FINANCING ENTERPRISES IN THE CZECH REPUBLIC: THE IMPORTANCE OF FIRM-SPECIFIC VARIABLES

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Financing enterprises in the Czech Republic: the importance of firm-specific variables

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Abstract:

This paper investigates the effects of firm specific variables on indebtedness, and thus financing decisions. A structural equation model with latent variables is estimated to show how size, profitability, foreign partnership, volatility of earnings, collateral availability and growth potential affect total, short term and bank indebtedness for each firm. The main results concern the role of size and growth in determining the availability of credit to enterprises. It is also shown that the most profitable firms, owing to high costs of credit and general market inefficiencies, prefer to use internal resources and thus neglect credit markets. When distinguishing among different forms of debt, bank debt seems to be the one that imposes the strongest financial discipline on enterprises. Evidence is provided for a change in allocation policies of banks.

The empirical evidence suggests some policy conclusions. It is noted that if banks have the right incentives (and the legal regulation of property should reinforce them), they are the best engine for transformation of the industrial sector. Furthermore, the paper suggests that small and medium enterprises should be provided with financial support, given that these productive units are strongly discriminated against in the official credit market.

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1. INTRODUCTION

The purpose of this paper is to stress the influence of firm-specific variables on enterprises’ financing choices during transition. The econometric analysis is an application of the Structural Equation Models with latent variables, developed, among others, by Joreskog, Sorhong and Bentler and applied to financing choices of enterprises by Titman and Wessels 1988 and by Butigian and De Leo 1994. Evaluated in particular will be the effect of six non observable firm level variables, each identified by one or more indicators, on the debt ratio of each enterprise (total debt, short term debt and bank debt).

Briefly described first is the statistical methodology used, followed by presentation of the main theoretical a priori of the analysis. The paper then discusses how the relationships between the firm-specific variables used and the debt ratios have been justified in the literature, taking particular account of the peculiar structure of transition economies. The model is than specified, estimated and tested, and some policy conclusions are drawn.

2. METHODOLOGY - STRUCTURAL EQUATION MODELS WITH LATENT VARIABLES

The econometric analysis is an application of Structural Equation Models with latent variables. This kind of statistical analysis assumes that the endogenous variables in the model depend on some latent variables which cannot be observed but can be indirectly measured using certain indicators. This suggested the joint estimation of a structural model and a measurement model. In the measurement model, the non-observable latent variables are related to observable indicators; in the structural model, the dependent variables are explained through the latent variables. Analytically, the measurement model is:

$$x = \Lambda \xi + \delta$$

where $x$ is the $q \times 1$ vector of the observable indicators, $\Lambda$ is the $q \times m$ matrix of the coefficients of the regression of $x$ over $\xi$, $\xi$ is the $m \times 1$ vector of the latent variables and $\delta$ is the $q \times 1$ vector of the measurement errors. The relationship between latent variables and observed indicators is linear;
the measurement errors are not correlated either with each other or with the latent variables.

In the structural model, the dependent variable is related to non observable variables. No ex ante hypothesis is formulated concerning the relationships among latent variables; in particular, the correlation matrix among the $\xi$ is estimated within the model ($m \times m \Phi$ matrix). It is assumed that the errors in the structural equation are not correlated with those of the measurement model. The variance and covariance matrix among the $\epsilon$, instead, is estimated by the model (it is a $p \times p$ matrix, $\Theta_\epsilon$, where $p$ is the number of endogenous variables). Analytically:

$$y = \Gamma \xi + \epsilon$$

where $y$ is the $p \times 1$ vector of dependent variables, $\Gamma$ is the $q \times m$ matrix of the structural parameters, $\xi$ is the $m \times 1$ vector of the exogenous latent constructs, while $\epsilon$ is the $p \times 1$ vector of measurement errors in the structural model.

