CESIS
Electronic Working Paper Series

Paper No. 135

The Impact of Firm Collateral on Knowledge Intensive Consulting Firms

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(CESIS JIBS and KTH)

September 2008

The Royal Institute of technology
Centre of Excellence for Science and Innovation Studies (CESIS)
http://www.cesis.se

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Abstract

This paper explores how sales and employment for knowledge intensive consulting firms are correlated. I apply theory on cash flow-investment sensitivities, mostly applied to manufacturing firms, to a less capital intensive part of the economy. Therefore the knowledge intensive consulting sector is investigated but instead of analyzing the investment in plant and machinery this analysis regards the investment in skilled employees. The argument of Kaplan & Zingales (1997) regarding low cash flow-investment sensitivity being a sign of financial distress is applied. The main result is that firms less likely to be financially constrained display 60 percent higher sales-employment sensitivities than firms more likely to be financially constrained. The results are estimated from a sample comprising 23,500 Swedish knowledge intensive consulting firms.

JEL Classification: D52, D82, L84, O16
Keywords: Incomplete markets, asymmetric information, knowledge intensive business services, economic development

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I Introduction

Firms displaying high cash flow-investment sensitivities are not financially constrained according to Kaplan & Zingales (1997). Their argument serves as critique to a paper by Fazzari et al (1988) which claim the contrary, namely, high cash flow-investment sensitivities is a sign of financial constraints. Kaplan & Zingales (1997) complement their regression on cash flow-investment sensitivities by examining the annual reports of all firms in their sample which argue in favor of their argument. A firm with low cash flow-investment sensitivity is likely to be financially distressed since it is forced by its creditors to spend additional cash flow on repaying debt rather than investing (Kaplan & Zingales (1997, p. 208). In this paper I examine financial constraints for knowledge intensive consulting firms. It is not as relevant to explore investments in plant and machinery for knowledge intensive consulting firms since consulting firms invest primarily in humans and the knowledge that they possess. In this way I intend to explore if investing in skilled employees for knowledge intensive firms are affected by external credit access issues in a similar way as the more obvious investment in plant and machinery for manufacturing firms.

I adopt the stance of Kaplan & Zingales (1997) through examining the sales-employment sensitivities of consulting firms. The analyses of Fazzari et al (1988) and Kaplan & Zingales (1997) identify a financially constrained firm through its dividend policy. They split their sample in to one sub-sample of high dividend firms and one with subsequently low dividend firms. A high dividend firm is considered less likely to be financially constrained. However, in this paper the sample comprise smaller firms (median employment of 1-99) and most of the firms are not listed at the stock exchange. Instead the likelihood of a firm being financially constrained is based on if it possesses collateralizable assets or not. If the firm owns collateral (in this paper collateral comprise book value of real estate and/or land assets) then it can more favorably access external credit, firm's with collateral are therefore considered less likely to be financially constrained. Collateralizable assets mitigate problems associated with information asymmetries and subsequently lower the premium on external finance.[2]

[2] Using collateral as a proxy for financial constraints is more suitable for smaller firms, such as in this paper, as compared to larger firms. Smaller firms cannot access external equity since they are often not quoted (Hall et al (2000)). Therefore their only alternative to retained earnings is debt and since collateralizable assets work as to mitigate information asymmetries and enabling access to external debt then collateral is a sensible proxy for small firm financial constraints.

Cash flow-investment sensitivity analyses are mostly relevant for manufacturing firms. The purpose of this paper is to apply what is learned from research on cash flow-sensitivities onto knowledge intensive consulting firms through exploring how sales and employment interact. This hypothesis is tested on a sample of about 23,500 Swedish knowledge intensive consulting firms covering the period 1997-2004.

After splitting the sample based on if the firm has book value of collateralizable assets the impact of collateral on firm sales-employment sensitivities is explored. The split of the sample results in two sub-samples which are similar in terms of mean and median sales, employment and knowledge intensity.

The estimated sales-employment sensitivities of the sub-samples differ substantially. The sub-sample of firms with collateralizable assets has 60 percent higher sales-employment sensitivity than firms without collateral. The estimation is performed with, besides ordinary least squares and within estimation, "system" generalized method of moments estimation in order to deal with potentially disturbing biases.

