)	(1.024)	(0.673)
ndustry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Observations	62	62	62	62	62	62	62	62
R-squared	0.183	0.190	0.347	0.351	0.155	0.150	0.319	0.320

Table 6: **Coinvestment and gearing**

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of leverage. The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Leverage* is defined as Liabilities/Total Assets. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	Dependent Variable: Leverage Ratio							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rel. coinv. partners	0.0700*		0.0876**					
	(0.0357)		(0.0348)					
Rel. coinv. all		0.0669*		0.0875**				
		(0.0363)		(0.0348)				
Absolute GP Investment Amount					-8.62e-10		-7.72e-10	
					(5.74e-10)		(6.03e-10)	
Abolsute GP Investment in %						-1.895		-1.339
						(1.225)		(1.164)
<i>Fund characteristics:</i>								
GP Age	0.00561	0.00563	-0.00267	-0.00292	0.00907	0.00592	0.00361	0.000193
	(0.00794)	(0.00797)	(0.00616)	(0.00620)	(0.00660)	(0.00641)	(0.00832)	(0.00812)
log(Fund Size)	0.0648	0.0666	0.0424	0.0456	0.141*	0.0295	0.140*	0.0400
	(0.0610)	(0.0609)	(0.0608)	(0.0600)	(0.0697)	(0.0601)	(0.0744)	(0.0738)
Fund Sequence Number	-0.0483**	-0.0474**	-0.0416**	-0.0405**	-0.0297*	-0.0235	-0.0232	-0.0195
	(0.0201)	(0.0195)	(0.0180)	(0.0178)	(0.0162)	(0.0217)	(0.0212)	(0.0247)
<i>Firm characteristics:</i>								
log(TA)	-0.00440	-0.00354	-0.0191	-0.0199	0.0121	0.0221	-0.00992	0.00469
	(0.0341)	(0.0334)	(0.0451)	(0.0445)	(0.0291)	(0.0346)	(0.0439)	(0.0484)
Fixed Asset Ratio	0.257	0.255	0.324*	0.329*	0.286	0.308	0.417**	0.398**
	(0.209)	(0.211)	(0.183)	(0.181)	(0.230)	(0.238)	(0.167)	(0.179)
RoA	-0.182	-0.183	-0.259	-0.260	-0.305	-0.345	-0.358	-0.386
	(0.214)	(0.214)	(0.239)	(0.238)	(0.210)	(0.229)	(0.225)	(0.255)
<i>Macro Controls:</i>								
Credit Spread	0.00132	0.000759			-0.00743	-0.00681		
	(0.0110)	(0.0111)			(0.0118)	(0.0126)		
Nibor	0.0135	0.0140			0.0394	0.0231		
	(0.0254)	(0.0254)			(0.0240)	(0.0256)		
Constant	-0.686	-0.734	0.146	0.0933	-2.580*	-0.239	-1.971	-0.00482
	(1.415)	(1.409)	(1.093)	(1.076)	(1.446)	(1.212)	(1.224)	(1.172)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Observations	62	62	62	62	62	62	62	62
R-squared	0.243	0.236	0.463	0.463	0.224	0.227	0.387	0.376

