Investment, Credit Rationing, and the Soft Budget Constraint: What Would a Well-Functioning Credit Market Look Like?

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Abstract: IV estimates of the link between profits and investment in the Czech Republic find a complex relationship. While firms may occasionally be credit rationed or face soft budget constraints, investments generally flow to industries with the greatest profit potential or need for recapitalization.

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A long line of studies have investigated the link between possible capital market imperfections and investment behavior.[1] In the transition context, Lizal and Svejnar (2002) investigated the relationship between sales, profits and investment in the post-communist Czech Republic between 1993 and 1998. They find that lagged output is positively related to investment, while for some types of firms in some periods greater profits also lead to greater investment.

Instrumental Variables (IV) estimates of this relationship, however, find a much more complex pattern. While some firms in some years may be credit rationed or subject to soft budget constraints, many of the results are more consistent with investments being directed to targets of opportunity including industries with the greatest profit potential or most need of recapitalization.

The result regarding sales is consistent with accelerator models, but the lack of a relationship between profits and investment is problematic. Lizal and Svejnar suggest

a) a positive coefficient is "an indication that firms are credit rationed because, in a perfect capital market, the firm and lender would be indifferent between internal and external financing and the coefficient on profit would be zero (p. 361)," while

b) a zero coefficient "signals that firms have access to bank credit for investment independent of their profitability.... [and] this nondiscriminatory supply of bank funds to firms signals the presence of a soft budget constraint for poorly performing firms (p. 361)," and a negative coefficient suggests a stronger form of soft budget constraint where failing firms have greater access to credit.

Lizal and Svejnar divide firms into two types: credit rationed (cooperatives and smaller private firms) or facing a soft budget constraint, according to whether the sum of the coefficients of four lags of profits is positive or not (p. 369). The problem with this analysis is that it leaves no space for a normal, well-functioning capital market. We are led to ask: "What pattern of coefficients would

[1] For recent examples see Gomez (2002) and Erickson and Whited (2000). Earlier literature is surveyed in Fazzari et. al (1988).

support a conclusion that the capital market was performing its proper function, allocating scarce investment capital to firms where it would be most productive?"

Controlling for sales, high profits suggest that a firm has a higher than normal rate of return and represents an attractive investment opportunity. Using OLS estimates there is no way to distinguish whether a positive relationship between firm profits and investment means that more profitable firms have greater access to internal investment capital (credit rationing) or offer more attractive investment opportunities to all types of capital (excess returns). An easy modification enables such a distinction. If economic prospects are correlated across firms in an industry, the profits of other firms in an industry are a valid instrument that removes the effect of credit rationing. If firms invest more when other firms in the industry are profitable, this suggests that the effect is due to opportunity and not credit rationing.

Instrumental variables estimates also provide insight into the importance of soft budget constraints. If, however, firms invest more when other firms in the industry perform poorly, then the results are unlikely to be due to soft budget constraints. Rather, they raise causality issues. Suppose that some industries required more extensive restructuring to compete in world markets. These industries should exhibit low profits during restructuring while undertaking unusually large investment programs.

Table 1 contains estimates from Table 7 of Lizal and Svejnar as well as the results instrumenting firm profits in a given quarter by the mean profits of all other firms in the same industry for that quarter, independent of ownership type. $\Sigma\gamma_k$ is the sum of the coefficients on output lagged for four quarters while $\Sigma\beta_k$ is the sum of the coefficients on profits. In Table 1, we have marked as ***bold italics*** and shaded cases where the instrumental variable (IV) estimates of the effect of profits on investment are significantly different, at the five percent level, from the ordinary least squares estimates.[1] Lack of a significant difference means that the firm's own profit does not affect

[1]The test is a conventional Hausman test for difference in the set of coefficients β_k for k = 1, (Hausman, 1978), $W = (\beta_{OLS} - \beta_{IV})^T \left(VAR(\beta_{OLS}) - VAR(\beta_{IV})\right)^{-1} (\beta_{OLS} - \beta_{IV}) \approx \chi^2_{(k)} = \chi^2_{(1)}$.

investment beyond what is common to the industry and strongly suggests that the estimated profit effect is related to investment opportunity and not credit constraints. The converse, however, is not true. A significant difference between the two estimators is consistent with both credit rationing or a soft budget constraint and with firm idiosyncratic profit opportunities such as might arise from patents or other firm-specific factors.

