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The Finance-Investment Link in a Transition Economy: Evidence for Poland from Panel Data

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THE FINANCE-INVESTMENT LINK IN A TRANSITION ECONOMY : EVIDENCE FOR POLAND FROM PANEL DATA

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Abstract

Real investment in Poland declined from 1990 to 1993, and only slowly recovered, while real credit decreased for a number of years, too. Has declining credit adversely affected investment? Controlling for industry and time fixed effect, and using dynamic panel data techniques, I estimate an investment model, which includes external and internal finance as investment determinants. The results suggest that internal and external finance are positively related to investment. Thus, industries seems to operate under hard budget constraints. Also, internal finance is more important than external finance in determining investment, thus indicating that credit rationing occurs. Finally, the effects of external finance are slightly larger among durable goods producing industries than in non-durable goods producing industries.

JEL Classifications: E22; F36; O16

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I. Introduction

Transition economies have experienced dramatic economic changes in the recent past, while they are also facing formidable challenges in the near future. The prime example for the roller coaster ride of transition is Poland which started with introducing financial reforms in early 1989, and followed with its "shock therapy" in 1990. The Polish GDP declined subsequently by 11.6% and 7.6% before it began to grow again. It also shows a similar, yet somewhat delayed trend in business investment as this declined rapidly until 1993 before recovering some lost ground (table 1). The issue arises as to whether investment is growing fast enough to allow Polish firms to make up for lost ground and to improve their competitive position, particularly in light of Poland's bid for EU membership. Understanding the determinants of Polish investment in the transition should also provide insights into the institutional changes which could help Polish firms to undertake their necessary investments, and to improve their competitive position.

An improved economy, and the prospect of EU membership should raise investment in Poland. So far, investment has followed the upswing in output growth with a lag. This is partly due to depressed future expectations of investors, following the rapid decline in the first years of the transition. No firm would sink often irrecoverable costs into a project if it expects the economy to continue its slump. Hence, it is no surprise that expectations and investment would improve after a turn around in the economy. Further, the political desire of policy makers to join the EU has raised pressures for firms to improve their technology and become more competitive.

A company's intention to invest is one thing, realizing it is certainly another. Realizing investment decisions depends largely on well functioning capital markets if internal capital is not available instead. In Poland, firms depend largely on external financing, particularly in the form of bank credit as equity markets are underdeveloped. However, in 1990, 1993 and 1994 real credit declined overall, and it declined for state owned firms from 1990 to 1996. Are these credit contractions reflections of a gradual imposition of hard budget constraints? More importantly, are firms' ability to invest adversely affected during part of the early transition period?

If there is a positive link between credit and investment, it would show that Polish industries operate under hard budget constraints, and that the credit decline led firms to undertake less than their desired fixed capital formation. Polish industries, particularly where SOEs are dominant, are often perceived as being funded by accommodating banks, thus possibly delinking financing and investment. While real credit for SOEs is declining for most of the time (table 1), this decline may only reflect a gradual privatization, and may not be connected to business investment. If decreasing real credit significantly affects investment behavior across industries, though, this would signal that hard budget constraints were introduced early in the transition process, which would imply that the declining real credit restricted firms' investment activities.

The remainder of this paper is organized as follows. Section II presents some background on the theoretical basis as it applies to the Polish case, while section III presents the empirical results for Polish industries. Finally, a few concluding remarks follow in section IV.

II. Background

The connection between external finance and fixed capital formation is based on financial market

imperfections resulting from informational asymmetries. Here, financing constraints may exist if firms have to rely on external financing. If lenders and borrowers have asymmetric information and if they cannot write complete contracts, borrowers cannot obtain the necessary amount of finance for their investments (Stiglitz and Weiss, 1981; Gertler, 1988; Stiglitz, 1988; Bernanke 1993). Finance matters for real outcomes because lenders set the lending rate below the market clearing rate to avoid adverse incentives for excessive risk taking, thereby rationing credit to borrowers, and keeping investment below its optimum. Further, if information asymmetries matter, we would expect internal finance to be more important than external finance for investment as outside investors require a greater rate of return than owners to compensate for the risk of imprudent behavior on the part of managers. A couple of studies using firm level data for the US have found a significantly different impact of internal versus external finance on business investment (Fazzari, Hubbard, Petersen, 1988; Ndikumana, 1999).