3. Financing Choices of Enterprises - Theoretical and Empirical Considerations Related to the Czech Republic Case

The purpose of this analysis is to evaluate the extent to which some firm-specific variables considered important by the theoretical literature influence indebtedness, and thus the financing choices of enterprises. Also suggested are potentially relevant factors specific to the experience of a transition economy, namely the presence of an adequate legal framework, the development of financial markets and the persisting influence of the planned economy system.

In practical terms, the empirical analysis evaluates the effect of six non perfectly observable firm level variables, each identified by one or more indicators, on the debt ratio of each enterprise, which is formalised as total debt, short term debt and bank debt, separately considered. The six variables of interest are: firm size (SIZE), collateral availability (COLL), growth opportunities (GRO), revenues volatility (VOL), foreign partnership (FOR) and profitability (PROFIT), which could be interpreted as self financing capacity, or, in negative terms, as the need to find external resources. Not considered are the variables of fiscal exemption and sector, which have instead been included in the analyses by Buttignon and De Leo and by Titman and Wessels. The decision to neglect the former variable was determined by the lack of data concerning the effective tax burden on enterprises due to the fact that widespread tax arrears practices during transition create large discrepancies between due and effectively paid taxes. The sector dummy was excluded because, following descriptive analysis of the data, it was found that production technology affects debt ratios only to a minor extent. This simple study shows that other firm specific characteristics outweigh the effect of sector of activity in determining access to external resources. Service sectors, (in particular those connected with trade) have a lower debt ratio, while machinery production - which according to Titman 1984 should have a low level of indebtedness because of the high specificity of its assets - lies in the medium-high level range.

Now analysed are the individual variables considered relevant to the investigation and the indicators which identify them. The procedure used to identify relevant indicators is not exempt from criticism. Masulis (1988) writes that “a great discretion is left to the researcher in searching for the indicators...and no information is given to the reader on the sensitivity of the results to this choice”. However, this arbitrariness is common to all empirical investigations, the estimation procedure used has the advantage that it does not impose a choice among possible alternative indicators.

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1 This is the structural model coefficient matrix.

2 Although specific firm variables are potentially observable, due to arbitrary definitions and to the necessity of relating only on balance sheet data, an analysis which allows identification of each latent variable through more than one indicator, each one providing new information on the variable, is extremely useful.

3 Owing to a lack of data it was impossible to control for debt with the public administration.

4 Masulis (1988), pag. 79.
3.1 Indebtedness Ratios

The dependent variable in the model is the debt ratio; the analysis is in terms of stock, which means that it considers not marginal financing decisions but total indebtedness towards creditors cumulated over time and thus influenced by past financing decisions. To deal with this problem, the model was estimated for two consecutive years (1994 and 1995). Although the results of both are not presented, comparison, stressed when necessary, between the results highlights changes in the financing policies of enterprises.

Debt ratios were specified as total debt over total assets, as short term debt over total assets and as bank debt over total assets. The first measure includes the whole enterprise debt, and therefore also short term and bank debt. There is an overlap between short term debt and bank debt, due to the fact that the former includes bank and non bank short term debt, while the latter one includes short and long term debt with the banking sector. Three alternative measures of indebtedness were considered so that the implications of each in terms of control and information could be compared.

As regards debt maturity, the literature on financing choices of enterprises has recently stressed the advantages in terms of information and control of short term debt. Jensen and Mackling 1976 and Myers 1977 found that short term indebtedness assures financiers that the enterprise does not practise “asset substitution” or “under investment”. It thus reduces the costs that the enterprise would face if it had to make a credible commitment not to undertake these actions. Diamond 1991 shows that in the presence of adverse selection, better quality enterprises require short term financing because they know that in the next period, due to their profitability, they will find other funds on better conditions. By requiring short term debt, therefore, they signal their quality. More recently other models have explicitly concentrated on the determination of the optimal maturity structure of debt (Diamond 1993, Hart and Moore 1994, Berglof and Roland 1994). In particular, these studies stress the advantages of short term debt in terms of control. Given that this form of indebtedness obliges the firm to report to the credit market as it searches for additional funds in the second period, it provides the enterprise with adequate incentives ex ante not to waste the resources gained. On the other hand, however, short term financing obliges the firm to re-negotiate debt, which implies high costs and precludes the long term planning of enterprise activities. In transition economies one would expect short term debt advantages in terms of monitoring to be exploited.

