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Berlin, May 2006

Opinions expressed in this paper are those of the author and do not necessarily reflect views of the institute.

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Abstract

Using a unique, large panel of German firms, we examine whether participation in business groups reduces the sensitivity of investment to cash flow. The main finding is that the reduction in the sensitivity is small for small firms and negligible for medium and large firms. We argue that by virtue of the continental business model, gains from business groups should be in better contract enforcement and coordination rather than in internalizing capital markets.

Keywords: concern, business group, investment, liquidity constraints.

JEL Classification: G32, G34

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1 Introduction

Business groups play an important role in many developed and developing countries. This corporate structure allows firms within these groups to reduce transaction costs, overcome market imperfections and increase performance by using economies of scale and scope (e.g., Alchian 1975, Williamson 1975, Chang and Choi 1988, Stein 1997, Khanna and Pelepu 2000, Khanna 2000, Morck et al. 2005). Business groups have a dark side as well (cf. Scharfstein and Stein 2000). More specifically, recent studies have shown that investment of firms affiliated with business groups is less sensitive to cash flow than investment of firms outside of business groups (e.g., Hoshi, Kashyap and Scharfstein 1991, Ramirez 1995, Perotti and Gelfer 2001). However, available evidence on the sensitivity of investment to liquidity in developed countries is only available for Anglo-American and Japanese business models and, to the best of our knowledge, little is known about the sensitivity in the continental business model. In fact, Morck et al. (2005, p. 672) observe that the lack of results may be due to "the lack of empirical attempts using developed country data." This paper fills this gap and examines the investment sensitivity to cash flows in a unique, large sample of German firms.[1] Using the econometric framework developed in Bond et al. (2003), we find that the sensitivity of investment to cash flow is virtually identical for firms participating in business groups as well as firms outside of business groups. This suggests that the European continental business model is effective in overcoming imperfections in the financial market and that gains from participation in business groups should come from other sources.

[1] Previous research on continental business model and its implications for investment are for the periods of early capitalism (e.g., Fohlin 1998, Becht and Ramirez 2003). Audretsch and Elston (2002), Behr (2005), and Bond et al. (2003) analyze the sensitivity of investment to cash flow for more modern German firms. They, however, do not consider the effects of participating in business groups.

2 Data

We use the Deutsche Bundesbank's database of income statements and balance sheets of German non-financial companies. (See Deutsche Bundesbank (1998) for a detailed description.) The number of firms included in the data varies from 50,000 to 70,000 per year and the available data span from 1988 to 2000. Although the sample of firms is not generally representative (the Bundesbank collects information only on firms applying for rediscount transactions), the coverage of the manufacturing sector is very high (see Deutsche Bundesbank 1998). Hence, because we focus on manufacturing firms in the corporate sector, our sample is interesting and important from statistical and policy standpoints. After dropping outliers and firms with incomplete records, our sample includes 8,260 firms and 74,174 observations.[2] Importantly, our data have a large portion of small- and medium-sized firms while previous exercises used data for listed companies that tend to be very large relative to non-listed firms. This aspect of the data is particularly important because most business groups include a large number of small unlisted entities, and the effect of participating in a business group is expected to be larger for small firms. Table 1 presents descriptive statistics.

Importantly, firms are required to disclose if they are a part of a business group, or *Konzern*. Hence, in contrast to previous work, we can identify affiliation very accurately. The firms participating in a Konzern are legally independent entities. Although these firms do not have to share a common owner with a controlling stake, they are coordinated by a single decision-making center and bound together by cross-firm equity holdings. Often, a Konzern includes a bank and other financial firms.[3] In our sample, approximately 12 percent of firms participate in Konzerns. Firms outside business groups (stand-alone firms) tend to have both higher investment to capital and cash flow to capital ratios than firms inside Konzerns (Konzern firms). Sales growth is higher in stand-alone firms (0.043) than in firms inside groups (0.028). Konzern firms are more capital intensive (i.e., higher capital to sales ratio) than stand-alone firms.

[2] We excluded firms with opening balance sheet (Eröffnungsbilanz), and balance sheets not covering a full year (Rumpfbilanz). These types of balance sheet do not cover the entire year of a firm's activity. Furthemore, we consider only firms with tax balance sheet (Steuerbilanz) or commercial balance sheet (Handelsbilanz) types of accounting.