An important aspect of financial market changes, especially increased competition, in transition economies is that market discipline should entice lenders now to establish and enforce hard budget constraints on firms as their own viability depends on them. However, as financial intermediaries in formerly centrally planned economies allocated credit to accommodate the requirements of the plan, it has been expected that political priorities would dominate the credit allocation at least in the early stages of the transition (Raiser, 1996; Kornai, 1993; Schmieding and Buch, 1992). External finance should not matter for investment outcomes in industries that are dominated by formerly state-owned enterprises if soft budget constraints are prevalent.

So far, it is assumed that Polish firms have actually decided to invest, and that their decision may either be aided by accommodating lenders, or hampered by market mechanisms. The decline in credit has hence not been attributed to decreasing finance demand by firms. It seems clear that investment needs of SOEs, privatized and newly created private firms are generally large. For one, the Polish economy has slowly been improving since 1992 (table 1), which should improve future expectations and raise firms' desired investment. Also, the new market economy has created pressures for firms to modernize to remain competitive, which are only augmented by Poland's bid to join the EU in the near future. Considering the SOEs' outdated equipment, modernization of production facilities, and financing demand, should continue for years to come. Similarly, capital needs of start-up companies are generally high in the early years of operation[1]. Thus, it is not surprising to find that demand for investment financing by the most dynamic companies remains high, too (Abel, Szekely, and Siklos, 1998; Anderson and Kegels, 1998).

Even though some factors indicate increased investment demand, the future uncertainty in a rather volatile environment could potentially lead firms to postpone their investment decisions (Dixit and Pindyck, 1994). Since the expected distributions of future prices, interest rates, and labor costs vary largely early in the transformation, firms may be better off waiting for a while than to undertake investments. However, factor and output prices have become more stable, while international competition has increased as the rapid growth of FDI shows (table 1).

[1] Some figures also suggest that capital needs may be rather large in the growing private sector. The share of GDP produced by private companies has increased from 30.9% in 1990 to about 60% by the end of 1995 (GUS, 1995; PAIZ, 1997). In 1990, private industrial firms employed 27.3% of the workforce, but had only 15.2% of all sales. In 1993, their employment grew to 41.8%, and their sales rose to 37.4% (Chmiel and Pawlowska, 1995). Similarly, the private sector as a whole produced 60% of GDP with 63% of the labor force (PAIZ, 1997).

Thus, as uncertainty declines, firms may be enticed to undertake new investments to stay in business in the new competitive environment regardless of the remaining uncertainty.

While financing needs are high, the evidence suggests that firms are finance constrained, and thus possibly unable to fund all desired investment. For instance, Cornelli, Portes and Schaffer (1996) suggest that Polish firms are actually underfunded as compared to their counterparts in the G7 countries. Compared to the benchmark of 66% debt asset ratio for non-financial firms in the G7 countries, they find a 41% ratio in Poland at the end of 1992. For the sample used here, the debt to asset ratio calculated from data in the GUS' Statistical Bulletin is about 45% for 1991, but closer to 60% by the end of 1992. In fact, the average debt to asset ratio increases to more than 100% until the first quarter of 1994, before it declines to about 70% after that. While this would put Polish firms closer to their counterparts in industrialized countries, it may still mean that they are more finance constrained, given their larger investment and financing needs during the early transition years. Their growing reliance on trade credit seems to support this, too (Abel, Siklos, Szekely, 1998). In other words, if Polish firms operate under hard budget constraints, and if they are finance constrained, their reliance on costly alternative external finance sources may inhibit investment, and may put them at a competitive disadvantage vis-a-vis their EU competitors.

III. Empirical Analysis

III.1 The Data

Very little research exists on firma and industry level finance in a transition economy, and it is especially scarce with respect to the effects of changes in credit. A few studies provide some preliminary evidence that Polish firms and industries may operate under hard budget constraints early in the transition process (Dittus, 1994; Pinto, Belka and Krajewski, 1993). In a somewhat more classified view, Raiser (1996:93) argues that "[t]he process of budget hardening has not been uniform across all enterprises [in Poland]. While inter-enterprise credits have declined and the majority of bank loans may now go to profitable firms, some SOEs are considered too big to be allowed to fail...", and hence receive government support regardless of their financial position. The limited evidence on the supply of credit to firms, though, seems to support the hypothesis that bank and inter-enterprise credit have introduced hard budget constraints. Cornelli, Portes and Schaffer (1996), for instance, find that Polish firms experience significant finance constraints because of pervasive credit rationing. Such finance constraints were assumed in Calvo and Corricelli's (1993) study of the impact of a credit contraction on output across 85 industrial sectors in the first quarter of the Polish transition, which is also the only study that looks at the real consequences of a credit decline in Poland. However, while they find that the credit contraction led to a drop in output, the exact causality between credit and output remains subject to debate. Furthermore, since their data covers only the first quarter of the transition process, it is likely that some of the standard economic relationships do not hold due to the turbulences associated with the social, political and economic changes in Poland. Hence, my study improves on the earlier work by looking at the consequences of changes of credit over a longer period of time, and by using a more clearly defined link between finance and investment.

