7.5. MONITORING OF BORROWERS UNDER ASSYMETRIC INFORMATION: THE CZECH EXPERIENCE IN THE EARLY 1990S

Aleš Bulíř
International Monetary Fund

7.5.1. Introduction

Economies in transition have been undergoing a complicated period of reform, amplified by developments in commercial banks and in the financial sector in general. Even in those countries where successful macroeconomic stabilization has occurred, overall economic growth is still relatively slow, at least compared to the Asian newly industrialized countries, and the sectoral industrial growth is highly volatile. Oddly enough, there is no clear divisive line between failing and prosperous firms going between sectors or property forms that would simplify resource allocation. One can rather observe that successful firms remain successful and latecomers cannot catch up.

This section suggests simple hypotheses of bank monitoring, credit rationing under asymmetric information, and economic growth and tests them on relevant Czech data. It is argued that the asymmetric information under rudimentary and imperfect monitoring might lead to excessive market differentiation and a slowdown in economic growth. The section concludes that existing self-regulating mechanisms in credit markets as well as state interventions are too weak to remove those effects in the short run. The results can be observed even in the Czech Republic, where the level of borrowers' differentiation is relatively small in comparison with some emerging economies or less developed countries.

7.5.2. Credit Markets and Imperfect Information

7.5.2.1. Asymmetric Information in the Financial Sector. In this section we discuss a simplified economy with financial intermediation under asymmetric information. We assume that some private information is not available to other market participants. Both creditors and debtors are able to monitor different proxy variables and derive from those variables probabilities of events like investment risk or risk of bank runs. The resulting credit-market equilibria affect the "real" behavior of firms.[12]

The literature usually assumes the existence of two types of debtors—"good" debtors who repay their loans with probability p^g and "bad" debtors who repay with probability p^b, assuming $0 < p^b < p^g < 1$. The "type of a debtor" is private information known only to the debtor: he is ex ante undistinguishable from other debtors (in other words, the return to investment is a random variable). Debtors are numerous and risk averse, and their utility function is concave.

Creditors are risk neutral, and their utility functions are linear. They have an alternative investment opportunity β based on their own entrepreneurial activity or on the yield of government paper. The potential loan must generate an expected yield that is at least identical to this alternative opportunity. Debtors, however, demand generally larger credits than individual creditors (presumably households) can offer.[13] Hence, dispersed small creditors seek financial intermediaries, which we for simplicity call *banks*. Banks collect deposits from creditors, lend to debtors, and monitor them.

As usual, the existence of banks can be justified on three grounds. First, lending allows significant economies of scale on operational costs. Second, an intermediary might actively study a potential borrower before the actual lending takes place and this way (ex ante) minimizes the default risk (see Boyd and Prescott, 1986). Third, an intermediary might monitor the debtor after the lending takes place (ex post) and limit his (intentional) default (see Diamond, 1984). Both ex ante and ex post monitoring offer economies of scale, which make specialized intermediaries superior to dispersed creditors.

7.5.2.2. Multiple Credit Market Equilibria. Theory has shown that a debtor offering an unconditional contract (loan) is motivated to hide his return and default on the loan (see Lacker, 1991). As a safeguard, creditors usually ask for a collateral that is forfeited in the case of loan default. The same role can be performed by the state or other guarantees. The size of the collateral or guarantee, or their very existence, might not be important, providing the debtor boasts a sufficient reputation for being a "good debtor." Reputation can be thought of as an implicit collateral equal to the future discounted returns of the debtor. (One can safely assume that most Czech firms lack a reputation sufficient for waiving or reducing the collateral requirement.)

A loan contract usually specifies two items: r, the debtor's repayments in the "good" state, and C, his collateral payment for the case of his default. The two types of debtors obtain two different contracts. A "good" debtor obtains contract (r_g, C_g) and a "bad" debtor obtains contract (r_b, C_b). Lacker (1994) has shown that both types of contract are separable and that creditors, as well as debtors, are stimulated to select contracts according to the debtor's type. However, this separation is possible only under the demanding assumption of perfect information. What would be the results of imperfect information? A "good" debtor might not be able to obtain the contract (r_g, C_g) because an undistinguishable "bad" debtor applied for this loan and obtained it.

Multiple credit market equilibria might exist. First, irrespective of whether perfect information is available or not, the standard one-price equilibrium fails because borrowers are not homogeneous. Second, under perfect information at least two separable equilibria might emerge: for "good" and for "bad" debtors. Finally, although preserving multiple equilibria outcome, under imperfect information the economy leans to the "bad" equilibrium, and both borrowers might have to face the possibility of a "bad" contract, (r_b, C_b).

The resulting market failure under imperfect information often leads to calls for some form of state intervention. For example, government guarantees can improve credit conditions for less than "good" borrowers (see Bulíř, 1992). Eventual aggregate improvements (lower interest rates and lower collateral requirements) will have a positive impact on "good" borrowers too, and "good" borrowers will be willing to finance—say, from taxes levied on their additional profits—this cross-subsidy initially benefiting "bad" debtors. Unfortunately, those cross subsidies fail to succeed if other agents—namely, financial intermediaries—can seize this subsidy as their rent (see Lacker, 1994).