[3] For example, Volkswagen Konzern includes Volkswagen, Škoda, Bentley, Bugatti, AUDI, SEAT, Lamborghini, Volkswagen Nutzfahrzeuge Scania, Volkswagen Marine Bootsmotoren, Volkswagen Bank, Volkswagen Leasing, Europcar and Volkswagen Insurance Service. See http://de.wikipedia.org/wiki/Volkswagen_AG.

Table 1
Descriptive statistics

Variable		All		Firms outside Konzern		Firms inside Konzern	
		Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
(1)		(2)	(3)	(4)	(5)	(6)	(7)
$I_{it} / K_{i,t-1}$	overall	0.291	0.637	0.301	0.65	0.223	0.533
	between		0.285		0.306		0.295
	within		0.576		0.585		0.469
$CF_{it} / K_{i,t-1}$	overall	1.206	3.31	1.254	3.382	0.869	2.731
	between		3.336		3.426		2.412
	within		2.158		2.205		1.643
$\Delta \ln Y_{it}$	overall	0.041	0.208	0.043	0.205	0.028	0.223
	between		0.0826		0.088		0.124
	within		0.193		0.190		0.199
$\ln(K_{i,t-1} / Y_{it})$	overall	-2.439	1.266	-2.478	1.281	-2.166	1.114
	between		1.229		1.237		1.114
	within		0.442		0.445		0.363
N obs		74,174		64,808		9,366	
N cross sections		8,260		7,743		1,440	
Avg obs per cross section		9.0		9.4		6.5	

Note: This table reports descriptive statistics for German manufacturing firms. The time span is from 1988 to 2001. *CF* is cash flow (sales minus the cost of materials minus the wage bill minus operating taxes minus rental and leasing expenses minus interest and other operating expenses), *I* is investment (gross additions to tangible assets minus gross disposal of tangible assets), *K* is capital stock (the end of period balance sheet value of land, buildings, technical equipment and machines, other equipment and machines), *Y* is net sales.

3 Econometric specifications and results

Since we do not have information about the value of firms, we use the econometric specifications motivated and developed in Bond et al. (2003). In particular, we estimate the following regressions:

$$\frac{I_{it}}{K_{i,t-1}} = \rho_0 \frac{I_{i,t-1}}{K_{i,t-2}} + \alpha_0 \Delta \ln Y_{it} + \alpha_1 \Delta \ln Y_{i,t-1} + \phi \ln\left(\frac{K_{i,t-2}}{Y_{i,t-2}}\right) + \beta_0 \frac{CF_{it}}{K_{i,t-1}} + \beta_1 \frac{CF_{i,t-1}}{K_{i,t-2}} + \\ + \gamma_0 \frac{CF_{it}}{K_{i,t-1}} \cdot BG_{it} + \gamma_1 \frac{CF_{i,t-1}}{K_{i,t-2}} \cdot BG_{i,t-1} + \omega_t + \lambda_i + \varepsilon_{it} \quad (1)$$

and

$$\frac{I_{it}}{K_{i,t-1}} = \rho_0 \frac{I_{i,t-1}}{K_{i,t-2}} + \rho_1 \left(\frac{I_{i,t-1}}{K_{i,t-2}}\right)^2 + \phi \frac{K_{i,t-2}}{Y_{i,t-1}} + \beta_0 \frac{CF_{i,t-1}}{K_{i,t-2}} + \gamma_0 \frac{CF_{i,t-1}}{K_{i,t-2}} \cdot BG_{i,t-1} + \omega_t + \lambda_i + \varepsilon_{it}, \quad (2)$$

where *i* and *t* index firms and time, (I/K) is investment to capital ratio, (K/Y) is capital to output ratio, (CF/K) is cash flow to capital ratio, *BG* is a business group dummy equal to one if the firm is affiliated with a business group and zero otherwise, $\Delta \ln Y$ is the growth rate of sales, ω_t and λ_i are time and firm fixed effects, ε is the error term.[4] As discussed in Bond et al. (2003), the error-correction specification (1) can be understood as an empirical generalization of the first order conditions for the optimal capital stock in a static factor demand model. On the other hand, the Euler specification (2) is based on explicit modeling of convex adjustment costs (Bond and Meghir 1991). The validity of these specifications is not mutually exclusive (see Bond et al. 2003).