The data set is compiled from the GUS' Statistical Bulletin and from the NBP's Information Bulletin. The panel consists of 369 quarterly observations covering 19 industries beginning in 1994, four industries starting in the fourth quarter of 1992, and two industries from 1991 until the end of 1997. All industry specific data are taken from the GUS' Statistical Bulletin, whereas interest and inflation rates are published in the NBP's Information Bulletin.

A few patterns in investment behavior across industries are discernible from the summary statistics in tables 2-4. The industries which are neither classified as durable nor as non-durable goods producing industries show the largest investment outlays. Particularly, utility companies have the largest investment outlays with an mean investment to asset ratio of 16.39%. Similarly, water purification (13.90%), paper production (13.37%), wood processing (12.16%), coke producers (11.92%), and non-metallic minerals production (10.44%) invest more than 10% of total assets. In contrast, durable goods producing industries show the least investment as a group, while transport equipment (1.70%), leather manufacturing (2.55%), and machinery production (2.98%) have individually the lowest investment outlays with less than 3% of total assets.

The summary statistics also indicate that credit may be positively related to investment. All industries, except water purification, are heavily dependent on external financing with an average debt to asset ratio greater than 50%. Three industries, leather production (107.27%), manufacturing of audio visual equipment (115.05%), and mining (138.02%), even show ratios above 100%. As the average debt to asset ratio is increasing in 14 out of 25 industries, and as investment is positively correlated with debt in most industries, there is some indication that a credit contraction may inhibit firms' desired investment.

III.2. Estimation Model

In general, q-type investment models which have included additional variables to correct for suspected financial market imperfections have performed rather well empirically in investigating the link between finance and investment (Fazzari, Hubbard, and Petersen, 1988; Abel and Blanchard, 1986; Gilchrist and Himmelberg, 1995; Ndikumana, 1999)[2]. However, despite its theoretical and empirical appeal resulting from forward looking and optimizing behavior that generates a readily identifiable structural parameters (Chirinko, 1987), this approach cannot be used here as market valuations, which could serve as marginal q approximations, are not available[3]. Hence, I use an investment accelerator model based on the a neoclassical investment function instead, which includes changes in internal finance, changes in debt, and changes in the cost of capital in addition to current and past sales growth.

The accelerator investment model can be derived from a neoclassical investment function. In the neoclassical investment theory, a firm's investment demand depends on the ratio of factor prices to the price of

[2] Following the insights of Tobin (1969) empirical researchers have studied the connection between finance and investment. In this approach the replacement cost of a marginal investment is compared to its capitalized value. A firm should invest if Tobin's q - defined as the ratio of the capitalized value to the replacement cost of the investment - is greater than 1.

[3] Not only are capital markets underdeveloped, thus making market valuations scarce, but as all variables exist merely on an industry level, firm valuations would be problematic anyway.

output, while a firm's production technology determines the optimal capital stock. It can be shown that if a firm operates with a CES production technology of the form $Q = \gamma[\alpha K^{-\rho} + (1-\alpha)N^{-\rho}]^{\upsilon/\rho}$, the following investment equation can be derived (Jorgenson, 1963)[4]:

$$\frac{I_t}{K_{t-1}} \approx \delta + \omega(L)\left[\sigma\frac{\Delta(P/c)_t}{(P/c)_{t-1}} + \theta\frac{\Delta Q_t}{Q_{t-1}}\right] \qquad (1)$$

Equation (1) shows that investment demand can be expressed as a function of relative changes of output, and relative changes in the ratio of output prices to the cost of capital. In empirical research output changes are often proxied by sales growth.

For the purpose of my study, it is important to note that for the accelerator model to hold, finance needs to be adequate to satisfy demand which is created by the accelerator. Since financial markets may be characterized by information asymmetries, firms may be able to obtain only suboptimal financing. In particular, due to the these frictions, internal finance gains a cost advantage over external finance. As outside financiers cannot distinguish between the quality of good and bad projects, they cannot require different rates of return for investments of distinct quality. As a result, investors require a lemons premium to compensate for the losses that arise from the ex ante unobservable portion of bad projects. Thus, firms may be finance constrained if there is insufficient internal finance, and if external finance is either too costly or not forthcoming.