The sales-employment specification is also submitted for different robustness checks which control for investment opportunities, knowledge intensity, and leverage.

The sales-employment sensitivity results give rise to a question which needs to be contemplated. Does collateral facilitate high sales-employment sensitivities or is the lack of collateralizable assets a feature of firms that simply just do not want to grow? I do not hold a clear answer to the question but in order to provide evidence of external capital access playing a role for the results a comparison is carried out as a further robustness check. In Martinsson (2008) I explore how manufacturing firms' knowledge intensity[3] correlates with sales variation and if and how this correlation differs if they possess collateralizable assets or not. Manufacturing firms with collateral display a counter-cyclical response to sales whereas firms without collateral display a pro-cyclical response. Firms with collateral can access external credit when sales decline which enable the counter-cyclical relationship.

The results for the consulting sample are similar to the results reported above for the manufacturing sample. The corroboration with the results of the manufacturing sample, coupled with the additional extensive robustness checks, suggest that even though consulting firms are less

[3] Knowledge intensity is defined as the ratio of employees with a university education exceeding three years out of total firm employment.

capital intensive than manufacturing firms they suffer from problems of external credit access, resulting from information asymmetries, in a similar way.

This paper is novel from at least two aspects. A sample of smaller knowledge intensive consulting firms has not to my knowledge been analyzed in a similar context. The results suggesting that collateral plays a significant role even for less capital intensive firms are also novel.

The paper proceeds as follows. Section II describes the data and sample. Section III presents the estimation strategy. Section IV presents and estimates the sales-employment sensitivities. Section V contains all robustness checks. Section VI concludes.

II Data

In A the dataset is presented with corresponding descriptive statistics. In B the sample which is submitted for estimation is described and presented.

A. Presentation of the data

This paper utilizes data collected from two datasets provided by Statistics Sweden. The firm level database (FS) is used to collect information on firm characteristics such as sales, equity and debt. Information on knowledge intensity and employment is collected from the Swedish firm level employment database (RAMS). These two databases contain all Swedish firms during the period 1997-2004.

The knowledge intensive business services (KIBS) sector is defined according to the two digit standard industrial classification code (SIC). The KIBS-sector ranges from 65-93.[4] Financial firms are normally not included in a study involving credit access issues and therefore are the financially related sub-sectors 65-67 excluded. The KIBS sub-sectors are displayed in table 1 in B.

The significant feature of the KIBS-sector is obviously its knowledge intensity. Comparing the manufacturing sector (SIC: 15-37), the retail and wholesale services sector (SIC: 50-64) and the KIBS-sector in figure 1 the difference regarding knowledge intensity is apparent.

[4] This definition of the KIBS-sector is also applied in Andersson & Hellerstedt (2008)

[Figure 1 about here]

Employment is also interesting to model based on the development of KIBS-employment compared to the other major sectors of the economy. The development of employment for each major sector of the economy is displayed in figure 2.

[Figure 2 about here]

The employment development of the KIBS-sector deviates from the development of the other two major sectors of the economy during the sample period. This leads to the employment ratio of especially the manufacturing and the KIBS-sector converging.

It is conceived difficult to properly measure the output of services firms. Services firms do to a large extent produce intermediary goods. Triplett & Bosworth (2004) highlight the measurement issues and suggest employment as an informative way to present services growth.

B. The sample

Consulting, comprising both business- and data-related consulting, is the by far the most dominant segment of the KIBS-sector constituting approximately two thirds of it. The consulting sub-sectors are suitable for this type of analysis. They have had significant employment growth, data-related consulting averaging annual growth of 8.2 percent and business related consulting averaging 5.9 percent. They are not capital intensive and they are both above the median in terms of knowledge intensity compared to other KIBS sub-sectors. The median capital intensity for a consulting firm defined as the capital stock divided by its employees during the sample period is at SEK 30,000. The median capital intensity for a firm of the manufacturing sector during the same time period is about SEK 310,000.[5]

Focusing on consulting exclusively also reduces the risk of biases toward the capital intensive sub-sectors. It is likely that observations corresponding to the capital intensive segment of the KIBS-sector would be over-weighted in the sub-sample of firms with collateral.