7.5.2.3. Credit Market Failure and Cost of Capital. What is the impact of credit market failure on production? Although most traditional inquiries begin from the Modigliani-Miller theorem, its empirical relevance remains doubtful (see Modigliani and Miller, 1958; for a review see Gertler, 1988).[14] Most empirical studies have found that the Modigliani-Miller theorem contradicts the actual developments because the strict conditions of perfect competition and perfect information are not fulfilled. Firms' financial decisions (essentially driven by the availability of external capital) have a strong impact on firms' real results, and this is especially true for firms in transitional economies.[15]

The output effect of the financial developments is intensified by the prevalence of asymmetric information in transitional economies. First, the short history of most firms prevents them from establishing an adequate reputation. Second, the rudimentary state of some markets prevents a proper pricing (and trading) of collateral and, hence, also prevents use of collateral for ex ante selection of potential borrowers. Third, the lack of their own capital (partly due to comparatively high taxation) forces firms to rely on external, mainly bank capital. Fourth, most commercial banks are ill equipped to deal with excess demand for bank loans because they are burdened with bad loans and the startup cost of new branches. Finally, the emerging stock markets also suffer a from shortage of capital and for the time being stock markets cannot replace bank financing on a mass scale.

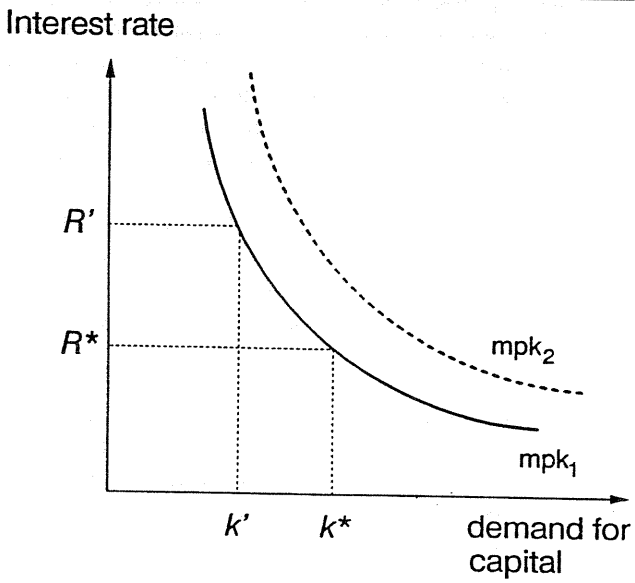
From the above it follows that asymmetric information affects the price of external financial resources and may influence the choice of investment projects or even area of business. If the costs of external capital are too high, the firm might be forced to rely fully on its own resources (retained profits) or perhaps might be even forced to exit the sector if it is characterized by a slow cash flow (see Tůma and Hlaváček, forthcoming).[16] The same result will be obtained if the time span between an investment and eventual cash flow will be "long." Presumably, a "good" borrower (a borrower, a with low probability of default and safe investment projects) will have problems in presenting his creditworthiness. Safe projects have by definition lower expected returns, and they pay off only under low costs of capital. The higher cost of capital, the bigger the incentive to embrace a risky project (Stiglitz and Weiss, 1981).

Under imperfect information even a "good" debtor is obliged to pay an interest rate of a "bad" borrower because the expected riskiness of commercial banks' loan portfolios rises. Consequently, banks will be required to build up higher loan provisions as p^b rises and p^g declines and eventually will offer fewer credits. The macroeconomic impact is unambiguous—lower aggregate output (decline in sectors with high debt) and simultaneously an increase in sectors with sufficient cash flow. (Bernanke, 1993; Alexander and Caramazza, 1994). The lack of an efficient capital market, which would otherwise offset this "cash-flow constraint," further lowers efficiency of allocation: society's income cannot be maximized when investments of equal return and risk are treated differently in terms of the amount of financing supplied and its cost.

The impact of asymmetric information on an individual competitive firm can be shown in the following example (inspired by Weinberg, 1994). Assume that a firm has neither any initial fixed assets nor any liquidity and that all financial capital needed to buy fixed assets is external. The firm chooses the relevant volume of fixed capital k given the usual production technology.

Two outcomes can arise. On the one hand, a successful firm produces output y given its production function $f(k)$. This production function assumes decreasing marginal products to capital, $mpk = f'(k)$, as shown in Figure 7.1. In a competitive environment, the marginal product of capital equals rental cost[17] and, simultaneously, the marginal product curve is the demand curve for capital. On the other hand, a failing firm will not produce anything and will default on its loan. As

Figure 7.1. Demand for Capital.



we know, "good" firms produce with probability p^g, and "bad" firms with probability p^b.

A closer examination of a "good" firm is in order. Under perfect information, the firm will be able to borrow at an interest rate R, where $p^gR \geq \beta$ (β is the return on alternative safe financial opportunities). In other words, the expected return to a bank on the loan, p^gR, must be equal to or be higher than the return on the alternative financial opportunity—say, the purchase of government bonds. Neglecting for simplicity depreciation cost, a firm will choose an investment k to equal the expected marginal product of capital to marginal cost of borrowing: $E_t[mpk_{t+1}] = \beta$. It follows that the firm will demand fixed capital k^* at the interest rate $R^* = \beta/p^g$.

What if the true characteristics of the firm are unknown to potential creditors? They would only know that some firms are "good" and that their share of the total is g. The probability of a firm being "bad" is b, where $b = 1-g$. If creditors cannot differentiate between "good" and "bad" firms—for example because of firms' short history—they have to lend to all under same conditions. Most important, this would require a uniform interest rate:[18]

$R = \beta/[gp^g + (1-g)p^b]$.

The interest rate is necessarily higher than under perfect information: it is higher as the probability of "good" firms' debt repayment is lower. Because the interest rate is higher, the "good" firm will demand k' amount of fixed capital, where $k' < k^*$.