To account for financial market imperfections in determining investment demand, I have added measures for internal and external finance to the model. Here, the quarterly changes of an industry's own financial means are included as a proxy for internal finance, whereas the quarterly change in the stock of debt is employed to control for the changes in external finance:

$$\left(\frac{I}{ASSETS}\right)_{it} = \beta_1 L\left(\Delta\left(\frac{INTFIN}{ASSETS}\right)\right)_{it} + \beta_2\left(\Delta\left(\frac{LOANS}{ASSETS}\right)\right)_{it} + \beta_3 L(SALESG)_{it} + \beta_4 L\Delta COSTK_{it} + e_{it} \qquad (2)$$

Here, L is a lag operator, I_{it} represents quarterly investment outlays, $ASSETS_{it}$ comprises total beginning-of-period assets, $INTFIN_{it}$ is the amount of internal financial means, $LOANS_{it}$ is the stock of liabilities, $SALESG_{it}$ is the change of quarterly sales, $COSTK_{it}$ is the cost of capital[5].

For the Polish transition, we would expect investment determinants to behave in their usual ways, with the exception of external finance. Sales growth should effect investment positively, as a good performance over

[4] K is capital stock, Q output, N labor, P output price, c the user cost of capital, γ an efficiency parameter, α a distribution parameter, ρ an input substitution parameter, υ a scale parameter, δ the depreciation rate of capital, $\sigma = 1/(1+\rho)$, and $\theta = \sigma + (1-\sigma)/\upsilon$, and $\omega(L)$ a polynomial in the lag operator L.

[5] See the appendix for lists of variables and industries.

the past quarters should increase raise expectations, such that firms undertake more investment. Further, cost of is traditionally understood as the opportunity cost of not investing, and hence increases in the cost of capital should

in internal finance should have a substantially larger effect on investment than changes in external finance. finance deserves our particular attention here as it is expected to have a positive influence on a firm's inves

to external funds may outweigh their greater costs. Put simply, firms need to access external finance first before

III.3 Estimation Results

I

internal and external finance. Regression (1) in table 5 estimates the determinants of investment using Generalized Squares random effects. The results of estimation (1) show that current sales growth has the expected positive sign in determining investment, while the lagged values of sales growth are insignificant.

of capital variable shows no indication either way may be an indication that the interbank lending rate is a poor

of internal and external finance growth on fixed capital formation. Industries with larger changes in internal or finance, have hence also higher investment outlays. For instance, a one standard deviation increase in the rate

almost one third of the variation in the investment to assets ratio. Put differently, if firms producing metal products raise the growth rate of their debt to asset ratio to that of firms manufacturing electrical machinery, than their investment

about 7% of the difference in the investment to assets ratio. Similarly, if firms in the apparel producing sector increase the rate of change of internal finance across all lags to that of publishing companies, their investment

While the estimated parameters for internal finance are all larger than that for external finance, the differences

The error term may not be independent over time in each country, an issue that I correct for by approach has the considerable advantage of controlling for the incidence of [6].

in regression (2) of table 5 are Least Squares with Dummy Variables (LSDV)[7] The impact of internal and external finance

time fixed effects, in this case for each quarter. The use of time fixed effects requires that a country with above

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Another reason is that I use Hausman's (1978) specification test to see whether random effects are appropriate. The test statistic for greater than 47.49 is virtually zero, which is evidence that the assumption of the random effects being uncorrelated with the explanatory variables is incorrect. Consequently, I also report regressions obtained by estimation with LSDV.

Shocks to changes in loans may be endogenously related to shocks to investment. Using the lagged values of the external finance has a chi-squared distribution with 1 degree of freedom, has a value of 0.33 for regression (1), and 0.29 for regression (2). As in both cases, the chance of obtaining a value of greater than the test statistic is more than 50%, I can proceed with LSDV regressions.

average investment in one quarter must also have an above average change in either internal or external finance to obtain significant coefficients. Controlling for country and time fixed effects keeps the signs of the estimated parameters for the finance variables the same, while the coefficient for current sales growth becomes insignificant in regression (3). Instead, the first lag for sales growth becomes negative. More importantly, the size of the overall effect of internal finance rises, while the impact of external finance decreases when time fixed effects are taken into consideration.