Table 7: Coinvestment and total risk

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of equity beta. The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	Dependent Variable: Equity Beta							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rel. coinv. partners	-0.151*** (0.0281)		-0.169*** (0.0410)					
Rel. coinv. all		-0.157*** (0.0266)		-0.174*** (0.0394)				
Absolute GP Investment Amount					4.81e-10 (7.77e-10)		9.54e-10 (9.01e-10)	
Abolsute GP Investment in %						1.178 (1.905)		0.817 (2.328)
<i>Fund characteristics:</i>								
GP Age	-0.0194 (0.0201)	-0.0193 (0.0201)	-0.0320* (0.0169)	-0.0314* (0.0168)	-0.0223 (0.0184)	-0.0205 (0.0196)	-0.0414** (0.0158)	-0.0368** (0.0174)
log(Fund Size)	-0.0396 (0.0568)	-0.0425 (0.0556)	-0.00771 (0.0739)	-0.0127 (0.0717)	-0.0930 (0.0582)	-0.0279 (0.0857)	-0.143 (0.0995)	-0.0343 (0.107)
Fund Sequence Number	0.136** (0.0545)	0.137** (0.0539)	0.167*** (0.0540)	0.165*** (0.0526)	0.104* (0.0599)	0.0995 (0.0659)	0.134** (0.0618)	0.134* (0.0664)
<i>Firm characteristics:</i>								
log(TA)	0.00746 (0.0522)	0.00966 (0.0514)	0.0628 (0.0799)	0.0657 (0.0790)	-0.0363 (0.0605)	-0.0422 (0.0572)	0.0374 (0.0791)	0.0215 (0.0780)
Fixed Asset Ratio	0.0559 (0.586)	0.0623 (0.586)	0.233 (0.665)	0.224 (0.665)	0.0250 (0.571)	0.0103 (0.590)	0.0843 (0.660)	0.124 (0.666)
RoA	-0.218 (0.133)	-0.225 (0.131)	-0.413 (0.254)	-0.415 (0.254)	-0.0580 (0.148)	-0.0291 (0.151)	-0.247 (0.264)	-0.251 (0.236)
<i>Macro Controls:</i>								
Credit Spread	0.0226 (0.0243)	0.0228 (0.0242)			0.0369 (0.0249)	0.0367 (0.0257)		
Nibor	-0.0249 (0.0600)	-0.0261 (0.0600)			-0.0410 (0.0726)	-0.0325 (0.0609)		
Constant	1.131 (0.925)	1.166 (0.902)	-0.482 (1.286)	-0.422 (1.239)	2.821** (1.079)	1.461 (1.682)	2.650 (1.542)	0.590 (1.898)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	Yes	Yes	No	No	Yes	Yes
Observations	62	62	62	62	62	62	62	62
R-squared	0.295	0.304	0.452	0.459	0.203	0.204	0.356	0.343

Table 8: **Coinvestment and Realative Investment Size**

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of ticket size. Ticket size is defined as balance sheet size of the firm divided by fund size. The sample is 62 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	Dependent Variable: Ticket Size							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rel. coinv. partners	-0.0701** (0.0278)		-0.0681** (0.0284)					
Rel. coinv. all		-0.0677** (0.0270)		-0.0666** (0.0275)				
Absolute GP Investment Amount					2.50e-10 (6.50e-10)		4.27e-10 (6.38e-10)	
Abolsute GP Investment in %						2.072** (0.957)		1.361 (0.856)
GP Age	-0.00971 (0.00870)	-0.00973 (0.00874)	-0.00368 (0.0101)	-0.00354 (0.0101)	-0.0111 (0.00768)	-0.0100 (0.00598)	-0.00768 (0.00796)	-0.00604 (0.00846)
log(Fund Size)	-0.288*** (0.0620)	-0.290*** (0.0628)	-0.262*** (0.0461)	-0.265*** (0.0472)	-0.315*** (0.0848)	-0.249*** (0.0592)	-0.321*** (0.0695)	-0.254*** (0.0668)
Fund Sequence Number	0.0352 (0.0277)	0.0344 (0.0275)	0.0199 (0.0259)	0.0188 (0.0255)	0.0200 (0.0179)	0.00938 (0.0154)	0.00650 (0.0208)	0.000808 (0.0239)
log(TA)	0.371*** (0.0941)	0.370*** (0.0946)	0.376*** (0.0984)	0.377*** (0.0989)	0.351*** (0.0951)	0.344*** (0.0946)	0.367*** (0.0985)	0.357*** (0.100)
Fixed Asset Ratio	-0.0354 (0.239)	-0.0333 (0.240)	-0.140 (0.229)	-0.145 (0.230)	-0.0504 (0.241)	-0.0903 (0.217)	-0.203 (0.218)	-0.205 (0.214)
RoA	-0.322* (0.174)	-0.321* (0.175)	-0.295 (0.225)	-0.293 (0.225)	-0.245 (0.194)	-0.148 (0.190)	-0.226 (0.226)	-0.182 (0.232)
Credit Spread	0.00479 (0.0129)	0.00529 (0.0129)			0.0115 (0.0138)	0.0131 (0.0118)		
Nibor	0.0294 (0.0224)	0.0288 (0.0228)			0.0212 (0.0213)	0.0189 (0.0227)		
Constant	1.651 (1.064)	1.696 (1.076)	2.162* (1.041)	2.215** (1.040)	2.482 (1.663)	1.126 (1.107)	3.500** (1.575)	2.138* (1.133)
Industry Control								
Year Dummies								
Observations	62	62	62	62	62	62	62	62
R-squared	0.716	0.714	0.790	0.789	0.692	0.714	0.772	0.777