The pattern of results is mixed but careful examination reveals several key points. While there are eight company-type/year pairs where there is a significant difference between the OLS and IV estimates, in four of these the IV estimates are greater than the OLS estimates, a result that is inconsistent with either the credit rationing or the soft budget constraint stories. Among the fifteen significant positive relationships between profits and investment that Lizal and Svejnar interpret as indicating possible credit rationing, in only one case (private, limited companies in 1997) was there a significant difference between the OLS and IV estimates, with the IV estimates being lower and insignificant. Three other cases (cooperatives in 1993 and 1995 and private, limited companies in 1995) suggest credit rationing, although large standard errors mean that estimated IV and OLS coefficients are not significantly different. In each case, the significant positive set of coefficients in the OLS estimates becomes negative and insignificant when the IV estimator is used to remove the effect of the firm's own profits but retain the investment attractiveness of the industry in general.

While, as discussed above, such a pattern might represent idiosyncratic opportunities available to these firms, given the types of firms involved it is likely that this difference in coefficients indicates credit rationing. Cooperatives were generally linked with agriculture and many were expected to go out of business during the transition, a fact born out by the substantial reduction in the number of such firms over the course of the sample from 215 in 1993 to 103 in 1998. The lack of any impact on the significant positive coefficients for cooperatives when firm-specific profit effects are eliminated though the use of IV estimators in the last two years studied strongly suggests that the apparent credit rationing in the early years of transition may, in fact, indicate rational risk assessment by banks who

refused to lend to firms that were destined to fail. Once the industry had settled down by 1996, there remains no evidence of credit rationing for these firms.

Indeed, the same can be said in general. With the exception of state-owed enterprises in 1997, there is little or no suggestion of credit rationing in any ownership-type group in the last two years under study. The apparent anomaly of state-owned enterprises is easily understood. By 1997 the Czech banking system was in crisis and was being prepared for privatization. State-owned firms no longer had access to soft money from this source. At the same time, they were yet to be privatized and their future was highly uncertain. Thus, it is not surprising that such firms would also not have ready access to debt or equity markets and would find themselves dependent on retained earnings for capital expenditures. With this one exception, however, the pattern of results suggests that the Czech capital market, rather than evidencing credit rationing, used profits as a signal of attractive investment opportunities, at least in late transition.

We also note that, of the ten significant negative relationships that Lizal and Svejnar interpret as supporting the strong form on the soft budget constraint, only three (private individuals in 1993, state owned enterprises in 1996 and mixed, joint stock companies in 1996) are significantly less negative in the IV estimates. As discussed above, a pattern whereby firms invest more when others in their industry are performing poorly is more suggestive of industries in need of restructuring than soft budget constraints, which are firm specific. This would create the negative relationships observed for some types of firms, especially private, joint stock companies in 1997 and 1998 by which time serious restructuring was underway in the Czech economy.

The functioning of the capital market is most easily seen by examining the coefficients for all firms combined. While at the start of transition these coefficients vary considerably across years and between the OLS and IV estimates, by the later years (1997 and 1998) the relationship between profits and investment is consistently positive in both the OLS and IV estimates, strongly suggesting that, instead of being credit rationed, Czech firms are more able to attract investment capital when they offer attractive investment opportunities.

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Table 1 OLS and IV Estimates of Investment Equation