The regression results support the hypotheses that Polish industries operate under hard budget constraints, and that the composition of finance matters for Polish industries. As the coefficients for internal finance are larger than that for external finance, the results show that there is a cost wedge between the two forms of finance. Further, while it is possible that increases in external finance may lower an industry's ability to invest due to higher debt service, the opposite seems to be true here. In other words, Polish industries seem to be finance constrained such that more credit would actually increase investment. The overall decreases in real credit in 1990, 1994 and 1995, and the continuous decline of real credit for public enterprises until 1996 may have thus adversely affected business investment. The fact that increases in credit would result in more investment suggest also that Polish industries operate under hard budget constraints as Polish industries can only be credit constrained if hard budget constraints are a reality.

Clearly, investment behavior may vary according to the type of industry. As the summary statistics show (tables 2 and 3) the ratio of external to internal finance is somewhat larger for durable goods producing industries, while investment is lower among durable goods producing industries. For the case of the US, a number of studies have investigated factors which may have affected the links between investment and finance, among them industry type. It is suggested that either tax shields or differential bankruptcy costs associated with various leverage levels may explain inter-industry differences (Bowen, Daley, and Huber, 1982; Buell and Schwartz, 1981). While an exploration of the causes for the greater dependence of durables good producing firms on external finance is beyond the scope of this paper, possible explanations could be differential government subsidies for some sectors of the Polish economy[8].

The regression results for durable goods producing and non-durable goods producing industries are presented in tables 6 and 7. Increases in external finance will lead to more investment, regardless of the industry type. Durable goods producing industries are slightly more affected by changes in external finance, though, than non-durable goods producing industries. Considering that, on average, durable goods producing industries experience a greater decline in lending relative to assets with -0.09% than non-durable goods producing industries with -0.04%, the former are more likely to be finance constrained than the latter. Furthermore, internal finance creation has almost no impact on investment for durable goods producing industries, while it is again significantly positive for non-durable goods producing industries. Thus, industries with more internal finance are not necessarily investing more. Finally, past sales growth seems to have a slightly negative impact on investment behavior for

[8] Firm size may be another factor which may affect the impact of leverage on investment. While in industrialized economies the main reason for this distinction lies in differential access to capital markets, larger firms in the transition economies - where capital markets do not play a significant role - may have easier access to government funds. However, as I am using only industry level data, a separation of the data set by firm sizes is not feasible.

durable goods producers. However, the negative impact of sales growth over the past two quarters remains rather

As regression (1) in table 6 shows, an increase in sales growth of one standard deviation two quarters ago reduces investment outlays in the current period, by 0.007% relative to assets.

A number of pervious studies have looked at the determinants of firm credit in Poland during the early years. While there seems to be some evidence in previous studies that Polish firms operated under hard budget constraints, the consequences of this shift in lending regimes are insufficiently researched.

paper consequently investigates the impact of debt on investment. My results suggest that debt plays a significant role

credit has a positive impact on business investment indicates not only that Polish industries operate under hard constraints, but that they also experience severe finance constraints during the transition period. These external finance constraints seem even more severe for durable goods producing industries.

there appears to be a positive connection between lending and investment there are some policy considerations

constraints early on. Second, public policy concerns which may have led to a restriction of real credit in a number years should be weighed against the adverse impact on business investment. In other words, if credit can be expanded

prepare for increased competition with their EU counterparts. However, further research may be needed to which firms exactly are the most finance constrained. In particular, a number of dimensions which could affect

leverage levels or debt service.

Appendix:

A. Data Sources

A.1 List of Industries:

1. Mining and Quarring
2. Manufacture of Food Products and Beverages
3. Manufacture of Tobacco Products
4. Manufacture of Textiles
5. Manufacture Wearing Apparel and Furriery
6. Processing of Leather and Manufacture of Leather Products
7. Manufacture of Wood, Straw and Wicker Products
8. Manufacture of Pulp and Paper
9. Publishing and Printing
10. Manufacture of Coke, Refined Petroleum Products and Derivatives
11. Manufacture of Chemicals and Chemical Products
12. Manufacture of Rubber and Plastic Products
13. Manufacture of Other Non-Metallic Mineral Products
14. Manufacture of Basic Metals
15. Manufacture of Metal Products (except machinery and Equipment)
16. Manufacture of Machinery and Equipment
17. Manufacture of Electrical Machinery and Apparatus
18. Manufacture of Radio, Television and Communication Equipment and Apparatus
19. Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks
20. Manufacture of Motor Vehicles, Trailers and Semi-Trailers
21. Manufacture of other Transport Equipment
22. Manufacture of Furniture; Other Manufacturing
23. Electricity, Gas, Steam and Hot Water Supply
24. Collection, Purification and Distribution of Water
25. Construction