Table 9: Wealth and project choice

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of asset beta. The sample is 59 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Partner Average Wealth	2.65e-10 (2.24e-09)	7.38e-10 (2.30e-09)	0 (2.35e-09)				1.07e-09 (2.43e-09)	1.33e-09 (2.34e-09)	6.30e-10 (2.46e-09)			
Partner YoY Wealth Change (in %)		0.0130* (0.00656)	0.0150** (0.00695)					0.0103 (0.00723)	0.0123 (0.00766)			
Rel. coinv. partners			-0.0357 (0.0223)						-0.0373 (0.0288)			
All Emp. Average Total Wealth				-2.01e-09 (2.27e-09)	-1.86e-09 (2.21e-09)	-2.64e-09 (2.45e-09)				-2.01e-09 (2.27e-09)	-1.03e-09 (1.90e-09)	-1.65e-09 (2.25e-09)
All Emp. YoY Wealth Change (in %)					0.0179 (0.0172)	0.0221 (0.0181)					0.0123 (0.0182)	0.0160 (0.0192)
Rel. coinv. all						-0.0441 (0.0262)						-0.0437 (0.0295)
GP Age	-0.0126 (0.00971)	-0.0117 (0.00988)	-0.0106 (0.0103)	-0.0127 (0.00984)	-0.0125 (0.0102)	-0.0113 (0.0109)	-0.0260*** (0.00897)	-0.0251*** (0.00955)	-0.0238*** (0.00961)	-0.0127 (0.00984)	-0.0259** (0.00930)	-0.0243*** (0.00975)
log(Fund Size)	-0.0191 (0.0378)	-0.0443 (0.0441)	-0.0351 (0.0416)	-0.0157 (0.0303)	-0.0301 (0.0370)	-0.0259 (0.0345)	-0.0340 (0.0408)	-0.0524 (0.0466)	-0.0429 (0.0469)	-0.0157 (0.0303)	-0.0407 (0.0475)	-0.0348 (0.0477)
Fund Sequence Number	0.0453 (0.0268)	0.0479 (0.0284)	0.0541* (0.0302)	0.0418 (0.0262)	0.0434 (0.0282)	0.0512 (0.0303)	0.0688** (0.0317)	0.0705** (0.0332)	0.0774* (0.0381)	0.0418 (0.0262)	0.0646* (0.0330)	0.0727* (0.0382)
log(TA)	-0.0434 (0.0482)	-0.0405 (0.0520)	-0.0377 (0.0520)	-0.0512 (0.0466)	-0.0505 (0.0489)	-0.0445 (0.0498)	-0.00826 (0.0357)	-0.00629 (0.0395)	-0.00264 (0.0395)	-0.0512 (0.0466)	-0.0152 (0.0353)	-0.00901 (0.0358)
Fixed Asset Ratio	0.163 (0.338)	0.137 (0.352)	0.143 (0.358)	0.169 (0.323)	0.136 (0.337)	0.144 (0.347)	0.281 (0.418)	0.252 (0.431)	0.259 (0.436)	0.169 (0.323)	0.234 (0.421)	0.246 (0.430)
RoA	-0.0394 (0.112)	-0.0361 (0.117)	-0.0621 (0.118)	-0.0249 (0.106)	-0.0222 (0.112)	-0.0601 (0.115)	-0.208 (0.207)	-0.201 (0.217)	-0.224 (0.214)	-0.0249 (0.106)	-0.192 (0.213)	-0.222 (0.210)
Credit Spread	0.00678 (0.0123)	0.0101 (0.0119)	0.00961 (0.0121)	0.00909 (0.0121)	0.0114 (0.0115)	0.0107 (0.0119)				0.00909 (0.0121)		
Nibor	-0.0322 (0.0391)	-0.0404 (0.0429)	-0.0366 (0.0433)	-0.0331 (0.0401)	-0.0397 (0.0449)	-0.0355 (0.0452)				-0.0331 (0.0401)		
Constant	1.464*** (0.442)	1.946*** (0.650)	1.707** (0.636)	1.530** (0.549)	1.827** (0.745)	1.646** (0.750)	1.060* (0.581)	1.389* (0.673)	1.137 (0.728)	1.530** (0.549)	1.333 (0.792)	1.113 (0.833)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59	59	59	59	59	59	59	59	59	59	59	59
R-squared	0.142	0.170	0.179	0.148	0.163	0.179	0.298	0.314	0.324	0.148	0.303	0.318