These specifications are similar in spirit to the specifications in Perotti and Gelfer (2001) and Hoshi et al. (1991) which also interact in the business group dummy with the cash flow. The coefficients γ_0 and γ_1 are of central interest. If business groups make affiliated firms less sensitive to a firm's own cash flow, then γ_0 and γ_1 should be negative.[5]

We estimate specifications (1) and (2) by the system generalized method of moments (SYSGMM) developed in Arellano and Bover (1995), Blundell and Bond (1998) and others to address potential

[4] *CF* is measured as sales minus the cost of materials minus the wage bill minus operating taxes minus rental and leasing expenses minus interest and other operating expenses; *I* is defined as gross additions to tangible assets minus gross disposal of tangible assets; *K* is measured as the end of period balance sheet value of land, buildings, technical equipment and machines, other equipment and machines; *Y* is net sales.

[5] One should be careful in giving structural interpretation of the estimates of β as these parameters may not reflect the relationship between liquidity constraints and investment sensitivity (e.g., Kaplan and Zingales 1997). Put differently, the magnitude of *β* might have no structural interpretation. However, the comparison of treated (Konzern) and control (stand-alone) firms is informative as finding a significant treatment effect (i.e. the estimate of *γ* being significantly negative) is consistent with the fact that the control group faces greater financing constraints than the treatment group. (See Bond et al. 2003 for further discussion). Like the rest of the literature (cf. Khanna and Yafeh 2005), we do not address the potential endogeneity of participation in a business group.

endogeneity of regressors and persistence of the series. We also report least squares (OLS) and fixed-effect (FE) estimates as a useful benchmark. These alternative estimates may have somewhat better properties than SYSGMM because cash flow to capital ratio tends to have a weak serial correlation so that the first stage fit is not very strong. We generally find that the bias in OLS and FE estimates for the error correction and Euler specifications is small and, furthermore, the Hausman test cannot reject the hypothesis that OLS and FE estimates have significant bias (relative to SYSGMM) in the estimates of γ_0 and γ_1. Since OLS and FE tend to have smaller standard errors, we use OLS and FE that provide sharper inference.

Table 2 presents estimates of the error-correction specification (1). Consistent with previous evidence (Bond et al. 2003, Behr 2005), the sensitivity of investment to cash flow is small for German firms: the point estimate of β_0 varies between 0.019 (OLS) and 0.035 (SYSGMM). Investment in Konzern firms is less sensitive to liquidity since the OLS and FE estimates of γ_0 and γ_1 are negative. The SYSGMM estimates γ_0 and γ_1 are not statistically significant so that Konzern firms are not less financially constrained than their stand-alone counterparts. The estimates of the Euler specification (2) also suggest very low sensitivity of investment to cash flow. The point estimate of β_0 does not exceed 0.03. On the other hand, the estimate of γ_0 is small and generally positive such that Konzern and stand-alone firms share the same sensitivity.

Small- and medium-sized firms are more likely to have a large wedge between the internal and external costs of financing and, thus, the difference in investment sensitivity should be smaller for a small firm participating in Konzerns than for a small stand-alone firm. Using employment as a criterion, we divide our sample into three size classes – small (less than 100 employees), medium (between 100 and 500 employees), and large (more than 500 employees) – and report the estimates by size class in Tables 3 and 4. In the error-correction specification (Table 3), the sensitivity to cash flow is smaller for small Konzern firms than for their small stand-alone counterparts. There is little difference in the investment sensitivity for medium and large firms. In the Euler specification (Table 4), there is no difference between Konzern and stand-alone firms for all size classes.

We find that the qualitative results do not change when we estimate (1) and (2) for each industry separately (Tables 6 and 7): Konzern firms have marginally smaller sensitivity of investment to cash flow according to OLS and FE estimates and no difference in the sensitivity according to SYSGMM estimates. The reduction in the sensitivity is particularly small in the estimates of the Euler specification.

Table 2
Estimates of the error correction specification

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
$I_{i,t-1} / K_{i,t-2}$	0.101***	-0.112***	0.364
	(0.007)	(0.008)	(0.230)
$\Delta \ln Y_{it}$	0.357***	0.302***	1.147*
	(0.019)	(0.019)	(0.639)
$\Delta \ln Y_{i,t-1}$	0.230***	0.220***	0.385
	(0.015)	(0.015)	(0.914)
$(\ln K_{i,t-2} - \ln Y_{i,t-2})$	-0.057***	-0.199***	0.005
	(0.003)	(0.009)	(0.083)
$CF_{it} / K_{i,t-1}$	0.019***	0.033***	0.035
	(0.002)	(0.003)	(0.087)
$CF_{i,t-1} / K_{i,t-2}$	-0.003	0.017***	0.000
	(0.002)	(0.003)	(0.036)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.016***	-0.014**	-0.028
	(0.005)	(0.007)	(0.081)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.002	-0.001	-0.035
	(0.006)	(0.007)	(0.040)
N	56,403	56,403	45,127
R^2	0.08	0.08	
Sargan (p-value)			0.80
AR(1)			-2.85***
AR(2)			0.67