Source: GUS, *Statistical Bulletin*, Table 31: “Investment Outlays and Investments Newly Started”, January 1997

TABLE A-1

LIST OF VARIABLES

Variable Name	Description
$(INV/ASSETS)_{it}$	ratio of investment over assets; investment is measured as the quarterly investment outlay, and assets are the current assets at the beginning of each quarter.
$(INTFIN/ASSETS)_{it}$	Internal finance is measured by the first difference of the ratio of financial means to beginning-of-the-period assets.
$(LOANS/ASSETS)_{it}$	External finance is measured by the first difference of an industry's liabilities to assets ratios. An industry's liabilities include bank credits, supplier credit and other external finance sources.
$SALESG_{it}$	Sales growth is the percentage change of real quarterly sales.
$COSTK_{it}$	The cost of capital is proxied by the change in the after tax real weighted average interest rate of interbank lending.

Sources: GUS, “Statistical Bulletin.”; NBP, “Information Bulletin.” Warsaw: NBP, various issues

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TABLE 1

ECONOMIC AND FINANCIAL INDICATORS FOR POLAND 1990-1997

Year	Real GDP Growth (%)	Unemployment (%)	Inflation (%)	Real Inv. (mn. PLZ)	Real Credit Growth (%)			Domestic Credit/GDP (%)	FDI Flow (bn. US$)
					Total	Nonfin. Public Enterprises	Private Sector		
1990	-11.6	6.3	585.8	11761.00	-56.23	-49.62	32.02	19.46	0.089
1991	-7.6	11.8	70.3	8927.13	46.40	-41.79	195.71	34.88	0.100
1992	2.6	13.6	43.0	7514.08	7.09	-22.03	0.53	38.20	0.300
1993	3.8	16.4	35.3	7041.24	5.38	-11.55	6.01	40.65	0.600
1994	5.2	16.0	22.2	7276.19	-2.35	-11.81	-0.75	39.17	0.500
1995	7.0	14.9	27.8	8205.79	-5.30	-4.23	14.99	34.27	1.100
1996	6.1	13.2	19.9	9637.11	9.35	-1.17	30.58	35.83	2.800
1997	6.9	10.5	14.9	11373.63	9.07	2.91	20.31	36.96	3.000

Sources: IMF, “International Financial Statistics”; Business Central Europe, “Key Data Online 1990-1997”.

TABLE 2

SUMMARY STATISTICS FOR DURABLE GOODS PRODUCING INDUSTRIES

Industry	Investment/ Assets (%)		Debt/ Assets (%)		Δ Debt/ Assets (%)		Δ Internal Fin./ Assets (%)		Sales Growth (%)		Corr. between Inv. & Debt
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Motor Vehicles	4.41	3.15	81.28	14.33	1.46	19.59	0.09	3.22	11.34	15.53	0.9673
Medical Equip.	3.08	1.10	54.65	8.32	0.30	0.11	0.26	2.62	12.15	17.08	0.8850
Metal Products	4.15	1.69	64.54	5.35	-0.84	4.36	0.23	1.27	8.83	8.63	0.8207
Electrical Equipment	5.63	1.79	55.16	4.12	0.85	4.86	0.19	1.38	8.73	10.70	0.8178
Wood	12.16	7.76	82.73	8.49	-0.83	10.41	0.57	3.58	8.31	7.53	0.7981
Furn.	5.00	1.88	71.63	5.72	0.99	6.30	0.14	1.42	9.96	12.87	0.7889
Machinery	2.98	1.05	76.07	7.51	-1.44	5.10	0.28	1.40	7.72	7.51	0.7564
Mining	7.30	3.05	138.02	21.36	-0.60	31.52	0.00	4.03	5.47	13.17	0.6219
Audio Visual	8.48	4.49	115.05	12.23	-2.56	10.78	0.30	2.71	14.76	30.90	0.4971
Basic Metals	6.63	3.40	86.61	12.94	0.12	10.17	0.09	0.73	6.07	6.06	0.4830
Transport Equipment	1.70	0.75	77.34	14.39	1.79	8.79	2.21	12.51	14.51	39.55	0.3664
Total Durable Goods Producing Industries	5.64	4.29	83.74	27.82	-0.09	14.09	0.38	4.34	9.68	17.98	0.7479
Total All Industries	6.67	5.50	75.08	30.53	0.06	29.67	0.29	9.08	8.40	16.98	0.6640

Sources: GUS, Statistical Bulletin; NBP, Information Bulletin.