Table 10: Wealth and Gearing

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of leverage. The sample is 59 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Leverage* is defined as *Liabilities/Total Assets*. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Partner Average Wealth	-4.33e-09*	-4.18e-09*	-2.56e-09			-4.56e-09	-5.12e-09*	-4.97e-09*	-3.14e-09			
	(2.16e-09)	(2.11e-09)	(1.98e-09)			(2.79e-09)	(2.82e-09)	(2.80e-09)	(2.49e-09)			
Partner YoY Wealth Change (in %)		0.00414	-0.000276				0.00591	0.00591	0.000649			
		(0.00509)	(0.00482)				(0.00616)	(0.00591)	(0.00591)			
Rel. coinv. partners			0.0807**			0.0792**			0.0981***			
			(0.0349)			(0.0312)			(0.0232)			
All Emp. Average Total Wealth				-6.05e-09*	-5.94e-09*	-4.56e-09				-7.51e-09**	-7.42e-09**	-5.96e-09**
				(3.43e-09)	(3.33e-09)	(2.79e-09)				(3.53e-09)	(3.43e-09)	(2.56e-09)
All Emp. YoY Wealth Change (in %)					0.0132	0.00577					0.0151	0.00643
					(0.0106)	(0.0112)					(0.0129)	(0.0134)
Rel. coinv. all						0.0792**						0.103***
						(0.0312)						(0.0200)
GP Age	0.00846	0.00874	0.00620	0.00772	0.00789	0.00577	0.00152	0.00204	-0.00135	0.00109	0.00156	-0.00205
	(0.00783)	(0.00774)	(0.00842)	(0.00720)	(0.00712)	(0.00789)	(0.00915)	(0.00910)	(0.00671)	(0.00857)	(0.00866)	(0.00579)
log(Fund Size)	0.137**	0.129*	0.108	0.104*	0.0936	0.0860	0.127**	0.116*	0.0910	0.0882	0.0774	0.0635
	(0.0557)	(0.0615)	(0.0706)	(0.0540)	(0.0581)	(0.0618)	(0.0563)	(0.0603)	(0.0617)	(0.0526)	(0.0535)	(0.0481)
Fund Sequence Number	-0.0430**	-0.0422**	-0.0561***	-0.0443**	-0.0432**	-0.0572***	-0.0374**	-0.0364*	-0.0544***	-0.0406*	-0.0399*	-0.0590***
	(0.0166)	(0.0168)	(0.0188)	(0.0177)	(0.0177)	(0.0173)	(0.0175)	(0.0180)	(0.0150)	(0.0213)	(0.0220)	(0.0126)
log(TA)	-0.00787	-0.00694	-0.0133	-0.00271	-0.00214	-0.0129	-0.0263	-0.0251	-0.0348	-0.0253	-0.0248	-0.0395
	(0.0334)	(0.0350)	(0.0352)	(0.0296)	(0.0317)	(0.0338)	(0.0463)	(0.0489)	(0.0484)	(0.0447)	(0.0476)	(0.0492)
Fixed Asset Ratio	0.300	0.292	0.278	0.317	0.293	0.277	0.366**	0.350*	0.332*	0.400**	0.367*	0.338*
	(0.232)	(0.238)	(0.241)	(0.237)	(0.249)	(0.254)	(0.165)	(0.176)	(0.179)	(0.172)	(0.188)	(0.193)
RoA	-0.245	-0.244	-0.186	-0.254	-0.252	-0.184	-0.331	-0.327	-0.266	-0.333	-0.329	-0.258
	(0.204)	(0.204)	(0.240)	(0.195)	(0.193)	(0.233)	(0.217)	(0.217)	(0.248)	(0.206)	(0.203)	(0.238)
Credit Spread	0.00115	0.00220	0.00331	0.00224	0.00397	0.00535						
	(0.0103)	(0.0108)	(0.0110)	(0.0105)	(0.0111)	(0.0112)						
Nibor	0.0308	0.0282	0.0196	0.0282	0.0233	0.0159						
	(0.0208)	(0.0233)	(0.0273)	(0.0203)	(0.0234)	(0.0272)						
Constant	-2.131*	-1.978	-1.438	-1.506	-1.286	-0.962	-1.372	-1.182	-0.521	-0.595	-0.385	0.134
	(1.200)	(1.322)	(1.567)	(1.226)	(1.329)	(1.482)	(0.948)	(1.037)	(1.107)	(0.902)	(0.940)	(0.923)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro Controls	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No
Year Dummies	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	59	59	59	59	59	59	59	59	59	59	59	59
R-squared	0.285	0.288	0.340	0.284	0.293	0.349	0.485	0.491	0.566	0.496	0.507	0.597