Note: Table reports estimates of specification (1). Industry and year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. Sargan is the Sargan-Hansen test of overidentifying restrictions . AR(k) are the test statistics for the presence of k-th order serial correlation in the error term. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3
Estimates of the Euler equation specification

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
$I_{i,t-1} / K_{i,t-2}$	0.232***	-0.019*	0.640
	(0.009)	(0.011)	(0.381)
$(I_{i,t-1} / K_{i,t-2})^2$	-0.033***	-0.014***	-0.135
	(0.003)	(0.003)	(0.092)
$K_{i,t-2} / Y_{i,t-1}$	-0.77910	-2.041***	-8.269
	(1.051)	(0.768)	(8.399)
$CF_{i,t-1} / K_{i,t-2}$	0.017***	0.028***	-0.014
	(0.001)	(0.002)	(0.016)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.003	0.011	-0.028
	(0.005)	(0.007)	(0.057)
N	65,280	65,280	56,865
R^2	0.051	0.038	
Sargan (p-value)			0.53
AR(1)			-2.2**
AR(2)			0.33

Note: Table reports estimates of specification (2). Industry and year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. Sargan is the Sargan-Hansen test of overidentifying restrictions. AR(k) are the test statistics for the presence of k-th order serial correlation in the error term. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4
Estimates of the error correction specification by firm size

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
Panel A: small firms (less than 100 employees)			
$CF_{it} / K_{i,t-1}$	0.020***	0.034***	0.032
	(0.003)	(0.003)	(0.067)
$CF_{i,t-1} / K_{i,t-2}$	-0.001	0.021***	0.005
	(0.003)	(0.003)	(0.033)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.021***	-0.019**	-0.014
	(0.006)	(0.008)	(0.066)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.001	0.001	-0.022
	(0.009)	(0.010)	(0.047)
N	29,769	29,769	24,708
Panel B: medium firms (the number of employees is between 100 and 500)			
$CF_{it} / K_{i,t-1}$	0.018***	0.029***	-0.009
	(0.004)	(0.005)	(0.069)
$CF_{i,t-1} / K_{i,t-2}$	-0.011***	0.005	-0.011
	(0.004)	(0.004)	(0.049)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.017*	-0.012	-0.029
	(0.010)	(0.015)	(0.167)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.001	-0.004	-0.017
	(0.008)	(0.011)	(0.072)
N	17,330	17,330	14,383
Panel C: large firms (more than 500 employees)			
$CF_{it} / K_{i,t-1}$	0.037*	0.043***	0.243
	(0.015)	(0.016)	(0.171)
$CF_{i,t-1} / K_{i,t-2}$	0.037***	0.050***	-0.010
	(0.014)	(0.015)	(0.054)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	0.023	0.046*	0.158
	(0.025)	(0.025)	(0.243)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.028	0.003	-0.096
	(0.021)	(0.020)	(0.191)
N	9,067	9,067	7,526

Note: Table reports estimates of specification (1). Industry and year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. Sargan is the Sargan-Hansen test of the overidentifying restrictions. AR(k) are the test statistics for the presence of k-th order serial correlation in the error term. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5
Estimates of the Euler equation specification by firm size

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
Panel A: small firms (less than 100 employees)			
$CF_{i,t-1} / K_{i,t-2}$	0.017***	0.030***	-0.017
	(0.002)	(0.003)	(0.024)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.006	0.015	-0.034
	(0.008)	(0.010)	(0.054)
N	35,009	35,009	30,087
Panel B: medium firms (the number of employees is between 100 and 500)			
$CF_{i,t-1} / K_{i,t-2}$	0.011***	0.018***	-0.054*
	(0.002)	(0.003)	(0.027)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.005	0.001	-0.132
	(0.006)	(0.009)	(0.121)
N	19,723	19,723	17,465
Panel C: large firms (more than 500 employees)			
$CF_{i,t-1} / K_{i,t-2}$	0.043***	0.070***	0.036
	(0.013)	(0.013)	(0.046)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.009	0.001	0.059
	(0.014)	(0.019)	(0.134)
N	10,283	10,283	9,074