[Table 1 about here]

[5] Based on calculations by the author

The first step of the sample selection procedure is therefore to eliminate all firms not operating in the consulting sectors. Beyond the first step, the sample selection is run exactly as in Martinsson (2008) enabling me to carry out the robustness checks of section V. Median employment must be at least one but may not exceed 99. The firm must have had at least one employee with a university education exceeding three years. The sample is also corrected for statistical and economical outliers. The final sample contains about 23,500 firms and a total of about 100,000 observations.

[Table 2 about here]

The sample division is based on if the firm has had collateralizable assets during the sample period or not. Firm collateral is measured as the book value of a firm's real estate and/or land assets.[6]

III Estimation strategy

It is not straightforward to estimate a regression with firm-level data in a dynamic context. Employment serves as dependent variable here. Arellano & Bond (1991) point to the persistence of employment and how that could create problems in terms of estimation. When a time series is persistent it probably needs to be modeled as an autoregressive series. In order to illustrate and explain the estimation strategy of this paper, consider the following simple autoregressive series with additional covariates:

$$Y_{i,t} = \alpha \cdot Y_{i,t-1} + \beta \cdot X_{i,t} + \eta_{i,t}$$
$$\eta_{i,t} = \upsilon_i + \varepsilon_{i,t}$$

Applying ordinary least squares (OLS) estimation provides inconsistent estimates because of the negative correlation between $Y_{i,t-1}$ and the time invariant component of the error term. Within estimation is consistent if the sample covers a long time period. As Nickel (1981) shows, if the panel contains many observations but covers few time periods, a so called "small T, large N" panel, the fixed effects component is positively correlated with $Y_{i,t-1}$ and thus yields biased estimates. Another

[6] There are papers arguing that banks primarily request private collateral from smaller firms, see e.g. Binks & Ennew (1996) and Reid & Jacobsen (1988). I do not have access to data on private collateral why firm collateral must suffice.

problem of utilizing within estimation is that it requires strictly exogenous covariates, and it is not likely to find strictly exogenous covariates when using economic firm-level data (Bond (2002)).

Generalized method of moments (GMM) estimation is supposed to correct for the biases which arise from applying OLS or within estimation to dynamic panels. Arellano & Bond (1991) develop and test "difference" GMM which transforms the specification above through differencing which wipes out the time invariant component of the error term. Estimation is performed instrumenting the dependent variable and the predetermined variables with lagged levels, and instrumenting the strictly exogenous variables with differences. The instrumentation procedure is conducted in order to deal with endogeneity and simultaneity biases. There are however a drawback with "difference" GMM. If the panel is unbalanced with gaps (as the sample of this paper is) the differencing procedure reduces the sample size and potentially important information is lost.

Instead, "System" GMM has some advantages over the "difference" GMM procedure. "System" GMM proposed by Arellano & Bover (1995) and Blundell & Bond (1998) utilizes another type of transformation, the so called "forward orthogonal deviations" transformation. The transformation of "System" GMM subtracts the averages of all future observations of the variable instead of subtracting the previous observation from the contemporaneous as in "differencing" GMM. "System" GMM also allows for additional instruments since it builds on the assumption that first differences of instruments are uncorrelated with the fixed effects. Therefore "System" GMM builds a system containing both the original level equation and a differenced equation.

IV Sales-employment sensitivity

A. Specification

The following specification is used in order to calculate sales-employment sensitivities.[7]

$$\ln(E)_{i,t} = \alpha + \phi \cdot \ln(E)_{i,t-1} + \beta \cdot \ln(Sales)_{i,t} + \gamma \cdot \ln(Sales)_{i,t} * Collateral_{i,t} + \mu_t + \nu_i + \varepsilon_{i,t}$$

[7] The ln (sales) variable is treated as predetermined. If $E[x_{i,t}\varepsilon_{i,s}] \neq 0$ for s < t but $E[x_{i,t}\varepsilon_{i,s}] = 0$ for all $s \geq t$, the variable is considered predetermined. In other words, ln (sales) may be correlated with previous realizations of the idiosyncratic error term.