Table 11: Wealth and Total Risk

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of equity beta. The sample is 59 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Partner Average Wealth	3.98e-09 (3.46e-09)	4.07e-09 (3.54e-09)	8.05e-10 (3.51e-09)			3.17e-10 (5.08e-09)	6.69e-09 (4.39e-09)	6.65e-09 (4.31e-09)	3.36e-09 (3.75e-09)	7.47e-09 (6.60e-09)	7.36e-09 (6.47e-09)	4.72e-09 (5.49e-09)
Partner YoY Wealth Change (in %)		0.00249 (0.0150)	0.0113 (0.0161)			0.00471 (0.0386)		-0.00168 (0.0156)	0.00780 (0.0162)		-0.0174 (0.0349)	-0.00169 (0.0377)
Rel. coinv. partners			-0.162*** (0.0509)			-0.168*** (0.0442)			-0.177*** (0.0562)			-0.187*** (0.0503)
All Emp. Average Total Wealth				3.35e-09 (5.53e-09)	3.26e-09 (5.50e-09)	3.17e-10 (5.08e-09)						
All Emp. YoY Wealth Change (in %)					-0.0111 (0.0355)	0.00471 (0.0386)						
Rel. coinv. all						-0.168*** (0.0442)						
GP Age	-0.0224 (0.0194)	-0.0222 (0.0199)	-0.0171 (0.0221)	-0.0219 (0.0197)	-0.0220 (0.0198)	-0.0175 (0.0221)	-0.0368*** (0.0165)	-0.0369*** (0.0167)	-0.0308* (0.0176)	-0.0365*** (0.0162)	-0.0370*** (0.0161)	-0.0305* (0.0168)
log(Fund Size)	-0.0879 (0.0752)	-0.0927 (0.0878)	-0.0510 (0.0841)	-0.0568 (0.0717)	-0.0479 (0.0788)	-0.0319 (0.0709)	-0.0819 (0.102)	-0.0789 (0.115)	-0.0337 (0.108)	-0.0368 (0.111)	-0.0243 (0.117)	0.00101 (0.0956)
Fund Sequence Number	0.116* (0.0593)	0.116* (0.0597)	0.144** (0.0613)	0.114* (0.0597)	0.113* (0.0589)	0.143** (0.0600)	0.146** (0.0556)	0.146** (0.0557)	0.179** (0.0637)	0.146** (0.0570)	0.145** (0.0559)	0.180*** (0.0592)
<i>Firm characteristics:</i>												
log(TA)	-0.00318 (0.0578)	-0.00262 (0.0587)	0.0102 (0.0555)	-0.0148 (0.0556)	-0.0153 (0.0561)	0.00750 (0.0539)	0.0604 (0.0859)	0.0601 (0.0869)	0.0774 (0.0844)	0.0528 (0.0856)	0.0523 (0.0872)	0.0789 (0.0863)
Fixed Asset Ratio	0.0147 (0.599)	0.00974 (0.610)	0.0374 (0.624)	0.00510 (0.585)	0.0256 (0.595)	0.0585 (0.624)	0.222 (0.708)	0.227 (0.721)	0.259 (0.725)	0.167 (0.695)	0.206 (0.706)	0.258 (0.719)
RoA	-0.127 (0.174)	-0.126 (0.179)	-0.244 (0.176)	-0.106 (0.175)	-0.108 (0.174)	-0.252 (0.171)	-0.327 (0.273)	-0.328 (0.274)	-0.438 (0.267)	-0.314 (0.276)	-0.319 (0.269)	-0.449* (0.257)
Constant	2.252* (1.273)	2.344 (1.592)	1.263 (1.479)	1.774 (1.501)	1.590 (1.710)	0.903 (1.548)	0.993 (1.527)	0.939 (1.854)	-0.252 (1.866)	0.209 (1.913)	-0.0344 (2.142)	-0.976 (1.870)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	No	No	No	No	No	No	No	No	No	No
Observations	59	59	59	59	59	59	59	59	59	59	59	59
R-squared	0.210	0.210	0.267	0.200	0.202	0.271	0.369	0.369	0.435	0.357	0.361	0.443