Let us summarize some consequences of this example. First, the undiscerned presence of "bad" borrowers brings a negative externality for (equally undiscerned) "good" borrowers: a lower supply of credits at a given interest rate and ultimately

lower output. Second, this example suggests that investment decisions (and growth) are sensitive to cash flow: liquid firms do not have to care about the credit constraint. Third, we can assume that the possibility of obtaining an additional reputation is good motivation for a firm to exhibit "good" borrower characteristics. The motivation is equal to the difference between R' and R^*, the surcharge for imperfect information. The more "good" borrowers compete for loans, the less they will be rewarded for their reputation. However, this is currently not the most compelling problem: even if a firm would boast excellent reputation at domestic banks, it probably would still lag behind the world standard.

7.5.2.4. Monitoring of Borrowers and Credit Market Differentiation. In this section we will build on the previously discribed model to show that even under asymmetric information some monitoring is possible. Continuous monitoring by banks will lead, of course, to differentiation of borrowers. To study the impact on firms, we introduce a general endogenous production function, which is a simplified version of Lucas (1978).

Let us assume that commonly accessible production technology uses homogeneous input(s) for all firms and that productivity depends on a broadly defined ability (X-efficiency) of the owner or manager to utilize these inputs.[19] Managerial abilities in emerging markets can be formulated also somewhat more cynically as the ability to find tax and legal loopholes, "handshaking" with the state authorities and mafia bosses, as well as the subjective probability of being caught by police or tax enforcers. Hence, the production function might take the following form: $y = \delta f(k)$, where δ measures some broadly defined managerial abilities ($\delta \geq 0$).

The amount of demanded external capital is based on the same calculation as in the previous case ($mpk \geq \beta$). However, the more skilled the firm's manager, the bigger the marginal product of capital in this firm. The curve mpk shifts upward and to the right on the Figure 7.1 (as $\delta' > \delta'' \Rightarrow mpk_1 > mpk_2$).

It seems reasonable to assume normal distribution for managerial abilities. Although a would-be entrepreneur or manager has an opportunity cost of staying outside the private sector, we believe that this opportunity cost is relatively less than in industrial countries.[20] This cost is equal to the wage he or she would receive in an alternative job.[21] The model generates a cutoff situation: individuals with managerial abilities higher than some minimum threshold ($\delta > \delta_0$) form firms and hire inputs, while those below that threshold ($\delta < \delta_0$) pursue other activities. The net return on managerial activity—the difference between managerial and other activities, v—can be written as $v(\delta) = \delta f[k(\delta)] - \beta k(\delta)$. Assuming that the return to the alternative job can be Z at the maximum, for the marginal firm holds that the net marginal return is equal to

$$Z = \delta_0 f[k(\delta_0)] - \beta k(\delta_0).$$

Consequently, demand for external capital is an increasing function of managerial abilities. It is an intuitive assumption: only able owners and managers have a vision of their firms' evolution.

In this setup, a financial intermediary has to monitor only one variable: "managerial abilities" or available proxy thereof.[22] Several observable proxies of those abilities can be used, most notably firm's past history, if available. Anecdotal evidence suggests that Czech loan officers indeed look at managers' education, size and short-term dynamics of firms, and so on.[23] There is, naturally, no direct evidence for this monitoring. Indirectly, however, one can observe that banks tend to lend to the same group of borrowers, which they consider as "able."[24]

The above argument also explains why the credit market exhibits strong signs of differentiation, albeit the differentiation is less sophisticated than in industrial countries. At the very beginning of the reform process, most firms were undistinguishable from each other, and almost all (state-owned) firms were perceived as potentially "bad." Over time, the implicit state guarantees expired, and most firms accumulated some financial history. In the Czech Republic this rudimentary monitoring process has some features supported by empirical evidence (see Calvo and Kumar, 1993; Hrnčíř; 1994; Tůma; 1994). First, firms labeled as "bad" face a much steeper supply curve of credit and bank lending often reminds one of medieval usury. Second, among "bad" debtors are firms that probably would be granted loans neither in a undifferentiated credit market nor in a more sophisticated one. Third, the main losers in the system appear to be firms exhibiting "average" results. Although possibly safe customers, they tend to end up in the group with the "bad" contracts.

7.5.3 Mechanisms Alleviating Imperfect Monitoring

In the previous sections we attempted to show that a credit-market differentiation is advantageous, unless it is based on very imperfect or biased information and thus misallocates resources. In every case, however, financial differentiation is likely to have real effects. Although the market itself is likely to alleviate the burden of an imperfect differentiation over time, the speed of this process depends on many circumstances outside the banking system such general reform progress, the openness of the current and capital account (see Agénor and Haque, 1994), legal developments, and the growth of the nonbanking financial sector. In following sections we review some mechanisms for alleviating the imperfect differentiation and their likely effect in the Czech Republic. We will discuss market mechanisms first and collective action mechanisms later. We argue that most of the commonly mentioned mechanisms, notwithstanding voluntary information sharing, cannot bring an immediate positive change.

The first mechanism argues that the rudimentary differentiation of credit and financial markets is a common element present in the early stages of the transition.[25] According to this, the markets self-regulating mechanism will automatically rectify the above problems: banks will amass sufficient reserves, and high interest rates will decline; firms will gain over time sufficient reputation; profits and cash flows will level off among sectors. Although this is likely the most sensible mechanism of all discussed here, it is plagued by uncertainty when (and at what cost) those conditions will be met. Quite obviously, differentiation itself

prevents or at least slows down reputation buildup. Similarly, the surge in "bad loans" in late 1994 and early 1995 does not support the hypothesis of banks' rapidly improving financial health, see Table 7.27.