I wish to capture the effect of sales on employment; additionally I want to test if the sales-employment correlation for firms with collateral is different. In order to properly capture these effects I apply a dynamic specification with lagged employment as explanatory variable, firm fixed effects, and a full set of time dummies. The γ-parameter corresponding to the interaction term tests formally if firms with or without collateral have different sales-employment sensitivity. The interpretation of γ is how much does the sales-employment correlation of firms with collateral deviate from β, i.e. the response for firms without collateral. The collateral variable is a binary variable assigning one if the firm-year observation in question reported book value on collateral and 0 if it did not.

Bond (2002) and Roodman (2006) propose a way to draw advantage of the inconsistent estimates of OLS and within estimation. Since OLS provides upward biased estimates of the lagged dependent variable and within estimation with downward biased estimates, a good benchmark for a consistent specification is to fall in between the OLS and within estimates.

The GMM estimation procedures presented in section 3 rests on the assumption that the idiosyncratic errors are uncorrelated and for that reason it is recommended to include time dummies (Roodman (2006)).

I estimate and report both one-step and two-step GMM estimation. The one-step estimation uses robust standard errors which controls for heteroscedasticity, as compared to two-step estimation which only deals with the homoscedasticity case resulting in downward biased standard errors. For this reason Arellano & Bond (1991) recommend one-step estimation for inference. The two-step estimates are run mainly because it enables me to test the validity of the instruments using the Sargan test of over-identification of Sargan (1958) which is only available for the homoscedasticity case.

B. Results

Table 3 provides the regression results. This specification was also run with two lags of the dependent variable. The second lag turned out to be non-significant and it did not improve the test statistics which made me choose the one lag structure for the dependent variable.[8]

[Table 3 about here]

[8] The results from the regressions with two lags of the dependent variable are not included in the paper due to space limitation but they are available upon request.

The results from the "system" GMM considering the lagged dependent variable falls in between the OLS and within estimates as it should. The "difference" GMM estimate is almost identical to the within estimate implying downward biased results. However, the "difference" GMM does not reject the null hypothesis of autocorrelation while "system" GMM does so. That fact is disturbing but I still choose to report the "system" GMM estimates based on the consistent results of the lagged dependent variable.

The β-estimate is as expected positive and rather large. The robust one-step "system" GMM estimate of β is 0.372. Interestingly the γ-estimate is as large as 0.238. These results suggest that firms with collateral have a sales-employment sensitivity of 0.61 while firms without collateral have a corresponding sensitivity of 0.372. Since the median firm of the two sub-samples, presented in table 2, appear to be identical the large difference in terms of sales-employment sensitivities is surprising. The sales-employment sensitivities are further evaluated in the next section.

V Robustness checks

In A the impact of collateral on consulting firms is compared to the results of Martinsson (2008) for manufacturing firms. In B I perform three different sample splits and estimate sales-employment sensitivities in order to test the robustness of the results obtained in section IV.

A. Manufacturing firms vs. consulting firms

Collateral should play a more important role for manufacturing firms since they are more capital intensive and therefore are more likely to require external capital. In Martinsson (2008) manufacturing firms with collateral display a counter-cyclical response to sales variation (i.e. $(\beta+\gamma)$ is negative) whereas firms without collateral display a pro-cyclical response (β-estimate positive). These results imply that firms with collateral can borrow externally, as earnings are reduced by declining sales, which enables the counter-cyclical response. These results corroborate with previous results from adjacent fields of research, see e.g. Aghion et al (2005, 2007). Below is the specification submitted for estimation:[9]

[9] The specification has been run without lags of the dependent variable and with one lag but it was not until two lags of the dependent variable that the specification became clear of autocorrelation.

$$K.I._{i,t} = \phi_1 \cdot K.I._{i,t-1} + \phi_2 K.I._{i,t-2} + \beta \cdot \ln(Sales)_{i,t} + \gamma \cdot \ln(Sales)_{i,t} * Collateral_{i,t} + \mu_t + \nu_i + \varepsilon_{i,t}$$

Based on the criteria of model selection presented in section IV it is hard to distinguish "difference" GMM from "system" GMM. As expected the OLS estimate produces a much larger estimate of the first lag of the dependent variable than the within estimate, 0.613 compared to 0.077. Both GMM procedures produce estimates in between of the OLS and within estimates.