Table 12: Wealth and Ticket Size

The table shows the coefficient estimates from cross-sectional ordinary least squares regressions of ticket size. Ticket size is defined as balance sheet size of the firm divided by fund size. The sample is 59 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. *Rel. coinvestment* is the total required coinvestment for the fund as a fraction of the professionals' or partners' total wealth averaged over the three prior to the buyout transaction. All variables are defined in Appendix Table 2. Standard errors are clustered by private equity firm and shown in parenthesis. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Partner Average Wealth	3.98e-09 (3.46e-09)	4.07e-09 (3.54e-09)	8.05e-10 (3.51e-09)				6.69e-09 (4.39e-09)	6.65e-09 (4.31e-09)	3.36e-09 (3.75e-09)		7.36e-09 (6.47e-09)	4.72e-09 (5.49e-09)
Partner YoY Wealth Change (in %)		0.00249 (0.0150)	0.0113 (0.0161)					-0.00168 (0.0156)	0.00780 (0.0162)		-0.0174 (0.0349)	-0.00169 (0.0377)
Rel. coinv. partners			-0.162*** (0.0509)						-0.177*** (0.0562)			-0.187*** (0.0503)
All Emp. Average Total Wealth				3.35e-09 (5.53e-09)	3.26e-09 (5.50e-09)	3.17e-10 (5.08e-09)				7.47e-09 (6.60e-09)		
All Emp. YoY Wealth Change (in %)				-0.0111 (0.0355)	-0.0111 (0.0386)	0.00471 (0.168***)						
Rel. coinv. all												
GP Age	-0.0224 (0.0194)	-0.0222 (0.0199)	-0.0171 (0.0221)	-0.0219 (0.0197)	-0.0220 (0.0198)	-0.0175 (0.0221)	-0.0368*** (0.0165)	-0.0369*** (0.0167)	-0.0308* (0.0176)	-0.0365*** (0.0162)	-0.0370*** (0.0161)	-0.0305* (0.0168)
log(Fund Size)	-0.0879 (0.0752)	-0.0927 (0.0878)	-0.0510 (0.0841)	-0.0568 (0.0717)	-0.0479 (0.0788)	-0.0319 (0.0709)	-0.0819 (0.102)	-0.0759 (0.115)	-0.0337 (0.108)	-0.0368 (0.111)	-0.0243 (0.117)	0.00101 (0.0956)
Fund Sequence Number	0.116* (0.0593)	0.116* (0.0597)	0.144** (0.0613)	0.114* (0.0597)	0.113* (0.0589)	0.143** (0.0600)	0.146** (0.0556)	0.146** (0.0557)	0.179** (0.0637)	0.146** (0.0570)	0.145** (0.0559)	0.180*** (0.0592)
log(TA)	-0.00318 (0.0578)	-0.00262 (0.0587)	0.0102 (0.0555)	-0.0148 (0.0556)	-0.0153 (0.0561)	0.00750 (0.0539)	0.0604 (0.0859)	0.0601 (0.0869)	0.0774 (0.0844)	0.0528 (0.0856)	0.0523 (0.0872)	0.0789 (0.0863)
Fixed Asset Ratio	0.0147 (0.599)	0.00974 (0.610)	0.0374 (0.624)	0.00510 (0.585)	0.0256 (0.595)	0.0585 (0.624)	0.222 (0.708)	0.227 (0.721)	0.259 (0.725)	0.167 (0.695)	0.206 (0.706)	0.258 (0.719)
RoA	-0.127 (0.174)	-0.126 (0.179)	-0.244 (0.176)	-0.106 (0.175)	-0.108 (0.174)	-0.252 (0.171)	-0.327 (0.273)	-0.328 (0.274)	-0.438 (0.267)	-0.314 (0.276)	-0.319 (0.269)	-0.449* (0.257)
Credit Spread	0.0257 (0.0246)	0.0264 (0.0241)	0.0241 (0.0248)	0.0269 (0.0255)	0.0255 (0.0245)	0.0225 (0.0257)						
Nibor	-0.0374 (0.0695)	-0.0389 (0.0745)	-0.0217 (0.0714)	-0.0360 (0.0707)	-0.0319 (0.0769)	-0.0161 (0.0741)						