The second frequently mentioned mechanism argues for development of capital markets. The differentiation of financial markets was relieved in some Asian countries through development of stock exchanges, and those actually offered a significant proportion of external financing (see Table 7.29). However, for several reasons, this scenario does not seem likely to be repeated in the Czech Republic. First, households traditionally save in (savings) banks and have little faith in the insider-driven Prague Stock Exchange. Second, only a limited amount of capital, both domestic and foreign, is available for new issues.[26] Finally, to motivate small domestic investors to the shift from saving accounts to mutual funds or direct investing, one would have to deliver higher than average returns in order to offset the effect of volatile prices on the Prague Stock Exchange. The last condition is rather unlikely: profitable firms always have the possibility of applying for relatively cheap bank loans because they satisfy (r_g, C_g). Alternatively, "good" firms can issue their own bonds, which can be substitutes for bank loans.[27]

Third, some firms are able to tap foreign credit markets either directly[28] or through foreign banks.[29] The nominal interest rate is lower because, at the absence of devaluation expectations, a creditor will ask for a "usual" real yield plus a "transitional economy premium" plus a world inflation premium. A domestic bank, unless it is also tapping foreign capital markets for its resources, will ask for a domestic inflation premium, and, for the time being, this will likely be higher than the world premium. Moreover, most foreign banks can be profitable under lower margins because they do not have to briskly build provisions against "bad loans" or even write them off.

On the one hand, access to foreign credit markets will deepen the imperfect market differentiation in the Czech republic as only "good" firms with international reputation will be granted the access and those firms disappear from domestic banks' balance sheets. On the other hand, the assets of domestic banks have to be lent out. Given the lack of demand from the "internationally good" firms, ceteris paribus, the supply of loans to other domestic debtors will rise. In turn, this might adversely impact balance sheets of Czech banks: their portfolio will worsen without the best debtors, and the banks will need bigger provisions and will have to charge higher rates because more of their customers will fit the description of "bad" debtors.

Fourth, the above problem might be relieved by outright lending between firms. In industrialized countries trade credits amount to up 50 percent of total loans, and, in principle, there is no reason why Czech suppliers should not lend to their customers. However, the Catch 22 is the same as in previous mechanisms: firms with sufficient cash flow lack the motivation to lend to insolvent firms. Due to monitoring problems, the issues of individual reputation will not be solved either. Moreover, trade credits are discredited by payment arrears (sort of informal trade credits) and by the lack of financial discipline among domestic firms.[30] Admittedly, the paltry use of tradeable bills of exchange is expected.

Fifth, it is likely that firms will try to adjust to the lack external financing by changing their organizational structure. The most common method is the creation of horizontally and vertically integrated firms that can exploit financial economies of scale because there would be no need to explicitly finance "trade" among individual units.[31] This mechanism, of course, offers only temporary relief: an integrated firm will have a lower demand for liquid resources, but its demand for longer-term financing will be ceteris paribus unchanged. Needless to say, such a firm might end up with an inefficient organizational structure because financial economies of scale do not necessarily correspond to production economies of scale and the firm's profit maximization objective.

Sixth, commercial banks and cooperating state institutions can spur a partial removal of asymmetric information. Information sharing concerning "bad" debtors and collateral requirements (apparently some buildings have been used as collateral at more than one bank and by more than one borrower), simplification of bankruptcy procedures, as well as simplification of collateral expropriation would clearly lower the premium paid by imperfectly monitored "good" firms. An important role could be played, for example, by the Banking Association. Needless to say, more frequent and more honest disclosure of firms' financial results could lower their aggregate borrowing cost both on domestic and foreign credit markets.

Seventh, the government authorities can directly intervene through credit guarantees.[32] Disregarding the information-collection problem, institutions like Záruční banka can limit the risk that firms with "good" investment projects will plunge among "bad" firms. The key problem is to pinpoint those projects that have above-the-average likelihood of success. It is not clear, however, why a state-run institution should have better information than the rest of the market. If the guarantees will be geared up for "average" firms, then the supply of credits will go up, and perhaps even the average interest rate will go down. Nevertheless, differentiation of borrowers would be unchanged, and the state budget will be eventually burdened by disbursed guarantees. Evidence shows that the goal of selecting an above-average project is permissible in the case of short-term interventions.[33] State interventions (guarantees) usually fail to relieve the lack of long-term external financing.

7.5.4. Some Sectoral Financial Data for Czech Firms

In the following section we try to verify some of the above statements and hypotheses about transitional economies. We employ data published by the Czech National Bank (CNB), Czech Statistical Office (CSO), and Ministry of Industry and Trade (MIT). All variables were normalized to rectify the fact that the sectoral composition is changing over time due to privatization and exits (Table 7.30).[34] We assume that, given the general absence of firm-specific information, banks would utilize sectoral observations as proxies. Data are represented in scatter diagrams with regression lines (curves).

Table 7.28. Risk Credits to Nonbanks, Reserves, and Provisions in Czech Banks (Billions of crowns and Percentage).

	1992:IV	1993:I	1993:II	1993:III	1993:IV	1994:I	1994:II	1994:III	1994:IV	1995:I	1995:II	1995:III
In Billions of Crowns:												
Risk credits[a]	110.0	133.8	136.0	152.3	159.3	156.5	177.8	275.1	311.1	317.1	331.8	340.0
Weighted[b]	—	—	—	—	61.2	86.0	104.0	156.4	187.6	199.5	216.9	228.7
Reserves and provisions	56.7	61.4	65.9	72.5	109.9	98.6	112.2	121.0	134.5	140.2	146.6	165.0
In Percentage:												
Risk credits/ total credits	18.71%	22.50%	21.65%	23.40%	23.67%	22.62%	24.65%	37.06%	40.26%	41.28%	40.07%	35.68%
Reserves and provisions/risk credits	51.55%	45.89%	48.46%	47.60%	68.99%	63.00%	63.10%	43.98%	43.23%	44.21%	44.18%	48.53%
Memorandum item in Billions of Crowns:												
Total credits	587.8	594.7	628.2	650.8	672.9	691.9	721.4	742.4	772.8	768.1	828.0	953.0

Source: Czech National Bank; author's calculations.
[a]After failures of several commercial banks in late 1993 and early 1994, the risk credits were reclassified by the Czech National Bank in late 1994.
[b]Risk credits weighted by the perceived likelihood of default. For the weights see Indikátory (1995).