[Table 4 about here]

As Arellano & Bond (1991) suggest I use the one-step estimates for inference since it controls for heteroscedasticity and therefore do not have biased standard errors. A similar pattern as for the manufacturing firms is present for the knowledge intensive consulting firms as suggested by both "difference" and "system" GMM. The "system" GMM estimates display a positive correlation between sales and knowledge intensity for firms without collateral. Whereas γ turns the overall effect for firms with collateral negative thus suggesting that sales and knowledge intensity is negatively correlated.

The counter-cyclical relationship between knowledge intensity and sales for firms with collateralizable assets suggest that collateral enabling firms to access external capital as earnings are reduced.

B. Sample splits

I split the sample based on three different criteria in order to explore the sensitivity of the results of section IV.

The first sample split is based on a measure proposed in Griliches (1969). It is called the gross rate of return on capital (GRR). GRR is calculated as the gross profit of the firm, expressed as value added minus its payroll, divided by the capital stock, i.e. the ratio of gross profit per unit of capital.

Marginal q is usually utilized to measure firm investment opportunities, but marginal q is not a feasible option when dealing with non-publicly traded firms. The q theory of investment measures how much a unit's increase in the firm's capital stock increases the value of the firm's profits. Left out to book value entities I argue in favor of the GRR measure as a proxy for investment opportunities, implying that firms with a high GRR ratio are facing investment opportunities to a greater extent

than firms with a low GRR. From a lender's point of view a firm with high GRR is more likely to be able to repay its debt since it is profitable in relation to its capital.

The other two sample splits are made based on knowledge intensity, and leverage[10]. In all three cases I have calculated the median for each firm over the sample period. Then the median for each of the three split criteria is located and then the sample is split in half.

B.1 Investment opportunities

Starting with the GRR sample split it is expected that firms above the median in terms of GRR are not in need of collateral to the same extent as firms in the below median sample since funds are supposed to be channeled to firms with investment opportunities.

Table 5 contains the results from the sample splits. I only present the one-step "system" GMM results in table 5 because they performed best following the estimation procedure of section IV.

[Table 5 about here]

The above GRR sub-sample estimated γ at -0.014, but it is only significant at below 10 percent with a z-value of -2. This cannot be considered an overwhelming result based on the large sample. On the other hand the below median GRR sub-sample provides with a strongly significant parameter estimate of γ, at 0.216.

The above median GRR sub-sample displays surprisingly different results than for the full sample. The low value of the estimate of the lagged dependent variable is particularly surprising suggesting that firms with high GRR are less persistent in terms of employment. The low z-value of γ is inline with expectations.

The firms of the above median sample share similar sales-employment sensitivity regardless collateral. Firms in the below median sample appear to face a similar impact of collateral as for the full sample.

[10] Leverage is defined as short debt plus long debt divided by total assets.

B.2 Knowledge intensity

As a next sensitivity check I split the sample based on knowledge intensity. It is interesting to explore if firms with more expensive and educated employees display different sales-employment sensitivities.

The above median sub-sample has a smaller β-estimate than the firms of the below median sub-sample. Highly knowledge intensive firms without collateral have a sales-employment sensitivity of 0.311. The highly knowledge intensive firms has a greater difference between firms with and without collateral. The sales-employment sensitivity for firms with collateral is 0.462 (0.311+0.151), implying that sales-employment sensitivities for firms with collateral is 49 percent higher than for firms without collateral. For the below median sample in terms of knowledge intensity the γ-estimate is again displaying a small z-value of only 3. However, the β-estimate is as large as 0.443.

Based on splitting the sample on knowledge intensity the conclusion is that highly knowledge intensive firms have lower sales-employment sensitivity than less knowledge intensive firms. On the other hand if highly knowledge intensive firms have collateral they display similar sales-employment sensitivity as the less knowledge intensive firms.

B.3 Leverage

Finally the sample is split based on firm leverage. Firms with high leverage are considered to have better access to external credit than firms with a low leverage ratio. Of course, a too levered firm could be a case of an insolvent or unsuccessful firm.

For the above median leverage sub-sample the β-estimate is 0.478. The γ-estimate is significant but with a low z-value, below 3. For the below median sub-sample the β-estimate is small at 0.285 implying that firms with poor credit market access have low sales-employment sensitivity. However firms with collateral in the below median sub-sample have significantly higher sales-employment sensitivity. The γ-estimate is estimated at 0.17 (with a z-value of 9) suggesting that firms with collateral in this sub-sample have a sales-employment sensitivity of 0.455.