TABLE 3

SUMMARY STATISTICS FOR NON-DURABLE GOODS PRODUCING INDUSTRIES

Industry	Investment/ Assets (%)		Debt/ Assets (%)		Δ Debt/ Assets (%)		Δ Internal Fin./ Assets (%)		Sales Growth (%)		Corr. between Inv. & Debt
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Publishing	6.30	1.82	53.25	6.75	0.64	7.94	0.89	3.92	7.79	6.50	0.8576
Food & Bev.	6.26	1.95	60.84	19.48	1.81	20.67	0.01	2.33	6.90	7.30	0.8329
Rubber	7.99	3.00	50.41	5.23	0.22	7.07	0.58	4.23	8.97	9.60	0.8061
Tobacco	4.87	2.87	63.7	12.61	0.19	17.37	0.04	4.31	5.46	20.26	0.7409
Apparel	3.76	1.09	69.46	6.43	0.14	8.64	0.11	2.13	7.52	7.25	0.7251
Coke	11.92	12.27	77.88	91.92	0.21	1.42	0.25	45.93	4.23	13.05	0.7241
Chemicals	6.33	1.71	57.66	7.94	-0.62	5.07	0.31	1.73	6.46	6.87	0.6887
Paper	13.37	6.46	67.70	18.40	-2.30	12.53	0.06	4.99	8.66	11.92	0.6203
Textiles	3.90	1.63	98.14	25.57	-1.13	29.53	0.15	1.20	5.38	7.33	0.4939
Leather	2.55	1.25	107.27	16.33	-0.65	16.50	0.19	2.97	7.27	20.05	0.3204
Total Non-Durable Goods Producing Industries	6.41	5.35	71.75	34.91	-0.04	42.82	0.23	13.19	6.86	11.68	0.9209
Total All Industries	6.67	5.50	75.08	30.53	0.06	29.67	0.29	9.08	8.40	16.98	0.6640

Sources: GUS, Statistical Bulletin; NBP, Information Bulletin

TABLE 4

SUMMARY STATISTICS FOR UNCLASSIFIED INDUSTRIES

Industry	Investment/ Assets (%)		Debt/ Assets (%)		Δ Debt/ Assets (%)		Δ Internal Fin./ Assets (%)		Sales Growth (%)		Corr. between Inv. & Debt
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Construction	3.31	2.04	68.09	11.07	1.08	9.52	0.17	3.06	11.14	27.37	0.8427
Electricity	16.39	8.45	70.93	13.76	3.06	16.28	0.43	2.56	4.24	13.05	0.8312
Minerals	10.44	3.91	64.69	8.40	-1.00	6.78	0.35	3.79	10.72	26.84	0.6905
Water	13.90	4.48	43.27	17.74	-0.91	16.72	0.02	2.43	5.86	5.03	0.0854
Total Unclassified Industries	9.73	7.17	62.80	16.25	-0.04	42.82	0.23	13.19	9.14	24.07	0.6988
Total All Industries	6.67	5.50	75.08	30.53	0.06	29.67	0.29	9.08	8.40	16.98	0.6640

Sources: GUS, “Statistical Bulletin”; NBP, “Information Bulletin”

TABLE 5

REGRESSION RESULTS FOR INVESTMENT ANALYSIS WITH

INV/ASSETS AS DEPENDENT VARIABLE

Variable	(1) Random Effects	(2) LSDV	(3) LSDV
Constant	0.07000****	0.05320****	0.03467**
	(0.0084)	(0.0074)	(0.0164)
$\Delta(INTFIN/ASSETS)_t$	0.08864**	0.08532*	0.11890****
	(0.0437)	(0.0441)	(0.0387)
$\Delta(INTFIN/ASSETS)_{t-1}$	0.16240****	0.16271****	0.17084****
	(0.0263)	(0.0265)	(0.0228)
$\Delta(INTFIN/ASSETS)_{t-2}$	0.10132****	0.10046****	0.10825****
	(0.0239)	(0.1005)	(0.0209)
$\Delta(LOANS/ASSETS)_t$	0.05888****	0.05998****	0.04814****
	(0.0127)	(0.0129)	(0.0114)
$SALESG_t$	0.00027**	0.00033***	0.00002
	(0.0001)	(0.0001)	(0.0001)
$SALESG_{t-1}$	-0.00015	-0.00008	-0.00023*
	(0.0001)	(0.0001)	(0.0001)
$SALESG_{t-2}$	-0.00010	-0.00004	-0.00018
	(0.0001)	(0.0001)	(0.0001)
$COSTK_t$	-0.00026	-0.00021	0.00015
	(0.0006)	(0.0006)	(0.0011)
Industry Fixed Effects	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes
No. of Observations	336	336	336
Adj. R-square	0.1607	0.6007	0.7101