Table 7.29 Financing of Non-Financial Firms in Selected Developing Countries, 1980 through 1988 (percentage)

Country	Internal resources	Total	Stocks	Loans
India	34.9%	65.1%	14.0%	51.1%
Jordan	11.6	88.4	46.6	41.8
South Korea	21.0	79.0	44.3	34.6
Malaysia	66.8	33.2	14.9	18.3
Mexico	26.3	73.7	69.4	4.3
Pakistan	42.0	58.0	20.4	37.6
Thailand	24.1	75.9	40.9	35.0
Turkey	17.4	82.6	60.9	21.7
Zimbabwe	42.9	57.1	35.2	21.9

Source: Calvo and Kumar (1993).

We discuss following six stylized observations:

1. *Loss-making firms are identified as "bad" borrowers.* Commercial banks clearly look for a relationship between debtor's default risk and his past performance. Figure 7.2 confirms the tight indirect relationship between the profit rate and the change in "bad loans," the correlation coefficient being 0.78.[35] For example, agriculture suffered heavy losses in 1993, and over the period its ratio of bad loans was up by 13 percentage point with one-half of its loans classified as "bad." The most profitable sectors, power distribution

Table 7.30. Change in Sectoral Performance of Czech Firms Between 1992 and 1993 (Millions of Crowns and Years).

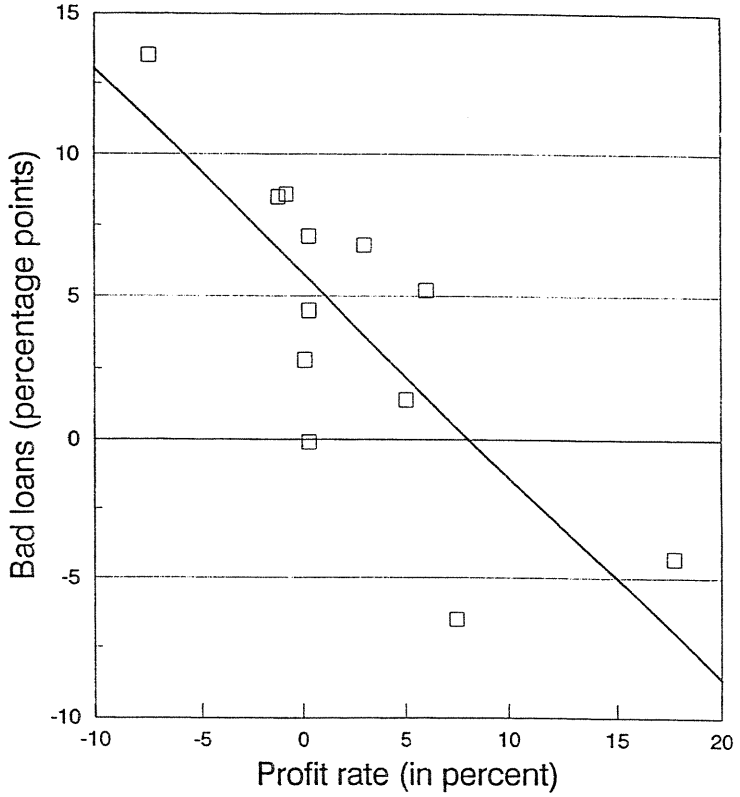
Sector	Change in Value Added per Capita	Equity/Cash Flow
Mining of fossil resources	1.63	1.66
Mining of non-energy resources	2.61	–0.05
Food processing	2.05	–0.96
Textile industry	0.49	5.25
Production of leather and leather products	1.61	39.03
Production of wood	–1.04	18.83
Production of pulp and paper	0.72	14.33
Oil refining	–21.39	2.96
Production of chemical products	1.98	2.48
Production of rubber products	–0.19	1.57
Production of stone and ceramics	1.87	2.48
Metallurgy	–0.12	4.41
Machinery	1.19	14.67
Electro engineering	1.77	8.71
Production of transportation machinery	–1.52	4,980.00
Other production	1.78	3.57
Electric power and gas distribution	4.17	0.86
Construction	1.48	1.67
Retail trade	–0.49	14.14
Public catering	–11.05	–67.69
Transportation	–0.19	37.15
Services, research and development	2.20	11.87
Mean[a]	–0.47	271.88
Coefficient of variation[a]	–60.82	4,529.97

Source: Ministry of Industry and Trade; own computations.
[a]Only sectors with positive equity/cash flow are taken into account.

and chemistry, lowered their ratios of bad loans well below the average of 24 percent.

2. *Cash-stripped firms grow more slowly.* Another simple and reliable rule applicable to individual sectors (and presumably to firms) is that firms with sluggish cash flow grow more slowly (see figure 7.3).[36] The correlation coefficient was 0.57. This result is encouraging notwithstanding the notorious shortcomings of the cash-flow measure under the Czech accounting procedures.
3. *Cash-stripped firms pay higher "effective" interest rates.* The above findings suggest that firms with sluggish cash flows will be regarded as "bad" firms and as such will have to pay higher interest rates (and offer higher collateral). Figure 7.4 shows a direct relation between equity and cash flow in

Figure 7.2. Loss-Making Firms Are "Bad" Borrowers, 1993.