Constant	2.252* (1.273)	2.344 (1.592)	1.263 (1.479)	1.774 (1.501)	1.590 (1.710)	0.903 (1.548)	0.993 (1.527)	0.939 (1.854)	-0.252 (1.866)	0.209 (1.913)	-0.0344 (2.142)	-0.976 (1.870)
Industry Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	No	No	No	No	No	No	No	No	No	No	No	No
Observations	59	59	59	59	59	59	59	59	59	59	59	59
R-squared	0.210	0.210	0.267	0.200	0.202	0.271	0.369	0.369	0.435	0.357	0.361	0.443

Table 13: Variable Definitions

Notes: In this table we.... Standard errors are clustered by PE Fund.

Variable	Definition
Leverage 1	$= (\text{sumeitend} - \text{ek}) / \text{sumeitend}$
Leverage 2	$= (\text{capital employed} - \text{ek}) / \text{capital employed}$
Leverage 3	$= \text{rgjeld}_{max} / (\text{rgjeld}_{max} + \text{ek})$
Asset Beta 1	$= \text{Equally weighted average of the five closest firms, using Leverage 1, where the individual } \beta_a = \beta_e * \frac{\text{marketcap}}{\text{marketcap} + \text{sumeitend} * 1000 - \text{ek}}$
Asset Beta 2	$= \text{Equally weighted average of the five closest firms, using Leverage 2, where the individual } \beta_a = q\beta_e * \frac{\text{marketcap}}{\text{marketcap} + (\text{capitalemployed}) * 1000}$
Asset Beta 3	$= \text{Equally weighted average of the five closest firms, using Leverage 3, where the individual } \beta_a = q\beta_e * \frac{\text{marketcap}}{\text{marketcap} + \text{rgjeld}_{max} * 1000}$
Ticket Size	$= \text{sumeitend} * 1000 / \text{Fund Size in NOK}$
Rel. coinvestment all	$= \text{GP Co-investment current fund in fund per person} / \text{Average wealth over the last three years}$
Rel. coinvestment all Partners Only	$= \text{GP Co-investment current fund in fund per partner} / \text{Average wealth per partner over the last three years}$
Absolute GP Investment Amount	$= \text{Absolute GP's co-investment amount}$
Absolute GP Percentage	$= \text{Absolute GP's co-investment in percentage points}$
Partner Average Wealth	$= \text{Absolute Amount of Partner Wealth}$
Partner YoY Wealth Change	$= \text{Year Change in Absolute Amount of Partner Wealth}$
All Employee Average Total Wealth	$= \text{Absolute Amount of total Employee Wealth}$
All Employee YoY Wealth Change	$= \text{Year Change in Absolute Amount of Total Employee Wealth}$
PE Firm Founding Year	$= \text{Year the GP was founded}$
Fund Sequence Number	$= \text{Sequence number for the funds in the sample}$
Credit Spread	$= \text{Credit Spread for European Bond issues from Bloomberg}$
(Uwe, can you please give me the exact definition?)	
NIBOR	$= \text{Norwegian Interbank Interest Rate at the year end from the Norwegian Central Bank}$
log(Fund Size)	$= \log(\text{Fund Size in NOK}) =$
Fixed Asset Ratio	$= (\text{etend} + \text{maskan}) / \text{sumgjek}$
log(TA)	$= \log(\text{sumeitend})$
Sales	$= \text{salgsinn} / \text{sumgjek}$
RoA	$= \text{ebitda} / \text{sumgjek}$