Note: Standard errors in parentheses. * denotes significance at 10% level, ** denotes significance at the 5% level, *** denotes significance at the 2.5% level, and **** denotes significance at the 1% level.

TABLE 6

REGRESSION RESULTS FOR INVESTMENT ANALYSIS WITH INV/ASSETS AS DEPENDENT VARIABLE FOR DURABLE GOODS PRODUCING INDUSTRIES

Variable	(1) Random Effects	(2) LSDV	(3) LSDV
Constant	0.0607****	0.0858****	0.0865****
	(0.0118)	(0.0117)	(0.0231)
$\Delta(INTFIN/ASSETS)_t$	0.1694*	0.1699	0.0407
	(0.1043)	(0.1054)	(0.0897)
$\Delta(INTFIN/ASSETS)_{t-1}$	0.0920	0.0989	0.0234
	(0.0920)	(0.0838)	(0.0789)
$\Delta(INTFIN/ASSETS)_{t-2}$	0.0768	0.0805	0.0807
	(0.0768)	(0.0868)	(0.0807)
$\Delta(LOANS/ASSETS)_t$	0.0541***	0.0555***	0.0386**
	(0.0541)	(0.0214)	(0.0184)
$SALESG_t$	0.0001	0.0001	-0.0004
	(0.0002)	(0.0002)	(0.0002)
$SALESG_{t-1}$	-0.0003	-0.0003	-0.0006***
	(0.0002)	(0.0002)	(0.0002)
$SALESG_{t-2}$	-0.0004**	-0.0004*	-0.0005***
	(0.0002)	(0.0002)	(0.0002)
$COSTK_t$	0.0003	0.0003	0.0000
	(0.0010)	(0.0010)	(0.0017)
Industry Fixed Effects	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes
No. of Observations	137	137	137
Adj. R-square	0.0728	0.4499	0.6595

Note: Standard errors in parentheses. * denotes significance at 10% level, ** denotes significance at the 5% level, *** denotes significance at the 2.5% level, and **** denotes significance at the 1% level.

TABLE 7

REGRESSION RESULTS FOR INVESTMENT ANALYSIS WITH INV/ASSETS AS DEPENDENT VARIABLE FOR NON-DURABLE GOODS PRODUCING INDUSTRIES

Variable	(1) Random Effects	(2) LSDV	(3) LSDV
Constant	0.0655****	0.0347****	0.0145
	(0.0077)	(0.0083)	(0.0208)
$\Delta(INTFIN/ASSETS)_t$	0.1696****	0.1731****	0.1952****
	(0.0518)	(0.0487)	(0.0467)
$\Delta(INTFIN/ASSETS)_{t-1}$	0.1678****	0.1684****	0.1629****
	(0.0261)	(0.0245)	(0.0228)
$\Delta(INTFIN/ASSETS)_{t-2}$	0.1164****	0.1161****	0.1156****
	(0.0237)	(0.0223)	(0.0205)
$\Delta(LOANS/ASSETS)_t$	0.0333***	0.0327**	0.0257*
	(0.0155)	(0.0146)	(0.0142)
$SALESG_t$	0.0002	0.0002	0.0004
	(0.0003)	(0.0003)	(0.0003)
$SALESG_{t-1}$	0.0001	0.0002	0.0001
	(0.0002)	(0.0002)	(0.0001)
$SALESG_{t-2}$	0.0000	0.0001	0.0002
	(0.0003)	(0.0002)	(0.0003)
$COSTK_t$	-0.0009	-0.0010	0.0001
	(0.0008)	(0.0007)	(0.0014)
Industry Fixed Effects	No	Yes	Yes
Quarter Fixed Effects	No	No	Yes
No. of Observations	143	143	143
Adj. R-square	0.3549	0.6740	0.7357

Note: Standard errors in parentheses. * denotes significance at 10% level, ** denotes significance at the 5% level, *** denotes significance at the 2.5% level, and **** denotes significance at the 1% level.

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