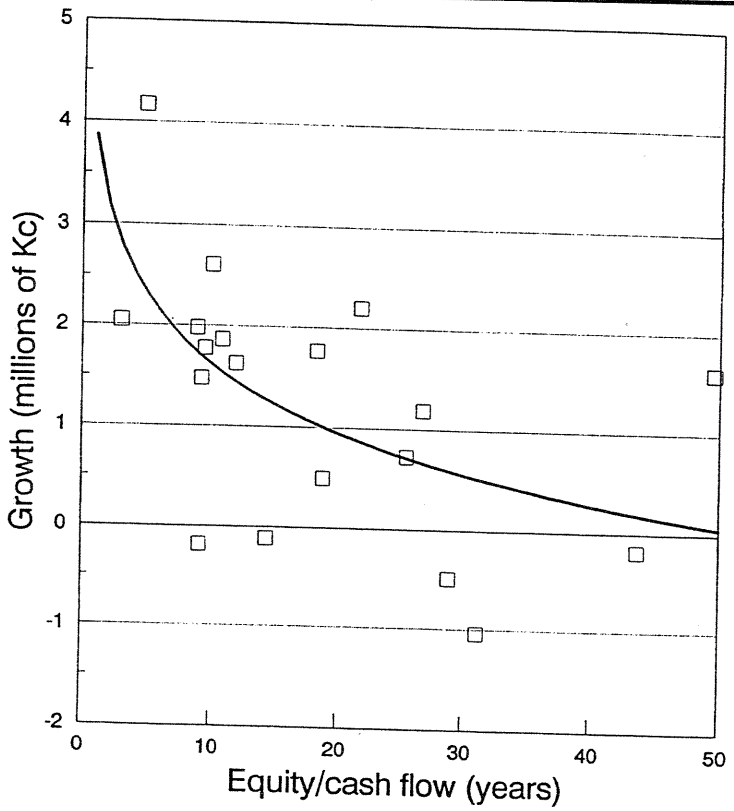


Source: CNB, CSO; author's computations.
Note: Profit rate = profits on sales; bad loans = bad/total loans, change from 1992 to 1993.

1992 and 1993 and the "effective" interest rate paid by firms in individual sectors in those years.[37] Correlation coefficients are still satisfactory, 0.41 and 0.38 for 1992 and 1993, respectively. Although the flatter profile of the regression curve for 1993 would suggest lower "effective" interest rates, this is not likely the case. First, the level of average credit rates increased in 1993 compared to 1992 by 0.5 to 0.7 percentage points, and, hence, a lower "effective" interest rate signalizes lower debt repayments and perhaps also a lower amount of new credits granted to those sectors compared to 1992. Second, the 1993 curve became only optically flatter due to an increase in the equity and cash flow ratio: while in 1992 this indicator was fifteen years at the maximum, in 1993 we had to limit our sample to sectors with equity and cash flow ratios lower than thirty years.

4. *Cash-stripped firms are credit rationed.* If "bad" firms are forced to pay higher interest rates, it is only reasonable to assume that they are also rationed with respect to the quantity of credits (here again proxied by total liabilities). Although the regression line on Figure 7.4 has the expected slope,

Figure 7.3. Cash-Stripped Firms Grow More Slowly, 1993.

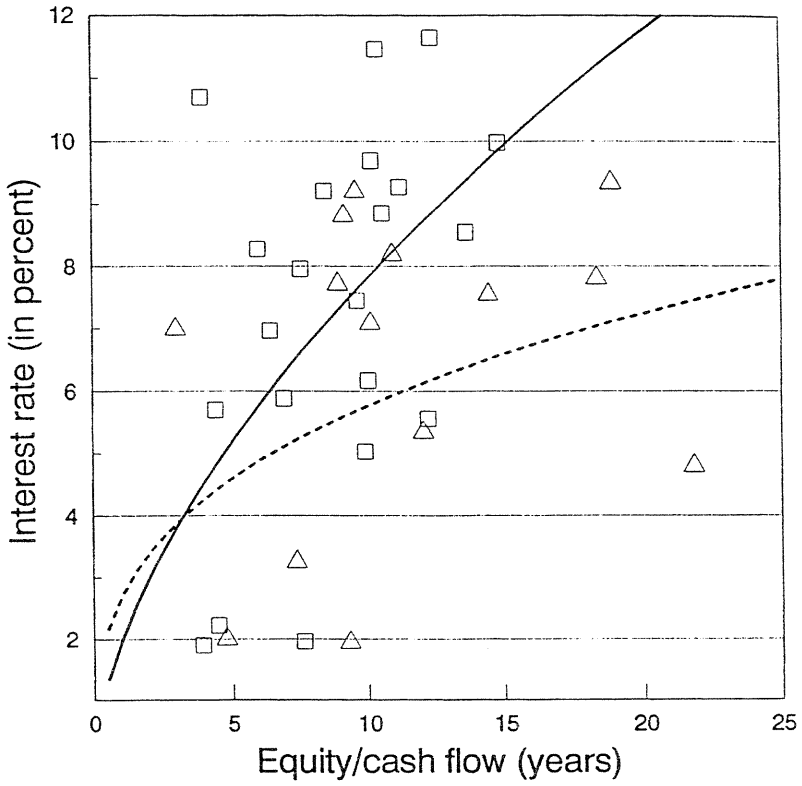


Source: MIT; author's computations.
Note: Equity/cash flow = equity/(profits + depreciation); Growth = value-added per capita, change from 1992 to 1993.