Note: Table reports estimates of specification (2). Industry and year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. Sargan is the Sargan-Hansen test of overidentifying restrictions. AR(k) are the test statistics for the presence of k-th order serial correlation in the error term. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6
Estimates of the correction specification by industry

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
	Panel A: Food Industry		
$CF_{it} / K_{i,t-1}$	0.036**	0.056***	-0.023
	(0.014)	(0.015)	(0.075)
$CF_{i,t-1} / K_{i,t-2}$	0.001	0.046***	0.048
	(0.012)	(0.014)	(0.048)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.052**	-0.061***	0.089
	(0.021)	(0.021)	(0.123)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.016	-0.019	-0.079
	(0.020)	(0.022)	(0.071)
N	3,847	3,847	3,193
	Panel B: Textile Industry		
$CF_{it} / K_{i,t-1}$	0.020**	0.032***	0.053
	(0.009)	(0.009)	(0.091)
$CF_{i,t-1} / K_{i,t-2}$	0.007	0.022***	0.045
	(0.008)	(0.008)	(0.048)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.021**	-0.016	-0.025
	(0.009)	(0.013)	(0.083)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.009	-0.007	-0.068
	(0.008)	(0.010)	(0.053)
N	4,384	4,384	3,639
	Panel C: Wood Industry		
$CF_{it} / K_{i,t-1}$	0.025***	0.044***	0.028
	(0.005)	(0.007)	(0.073)
$CF_{i,t-1} / K_{i,t-2}$	-0.009**	0.017**	-0.002
	(0.004)	(0.005)	(0.047)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.036	-0.047	-0.159
	(0.026)	(0.030)	(0.217)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.063	0.064*	0.284
	(0.039)	(0.034)	(0.322)
N	10,606	10,606	8,803
	Panel D: Chemical Industry		
$CF_{it} / K_{i,t-1}$	0.010	0.023***	-0.002
	(0.007)	(0.007)	(0.159)
$CF_{i,t-1} / K_{i,t-2}$	-0.006	0.007	-0.000
	(0.007)	(0.009)	(0.144)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.020	0.002	0.123
	(0.016)	(0.024)	(0.194)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.019	0.011	-0.026
	(0.017)	(0.022)	(0.204)
N	7,530	7,530	6,250

Table 6 (continued)
Estimates of the correction specification by industry

Dependent variable: $I_{it} / K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
	Panel E: Glass Industry		
$CF_{it} / K_{i,t-1}$	0.043**	0.073***	0.092
	(0.017)	(0.015)	(0.076)
$CF_{i,t-1} / K_{i,t-2}$	0.006	0.032	0.057
	(0.022)	(0.025)	(0.049)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	0.038	-0.003	0.379
	(0.034)	(0.028)	(0.260)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.059**	-0.046	-0.142*
	(0.027)	(0.028)	(0.081)
N	2,391	2,391	1,985
	Panel F: Metallurgy		
$CF_{it} / K_{i,t-1}$	0.013**	0.030***	0.066
	(0.006)	(0.007)	(0.043)
$CF_{i,t-1} / K_{i,t-2}$	0.004	0.025***	-0.033
	(0.006)	(0.008)	(0.022)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	0.032	0.032	-0.244
	(0.021)	(0.021)	(0.182)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.034*	-0.014	0.184
	(0.017)	(0.019)	(0.179)
N	8,214	8,214	6,818
	Panel G: Metal processing		
$CF_{it} / K_{i,t-1}$	0.020***	0.031***	-0.045
	(0.004)	(0.005)	(0.108)
$CF_{i,t-1} / K_{i,t-2}$	-0.007**	0.011***	-0.036
	(0.003)	(0.004)	(0.068)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	-0.015*	-0.015	-0.129
	(0.008)	(0.011)	(0.201)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.008	-0.007	0.138
	(0.008)	(0.010)	(0.170)
N	14,279	14,279	11,852
	Panel H: Electronics		
$CF_{it} / K_{i,t-1}$	0.014**	0.028***	-0.060
	(0.007)	(0.007)	(0.132)
$CF_{i,t-1} / K_{i,t-2}$	0.003	0.021**	0.016
	(0.006)	(0.007)	(0.085)
$B_{it} \cdot CF_{it} / K_{i,t-1}$	0.009	0.028	0.093
	(0.024)	(0.022)	(0.200)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.021	-0.039*	-0.080
	(0.018)	(0.020)	(0.260)
N	5,152	5,152	4,276