1993

	All	State/ J. Stock	Private/ J. Stock	State/ SOE	Private/ Ltd.	Coop	***Private/ Individ.***	Foreign/ J. Stock	Foreign/ Ltd.	Mixed/ J. Stock
$\Sigma\gamma_k$	0.095***	0.113***	0.028	0.040***	-0.001	0.043	0.712***	0.706	-0.046*	0.199
	(0.005)	(0.010)	(0.022)	(0.015)	(0.006)	(0.029)	(0.029)	(0.875)	(0.025)	(0.132)
$\Sigma\beta_k$	-0.229***	-0.114*	-0.163	-0.150***	0.136***	0.153**	***-1.138****	-0.239	-0.043	-0.432
	(0.030)	(0.062)	(0.404)	(0.042)	(0.041)	(0.060)	***(0.475)***	(2.870)	(0.083)	(0.291)
$\Sigma\gamma_k$ (IV)	0.073	-0.058	0.334	0.065	0.000	0.056	0.686***	0.769	-0.084	0.207
	(0.063)	(0.510)	(1.326)	(0.193)	(0.038)	(0.362)	(0.026)	(0.911)	(0.161)	(0.146)
$\Sigma\beta_k$ (IV)	-0.034	-0.912	10.117	0.969	0.128	-0.198	***0.679***	0.140	0.200	-0.426
	(0.538)	(4.597)	(43.530)	(0.835)	(0.363)	(4.403)	***(0.492)***	(3.352)	(1.542)	(0.346)

1994

	All	State/ J. Stock	***Private/ J. Stock***	State/ SOE	Private/ Ltd.	Coop	Private/ Individ.	Foreign/ J. Stock	***Foreign/ Ltd.***	Mixed/ J. Stock
$\Sigma\gamma_k$	0.016***	0.000	0.025	0.000	0.016**	0.036***	0.310***	-0.018	0.228***	0.083
	(0.002)	(0.008)	(0.023)	(0.005)	(0.007)	(0.011)	(0.040)	(0.121)	(0.030)	(0.056)
$\Sigma\beta_k$	0.003	0.001	***0.048***	0.013	-0.057**	0.021	-0.351***	0.993**	***0.114***	-0.379**
	(0.013)	(0.020)	***(0.242)***	(0.025)	(0.028)	(0.054)	(0.092)	(0.394)	***(0.080)***	(0.165)
$\Sigma\gamma_k$ (IV)	0.016	0.316	0.099***	-0.002	0.027	-0.009	0.314***	0.008	0.225***	0.060
	(0.019)	(0.310)	(0.028)	(0.006)	(0.022)	(0.210)	(0.069)	(0.109)	(0.025)	(0.051)
$\Sigma\beta_k$ (IV)	-0.009	1.402	***-0.994****	0.016	-0.120	0.363	-0.368	0.904**	***0.232****	-0.200
	(0.149)	(1.369)	***(0.351)***	(0.026)	(0.167)	(1.435)	(0.230)	(0.410)	***(0.081)***	(0.169)

1995

	All	State/ J. Stock	Private/ J. Stock	State/ SOE	Private/ Ltd.	Coop	***Private/ Individ.***	Foreign/ J. Stock	Foreign/ Ltd.	Mixed/ J. Stock
$\Sigma\gamma_k$	0.074***	0.064***	0.038*	0.011**	0.090***	-0.003	0.070	0.240***	-0.078	-0.023
	(0.006)	(0.009)	(0.019)	(0.005)	(0.009)	(0.021)	(0.044)	(0.070)	(0.211)	(0.018)
$\Sigma\beta_k$	0.065***	0.084**	0.028	0.019	0.055**	0.159*	***0.020***	-0.268	0.436	1.164**
	(0.015)	(0.042)	(0.078)	(0.036)	(0.023)	(0.086)	***(0.113)***	(0.216)	(0.610)	(0.463)
$\Sigma\gamma_k$ (IV)	0.084***	-0.095	0.045	0.010*	0.096***	0.055	0.076**	0.249	0.042	-0.013
	(0.013)	(0.518)	(0.052)	(0.005)	(0.015)	(0.156)	(0.037)	(0.245)	(0.194)	(0.017)
$\Sigma\beta_k$ (IV)	-0.020	1.209	-0.093	0.056	-0.014	-0.574	***-0.114***	-0.312	0.676	0.787*
	(0.109)	(3.532)	(0.521)	(0.043)	(0.121)	(1.983)	***(0.102)***	(0.821)	(0.586)	(0.468)