Table 14: **Coinvestment and total risk**

The table shows the variable definitions for our sample based on the definitions used by ?.

Variable	Definition
Market cap	From NHH's Børsprosjekt
Capital Employed	sumeierend -cash -invest -varer -kundef -pforpl
rgjeld avg	(rgjeld_max + rgjeld_min)/2
ebitda	'Earnings before interest, tax, depreciation, and amortisation'
rentekost	'Interest expenses'
sumeierend	'Total assets'
ek	'Shareholder's equity'
gjeld	'Total Liabilities'
cash	'Bank deposits, cash etc.'
invest	'Investments'
varer	'Stocks'
kundef	'Trade debtors'
pforpl	'Pension commitment'
rgjeld_min	'Total interest-bearing liabilities, minimum'
rgjeld_max	'Total interest-bearing liabilities, maximum'
rgjeld	'Interest-bearing long-term liabilities'
sumgjek	'Total equity and liabilities'
	All years. Total all liabilities and equity. Total gjeld + ek
salgsinn	'Sales revenues'
eiend	'Real property'
maskanl	'Machinery and plant'
drlosore	'Operating equipment, fixtures and fittings'
skiprigfl	'Ships, rigs, planes etc.'

Table 15: **Sample Comparison**

The table compares the 60 firms included in the sample relative to the 51 firms for which we do not have information about the GP's co-investment. The first part of the sample has at maximum 51 firms from between 1996 and 2010 whereas the other contains 60 Norwegian portfolio companies acquired by Nordic buyout funds between 2000 and 2010. We report the difference in means between the two samples and run a t-test on the difference. All variables are defined in Appendix Table 2. ***, ** and * denote that the coefficient is significantly different from zero at the 1%, 5% and 10% level, respectively.

Variable	N	Mean	Std. Dev.	N	Mean	Std. Dev.	Diff	
<i>Fund characteristics:</i>								
GP Age	28	7.607	6.136	62	9.90	5.96	-2.30	
log(Fund Size)	28	20.979	1.267	62	21.29	1.15	-0.32	
Fund Sequence Number	32	2.688	1.839	62	3.63	2.13	-0.94	**
<i>Firm characteristics:</i>								
log(TA)	51	11.94	2.009	62	12.86	1.16	-0.93	***
Fixed Asset Ratio	51	0.142	0.250	62	0.08	0.15	0.06	
RoA	51	-0.155	1.040	62	0.03	0.24	-0.19	
Industry Control	51	0.490	0.505	62	0.42	0.50	0.07	
<i>Macro characteristics:</i>								
Credit Spread	40	4.757	2.326	62	5.65	3.04	-0.89	*
Nibor	51	4.183	1.606	62	4.23	1.51	-0.05	
Year	51	2004	4.043	62	2007	2.28	-3.49	***

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