Note: Table reports estimates of specification (1). Year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7
Estimates of the Euler equation specification by industry

Dependent variable: $I_{it}/K_{i,t-1}$	OLS	FE	SYS-GMM
(1)	(2)	(3)	(4)
	Panel A: Food Industry		
$CF_{i,t-1} / K_{i,t-2}$	0.034***	0.047**	-0.043
	(0.013)	(0.021)	(0.065)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.019	-0.001	-0.124
	(0.015)	(0.025)	(0.359)
N	4,451	4,451	3,895
	Panel B: Textile Industry		
$CF_{i,t-1} / K_{i,t-2}$	0.022***	0.032***	-0.054
	(0.004)	(0.006)	(0.069)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.003	0.008	0.086
	(0.008)	(0.010)	(0.062)
N	5,084	5,084	4,419
	Panel C: Wood Industry		
$CF_{i,t-1} / K_{i,t-2}$	0.014***	0.030***	-0.014
	(0.003)	(0.004)	(0.017)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.048*	0.053*	-0.011
	(0.027)	(0.030)	(0.243)
N	12,449	12,449	10,689
	Panel D: Chemical Industry		
$CF_{i,t-1} / K_{i,t-2}$	0.012***	0.024***	0.049*
	(0.003)	(0.007)	(0.027)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.024	0.015	-0.022
	(0.018)	(0.021)	(0.117)
N	8,701	8,701	7,604
	Panel E: Glass Industry		
$CF_{i,t-1} / K_{i,t-2}$	0.024**	0.040**	0.088
	(0.010)	(0.016)	(0.085)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.024	-0.010	-0.075
	(0.016)	(0.026)	(0.090)
N	2,756	2,756	2,411
	Panel F: Metallurgy		
$CF_{i,t-1} / K_{i,t-2}$	0.021***	0.032***	0.042
	(0.004)	(0.008)	(0.056)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.016	-0.025*	-0.246
	(0.010)	(0.014)	(0.251)
N	9,326	9,326	8,275
	Panel G: Metal Processing		
$CF_{i,t-1} / K_{i,t-2}$	0.013***	0.020***	-0.010
	(0.002)	(0.003)	(0.016)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	0.008	0.020	-0.029
	(0.015)	(0.017)	(0.087)
N	16,404	16,404	14,376
	Panel H: Electronics		
$CF_{i,t-1} / K_{i,t-2}$	0.022***	0.030***	0.012
	(0.004)	(0.005)	(0.053)
$B_{i,t-1} \cdot CF_{i,t-1} / K_{i,t-2}$	-0.023***	-0.048**	0.034
	(0.008)	(0.020)	(0.142)
N	6,109	6,109	5,196

Note: Table reports estimates of specification (2). Year dummy variables and constant term are included but not reported. Asymptotic robust standard errors are reported in parentheses. The set of instruments for SYSGMM includes third to fifth lags of levels of predetermined variables for the difference moment conditions and second to fifth lags of differences of predetermined variables for the level moment conditions. * significant at 10%; ** significant at 5%; *** significant at 1%.

In summary, we do not find strong support for the hypothesis that investment sensitivity to financial constraints is higher for stand-alone firms than for firms inside business groups (provided that the sensitivity of investment to cash flow is a good approximation of financial constraints; see Kaplan and Zingales, 1997). Hence, the continental model might be more efficient than one for Anglo-American countries, because of the prevalence of bank financing rather than equity financing. With large banks occupying corporate boards and closely monitoring firms, these firms can afford to make investment decisions based on long-term perspectives rather than on short-term cash flows, regardless if they are part of a business group. In light of our findings, the gains from participating in a business group should probably lie not so much in overcoming imperfections of financial markets (i.e., in internalizing capital market) but in better contract enforcement, coordination, monitoring, diversification and tax optimization (e.g., Hulle 1998).

4 Conclusion

Participation in business groups can attenuate information asymmetries and, thus, it can improve allocation of capital and reduce sensitivity of investment to cash flow. We find that firms do not benefit substantially from being a part of a business group in an economy with a continental business model. Specifically, the level of investment sensitivity in Germany is small and, hence, the reduction in the sensitivity that business groups can offer is small as well. Only small firms appear to have relatively small benefits from participation in business groups, while large and medium firms inside and outside business groups have the same sensitivity. The benefits of continental business groups may be in reducing other transaction costs by improving contract enforcement, coordination, and so on.

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