Consulting firms with high leverage and with low leverage and collateral have similar sales-employment sensitivity.

VI Conclusion

The question asked in the beginning of the paper regarding if collateralizable assets facilitate high sales-employment sensitivities or if the lack of collateralizable assets simply is a feature of firms not intending to grow is of key importance. The results of the robustness section increase the likelihood that the possession of collateral actually facilitates high sales-employment sensitivities. However an omitted variable bias problem can never be excluded. The sample division produces sub-samples with almost identical median firms implying that there is no size dimension in terms of sales or employment for firms with and without collateralizable assets. The distribution of firms with collateralizable assets is evenly distributed across sub-sectors (at the SIC 5-digit level) within the consulting sector implying that the results are not biased toward a specific segment of consulting firms.[11]

As a final robustness check the debt structure of firms with and without collateralizable assets is investigated. By simply comparing median leverage of the sub-samples no difference is visible, both sub-samples displaying leverage at around 0.60. But when breaking down the leverage number into long and short-term debt there is a clear distinction between the two sub-samples. The median short/long debt-ratio[12] of firms with collateralizable assets is around 4. The same ratio for firms without collateralizable assets is 139. This is evidence of collateralizable assets playing an important role for consulting firms. It is also unlikely that firms which do not wish to grow choose to only use short-term debt which supports the notion of collateralizable assets facilitating high sales-employment sensitivity. The argument of Kaplan & Zingales (1997) says that low cash flow-investment sensitivity is a sign of financial distress. Based on the debt structure of firms with low sales-employment sensitivities their argument is also applicable in this paper. Firms without collateralizable assets need to repay their short-term debt before directing its generated cash flow to employment. On the other hand firms with collateralizable assets can direct a larger portion of its earnings to employment because of their more favorable debt-structure. Possessing collateralizable assets facilitate higher sales-employment sensitivities for knowledge intensive consulting firms.

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[11] The list of consulting sub-sectors at the 5-digit level is available upon request.
[12] This ratio is computed as (Value of median short-term debt) / (value of median long-term debt). The calculations are available upon request

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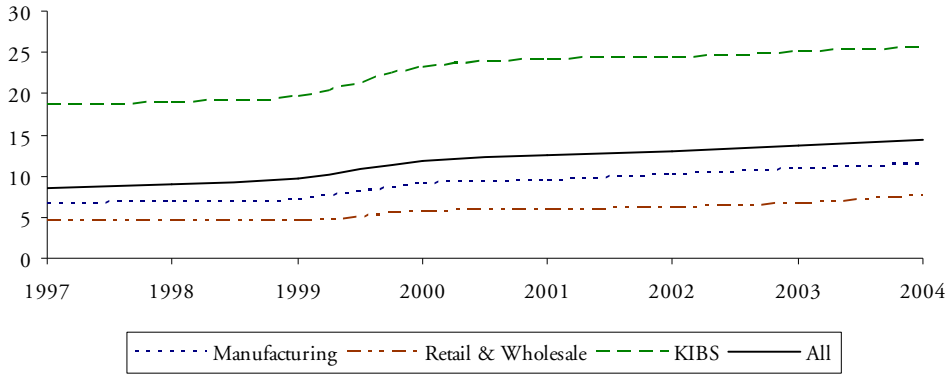