the correlation is fairly low.[38] (Controlling for sectors that clearly do not rely on bank credits, the correlation coefficient can be as high as 0.44.) A few hypotheses can be put forward to explain the relatively unimportant correlation. First, banks might continue to lend to loss-making firms, assuming that they will at least service their debts. Commercial banks may be considering an eventual debt-equity swap, at a point when the debt will become unserviceable, preferable to an immediate cessation of the credit line. Second, the decline in bank credits, which is not directly observed from total liabilities, can be concealed by increase in other liabilities—say, interenterprise, wage, or tax arrears.[39]

5. *In addition to higher interest rates, banks also ration the supply of credit.* The previous two statements imply that commercial banks might be able to influence also the overall quantity of credit supplied (see figure 7.5).[40] Although this correlation coefficient is again influenced by a few extreme observations, in most sectors higher lending costs go hand in hand with

Figure 7.4. Cash-Stripped Firms Pay Higher Interest Rates, 1992 and 1993.



Source: MIT; author's computations.
Note: Equity/cash flow = equity/(profits + depreciation); Interest rate = interest payments/liabilities.

lower amounts of credits supplied. A few outliers suggest that a different pattern of behavior might be present in some sectors: some firms borrow to service old debts, providing, of course, that they can find a lender. This would also suggest possibility of adverse selection: higher rates are paid by those firms that carry the highest default risk. Sectoral analysis is perhaps too aggregated and both hypotheses 4 and 5 would be better tested on the firms' level.

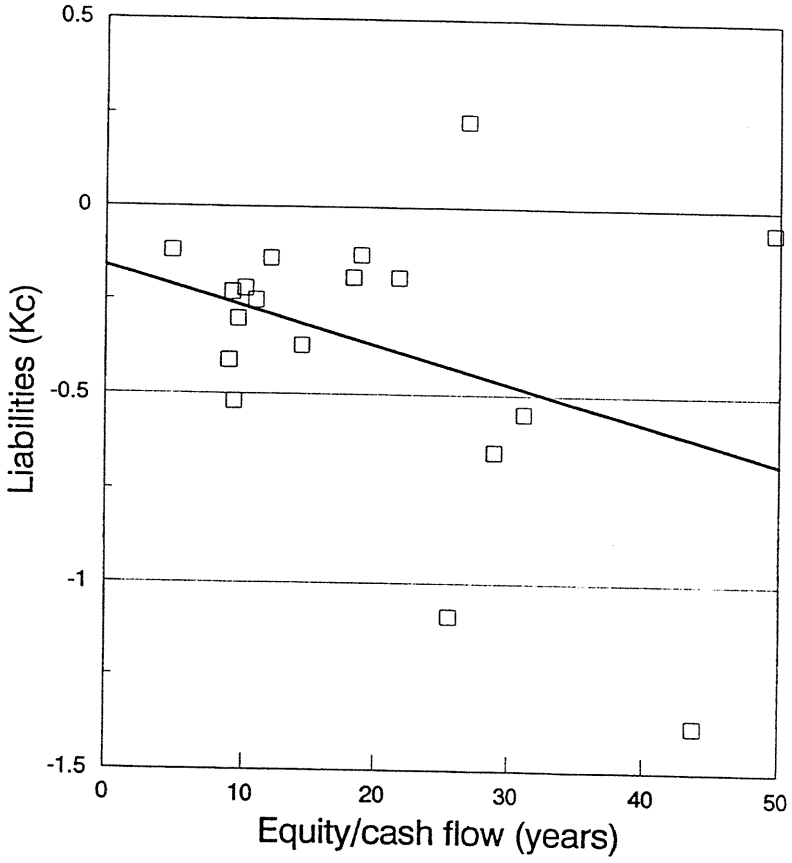
6. *Interenterprise arrears (trade credits) are complements to loans and not substitutes.* In the previous section we discussed, among other mechanisms, trade credits as a way to increase the aggregate supply of external financing. For several reasons, mainly connected to institutional arrangements in the formerly planned economy, trade credits often have a form of payment arrears. The data do not suggest, however, that bank credits and trade credits are substitutes: between 1992 and 1993 payment arrears were moving in the same direction as total liabilities (our proxy for bank credits), see Figure 7.6.[41] The complementary character of bank and trade credits, supported by

the corelation coefficient of 0.31, indeed suggests that this mechanism will not likely ameliorate the shortage of external capital in the short term.

7.5.5. Conclusions

In this section we tried to model and empirically test the differentiation of the Czech financial market as a result of monitoring under imperfect information. We discussed some features of reform economies that might help to explain the emergence of a rudimentary monitoring and its likely negative impact on economic growth. Although an automatic adjustment might help to ameliorate some side effects of the rudimentary monitoring, it is unlikely that the problems will disappear

Figure 7.5. Cash-Stripped Firms Do Not Get New Credits.