1996

	All	State/ J. Stock	Private/ J. Stock	***State/ SOE***	Private/ Ltd.	Coop	Private/ Individ.	Foreign/ J. Stock	Foreign/ Ltd.	***Mixed/ J. Stock***
$\Sigma\gamma_k$	0.023***	0.059**	0.061***	0.104***	0.052***	0.024	0.225**	0.048	0.039**	0.058***
	(0.004)	(0.029)	(0.004)	(0.016)	(0.012)	(0.027)	(0.091)	(0.029)	(0.018)	(0.003)
$\Sigma\beta_k$	-0.070*	-0.190**	0.971***	***-0.459****	0.011	0.032	0.688**	0.033	-0.045	***-0.267****
	(0.036)	(0.093)	(0.056)	***(0.131)***	(0.084)	(0.248)	(0.320)	(0.230)	(0.056)	***(0.060)***
$\Sigma\gamma_k$ (IV)	0.007	0.066***	0.064	0.120***	0.044**	-0.046	0.216***	-0.086	0.048*	0.055***
	(0.012)	(0.025)	(0.043)	(0.015)	(0.020)	(0.372)	(0.077)	(0.273)	(0.028)	(0.003)
$\Sigma\beta_k$ (IV)	0.026	-0.090	1.438	***-0.235***	0.139	1.506	0.623**	-6.244	0.030	***-0.125***
	(0.255)	(0.093)	(3.849)	***(0.150)***	(0.357)	(8.082)	(0.284)	(3,114)	(0.866)	***(0.078)***

1997

	All	State/ J. Stock	Private/ J. Stock	***State/ SOE***	***Private/ Ltd.***	Coop	Private/ Individ.	Foreign/ J. Stock	Foreign/ Ltd.	Mixed/ J. Stock
$\Sigma\gamma_k$	0.014***	0.051**	0.105***	0.024	0.017***	0.020	-0.029	0.037	0.026***	0.011
	(0.002)	(0.020)	(0.008)	(0.021)	(0.003)	(0.012)	(0.057)	(0.034)	(0.007)	(0.008)
$\Sigma\beta_k$	***0.050****	0.063	-0.100**	***0.113***	***0.050****	0.249***	-0.261	0.351**	0.330***	-0.025
	(0.011)	(0.060)	(0.043)	***(0.082)***	***(0.022)***	(0.086)	(0.283)	(0.141)	(0.063)	(0.072)
$\Sigma\gamma_k$ (IV)	0.017***	0.059***	0.106***	0.040**	0.016***	0.019*	-0.003	0.043	0.028***	0.646
	(0.002)	(0.018)	(0.007)	(0.019)	(0.003)	(0.011)	(0.066)	(0.034)	(0.006)	(0.808)
$\Sigma\beta_k$ (IV)	***0.074****	0.079	-0.096**	***0.019***	***0.020***	0.319***	-0.191	0.264	0.329***	-0.269
	(0.014)	(0.062)	(0.046)	***(0.084)***	***(0.022)***	(0.083)	(0.338)	(0.175)	(0.059)	(1.073)

1998

	All	State/ J. Stock	Private/ J. Stock	State/ SOE	Private/ Ltd.	Coop	Private/ Individ.	Foreign/ J. Stock	Foreign/ Ltd.	Mixed/ J. Stock
$\Sigma\gamma_k$	0.013***	0.051	0.014***	0.630***	0.013***	0.042***	0.029*	0.620***	0.013***	0.067***
	(0.001)	(0.042)	(0.003)	(0.131)	(0.004)	(0.012)	(0.016)	(0.061)	(0.004)	(0.005)
$\Sigma\beta_k$	0.027***	-0.050	-0.118***	0.694*	0.005	0.136*	0.017	-0.361	-0.020	0.056***
	(0.007)	(0.243)	(0.037)	(0.363)	(0.034)	(0.077)	(0.066)	(0.220)	(0.055)	(0.020)
$\Sigma\gamma_k$ (IV)	0.012***	0.046	0.014***	0.584***	0.013***	0.043***	0.007	0.602***	0.009**	0.069***
	(0.001)	(0.036)	(0.002)	(0.118)	(0.003)	(0.011)	(0.019)	(0.059)	(0.004)	(0.004)
$\Sigma\beta_k$ (IV)	0.029***	-0.104	-0.095**	0.510	-0.005	0.147**	-0.084	-0.172	0.035	0.040**
	(0.008)	(0.227)	(0.038)	(0.351)	(0.035)	(0.071)	(0.092)	(0.271)	(0.051)	(0.020)

* significant at 10% level, ** significant at 5% level, *** significant at 1% level