Fig. 1: Knowledge intensity expressed as a percentage across sectors

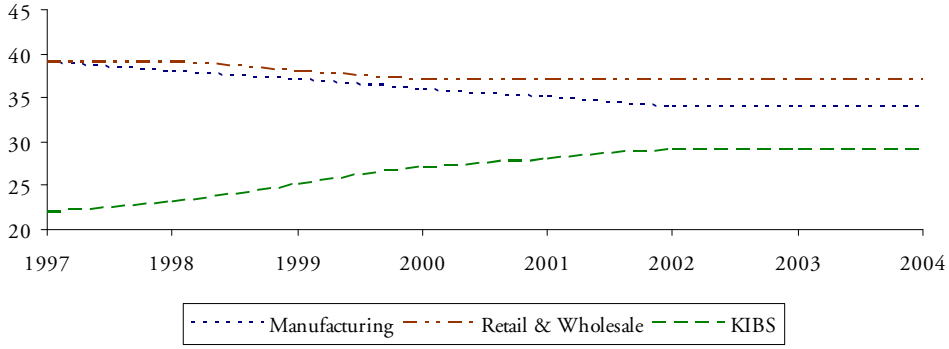

Fig. 2: Relative employment strength expressed as a percentage across sectors

SIC	Sub-sector	Obs	K-I (1)	E-G (2)	Ca-I (3)	Lev (4)
70	Real Estate	13727	10.0	2.5	48000	0.82
71	Renting	2013	2.9	3.8	146000	0.73
72	Data-related Consulting	25566	40.0	8.2	31000	0.60
73	R&D	2481	56.0	2.6	51000	0.57
74	Business-related Consulting	119523	40.0	5.9	30000	0.62
80	Education	7163	36.4	14.8	35000	0.65
85	Health & social work	34160	40.0	9.0	44000	0.56
91	Organizations	1890	33.3	0.8	37000	0.61
92	Culture & recreation	10401	10.0	4.4	53000	0.67
93	Personal service activities	2716	4.6	5.4	49000	0.72
	Median KIBS		33.3	6.7	35000	0.62

Table 1: Descriptive Statistics of the KIBS-sectors [13]

[13] (1)-(4) represent the median firm during the sample period. (1) Knowledge intensity expressed as a percentage defined as the number of employees with a university education exceeding three years divided by total employment; (2) Annual employment growth expressed as a percentage; (3) The Capital intensity in SEK defined as the capital stock divided by employees; (4) Leverage defined as total debt divided by total assets.

Variable	Mean	Q1	Median	Q3	Min	Max
Whole Sample (Obs.=101582)						
No Employees	6.51	1.00	2.00	6.00	0.00	190
Sales (1)	7151	933	1954	5729	1.00	830571
Variation of Sales (2)	0.02	-0.19	0.04	0.25	-8.96	11.91
Knowledge Int. (3)	0.47	0.00	0.44	1.00	0.00	1.00
With Collateral (Obs.=22280)						
No Employees	6.19	1.00	2.00	6.00	0.00	163
Sales (1)	6796	1100	2025	5917	1.00	830571
Variation of Sales (2)	0.01	-0.18	0.03	0.22	-7.67	8.51
Knowledge Int. (3)	0.47	0.00	0.47	1.00	0.00	1.00
Without Collateral (Obs.=79302)						
No Employees	6.59	1.00	2.00	6.00	0.00	190
Sales (1)	7251	888	1927	5685	1.00	716100
Variation of Sales (2)	0.02	-0.19	0.04	0.26	-8.96	11.91
Knowledge Int. (3)	0.47	0.00	0.44	1.00	0.00	1.00

Table 2: Descriptive statistics of the sample [14]

[14] (1) In thousand SEK; (2) $\ln(S_{i,t}) - \ln(S_{i.t-1}) = \ln(S_{i,t}/S_{i,t-1})$; (3) Employees with a university education exceeding three years / Total employment.

Dep: ln(Emp)			One-step	Two-step	One-step	Two-step
	OLS	**Within**	**Diff GMM**	**Diff GMM**	**Sys GMM**	**Sys GMM**
lnE(t-1)	0,732***	0,210***	0,220***	0,216***	0,461***	0,485***
	(-0,003)	(-0,006)	(-0,012)	(-0,012)	(-0,008)	(-0,008)
ln (Sales)	0,203***	0,288***	0,180***	0,085***	0,372***	0,377***
	(-0,003)	(-0,005)	(-0,031)	(-0,025)	(-0,007)	(-0,006)
ln (Sales)*F_C	0,017***	0,001	0,269***	0,192***	0,238***	0,134***
	(-0,003)	(-0,006)	(-0,019)	(-0,019)	(-0,025)	(-0,019)
Observations	96697	96697	84694	84694	96697	96697
Firms		23341	20974	20974	23391	23391
Av Obs. per firm		4,1	4	4	4,1	4,1
Sargan				0		0
AR(1)			0	0	0	0
AR(2)			0,624	0,697	0,01	0
St Error	Robust	Robust	Robust		Robust	