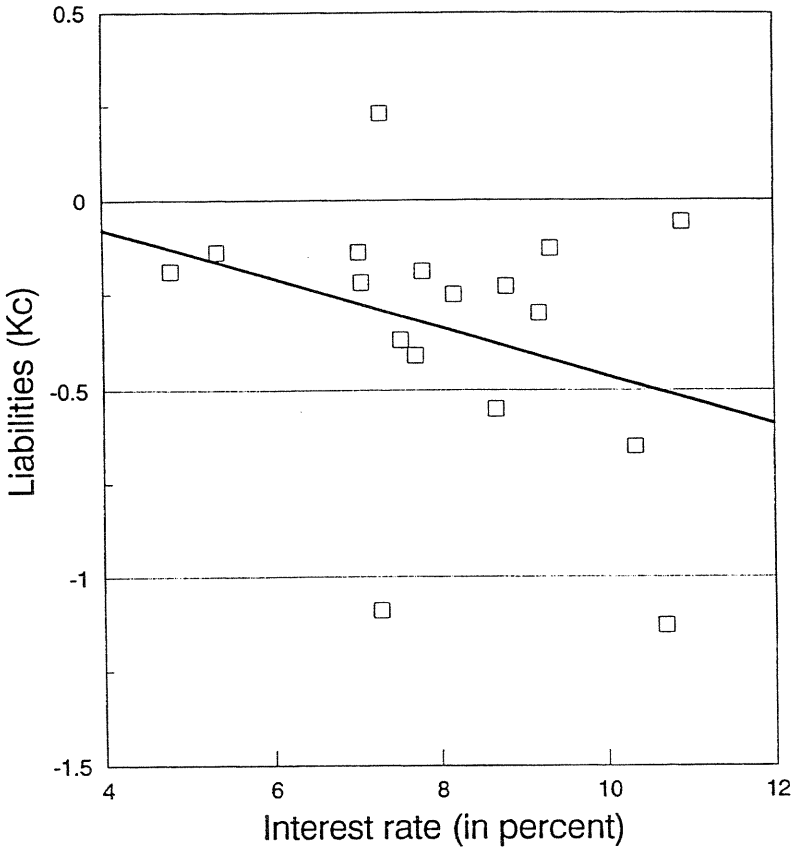
Source: MIT; author's computations.
Note: Equity/cash flow = equity/(profits + depreciation); Liabilities = liabilities/value added, change from 1992 to 1993.

in the short term. The empirical part substantiated several intuitive hypotheses concerning the monitoring process: for example, loss-making and cash-stripped firms receive fewer less loans and pay higher interest rates.

7.5.6. Appendix: Data and Sources

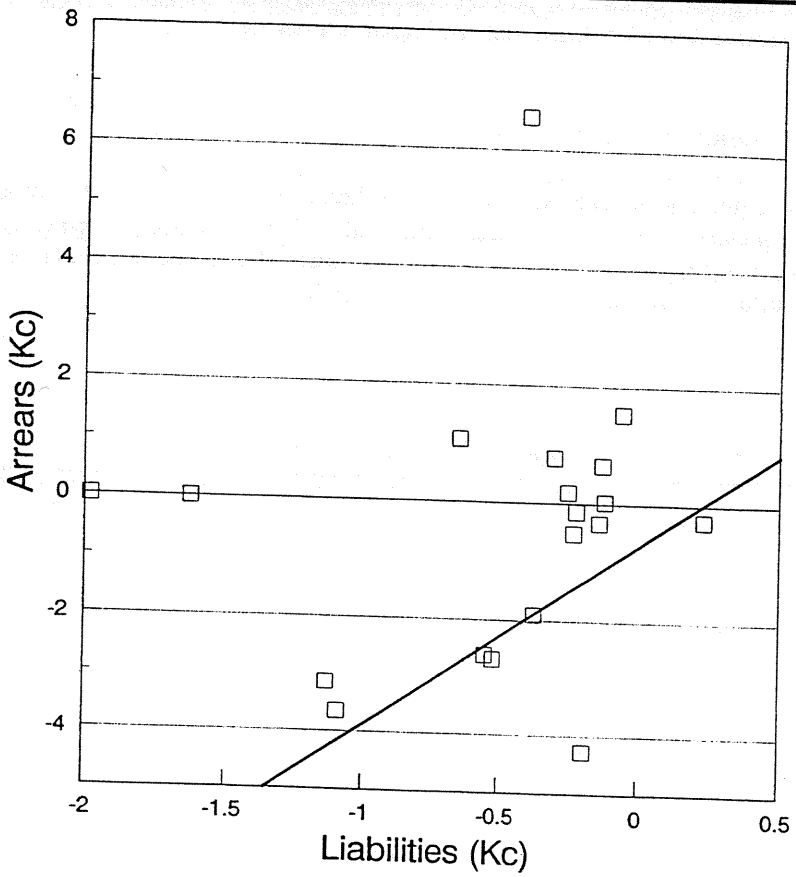
In the empirical section we used two different cross-samples. The first sample covers sectors traced by the Czech Statistical Office and is supplemented by "bad loans" data provided by the Czech National Bank. The second sample comes from the database of the Ministry of Industry and Trade.

Figure 7.6. Higher Interest Rates Also Mean Fewer Credits, 1993.



Source: MIT; author's own computations.
Note: Equity/cash flow = equity/(profits + depreciation); Liabilities = liabilities/value added, change from 1992 to 1993.

Figure 7.7. Arrears Are Not Substitutes for Bank Credits, 1993.



Source: MIT; author's own computations.
Note: Arrears = arrears/value added; Liabilities = liabilities/value added, change from 1992 to 1993.

The database of the Czech Statistical Office used in the paper consists of twelve sectors:

Agriculture, hunting, and fishery
Mining
Food processing
Chemistry and pharmaceutical production
Metallurgy and machinery
Electro engineering
Textile and leather production
Production and distribution of electric power, gas, and water
Construction
Trade
Transportation and telecommunication
Other

The database of the Ministry of Industry and Trade is based on the Sector Classification of Economic Activities (OKEC) and collects data from twenty-two sectors:

Mining of fossil resources
Mining of nonenergy resources
Food processing
Textile industry
Production of leather and leather products
Production of wood
Production of pulp and paper
Oil refining
Production of chemical products
Production of rubber products
Production of stone and ceramics
Metallurgy
Machinery
Electro engineering
Production of transportation machinery
Other production
Electric power and gas distribution
Construction
Retail trade
Public catering
Transportation
Services, research and development