- Diff GMM: Instruments for differenced equation: GMM-type l(2/3).ln(E); l(1/.).ln (Sales); l(1/.).ln (Sales)*F_C. Standard: D.F_C; D.99-D.04.
- System GMM: Instruments for differenced equation: GMM-type l(2/3).ln(E); l(1/.).ln (Sales); l(1/.).ln (Sales)*F_C. Standard. Standard: D.F_C; D.99-D.04. Instruments for level equation: GMM-type LD.ln(E) D.ln (Sales) D.ln (Sales)*F_C

Table 3: Regression results from the sales-employment equation [15]

[15] The dependent variable is ln (Employment). F_C is firm collateral and is a binary variable assigning 1 if the firm has had collateral and 0 otherwise. Standard errors are within parenthesis and all regressions are run with time dummies. ***, **, * correspond to a 1, 5, and 10 percent significance level respectively.

Dep: K.I.			One-step	Two-step	One-step	Two-step
	OLS	**Fe**	**Diff GMM**	**Diff GMM**	**Sys GMM**	**Sys GMM**
K.I.(t-1)	0,613***	0,077***	0,431***	0,453***	0,453***	0,474***
	(0,005)	(0,007)	(0,014)	(0,013)	(0,010)	(0,009)
K.I.(t-2)	0,183***	-0,090***	0,070***	0,071***	0,067***	0,072***
	(0,005)	(0,006)	(0,080)	(0,008)	(0,009)	(0,008)
Ln(Sales)	0,009***	0,077***	0,111***	0,101	0,081***	0,069***
	(0,001)	(0,002)	(0,011)	(0,011)	(0,003)	(0,002)
Ln(Sales)*F_C	-0,008***	-0,019***	-0,155***	-0,128***	-0,101***	-0,074***
	(0,002)	(0,004)	(0,0169	(0,016)	(0,014)	(0,013)
Obs	78776	78776	69945	69945	78776	78776
Firms		21051	18942	18942	21051	21051
Av Obs per firm		3,7	3,7	3,7	3,7	3,7
Sargan				0,000		0,000
AR(1)			0,000	0,000	0,000	0,000
AR(2)			0,906	0,666	0,345	0,291
St Errors	Robust	Robust	Robust		Robust	

- Diff GMM: Instruments for differenced equation: GMM-type l(2/3).K.I.; l(1/.).ln (Sales); l(1/.).ln (Sales)*F_C. Standard: D.F_C; D.99-D.04.
- System GMM: Instruments for differenced equation: GMM-type l(2/3).K.I.; l(1/.).ln (Sales); l(1/.).ln (Sales)*F_C. Standard. Standard: D.F_C; D.99-D.04. Instruments for level equation: GMM-type LD.K.I. D.ln (Sales) D.ln (Sales)*F_C

Table 4: Regression results from the knowledge intensity equation [16]

[16] The dependent variable K.I. is knowledge intensity defined as employees with a university education exceeding three years / Total employment. F_C is firm collateral and is a binary variable assigning 1 if the firm has had collateral and 0 otherwise. Standard errors are within parenthesis and all regressions are run with time dummies. ***, **, * correspond to a 1, 5, and 10 percent significance level respectively.

Dep: ln(emp)	GRR		K.I.		Leverage	
	Above	**Below**	**Above**	**Below**	**Above**	**Below**
lnE(t-1)	0,250***	0,451***	0,483***	0,400***	0,398***	0,459***
	(0,007)	(0,010)	(0,011)	(0,010)	(0,010)	(0,011)
lnS	0,314***	0,348***	0,311***	0,443***	0,478***	0,285***
	(0,007)	(0,009)	(0,009)	(0,011)	(0,013)	(0,008)
lnS*F_C	-0,014*	0,216***	0,151***	0,087***	0,080***	0,170***
	(0,007)	(0,024)	(0,025)	(0,029)	(0,028)	(0,025)
Obs	58712	50631	54413	54930	53400	55943
Firms	12250	11695	11711	12234	11996	11949
Av Obs per firm	4,8	4,3	4,6	4,5	4,5	4,7
St Error	Robust	Robust	Robust	Robust	Robust	Robust

Table 5: Regression results from sample splits [17]

[17] Run as system GMM in table 3.