Some models emphasise the advantages in terms of monitoring of bank-intermediate debt; among them Diamond 1984, Rajan 1992 and Calomiris and Kahn 1991. In transition economies, bank debt should be able to guarantee a closer control compared with other forms of debt, due to the fact that banks should adopt more strictly market roles in the allocation of credit. Thus may be the form of debt that best guarantees the financial discipline of enterprises. From the empirical analysis conducted here it is expected that bank debt will be more closely linked to variables like size and collateral, compared with other forms of debt, providing a proof of the greater financial discipline that it imposes.

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5 The decision to work with indebtedness stocks is shortcoming in the empirical analysis. However, the same choice is made by all the other works which analyse financing choices of enterprises in Eastern Europe; among them, Cominelli, Pontes and Schaffer 1995 and Classens, Djankov and Pohl 1997.
6 The ratio is the sum of payables (in both the short and in the long run), bank credits and assistance and other liabilities.
7 Total debt equals total liabilities minus reserves, that is, the sum of payables (in the short and in the long run), bank credits and assistance and other liabilities.
8 Total debt is expressed as the ratio between short term debt and total assets. Short term debt is the sum of three components: short term payables, short term bank credits and other credits, and other liabilities.
9 Book value instead of market value of debt is used, due to data availability.
10 In paragraph 2.5 I shall show the exact relationship among the three dependent variables, by presenting their correlation matrix.
3.2 SIZE AND AGE

The relationship between firm's size and indebtedness can theoretically assume different forms; in particular, according to the model used, it can be positive or negative. A direct relationship is assumed in models which focus on supply factors to show that information and agency problems, which exist for all enterprises, are particularly severe for small and medium ones. This is because these productive units are generally subject to less demanding laws on information disclosure and make a greater use of non conventional sources of finance (informal markets), which cannot be registered. Since creditors internalise all these problems; other things remaining equal, they prefer to finance larger enterprises, because size creates a reputation or guarantee effect (Holmstrom and Tirole 1994). This phenomenon is even more evident when forms of credit rationing arise (Stiglitz and Weiss 1981).

In transition economies, the presence of major inefficiencies in the juridical and legal framework tends to exacerbate this kind of information problem, especially for small enterprises. Collateral laws which do not provide effective and rapid systems of guarantee registration, bankruptcy laws which are not clear and require long recovery procedures, linked with the persistent feeling that large enterprises are "too big to fail", induce creditors to prefer large productive units in the allocation of resources. Moreover, the close link in East European countries between size and age of a firm explains the positive relationship between size and indebtedness. Large enterprises are usually older and have thus cumulated a greater stock of debt over time, simply because they have been in business for longer. Also for this reason, a direct relationship between debt and size may testify to the persistence of lobby attitudes in credit allocation policies.

Models which assume an indirect relationship between indebtedness and size focus on demand factors. Their main hypothesis is that larger enterprises encounter fewer difficulties in accessing sources of finance alternative to debt. Thus, when debt financing is particularly costly, as in transition economies, they prefer to use these alternative sources of funds. Obviously, these considerations, which in part derive from the model of Myers and Majluf 1984, require the existence of effective and wide capital markets. In transition economies this is not the case; rather than being a conventional source of finance, in fact, capital markets tend to be a means to transfer enterprise property, mainly as part of the privatisation process. The liquidity level in capital markets\(^{10}\) can be considered to be an indirect measure of the capacity of firms to raise funds through equities. A low value means that transaction costs are high and that capital markets are essentially considered an instrument to transfer property through privatisation; a high level may be associated with low transaction costs and high financing opportunities. The 13% value of the Czech capital markets at end 1995 (compared to 23% for Hungary and 59% for Poland) shows that in that country capital markets are mainly considered to be a privatisation instrument and that they are not really viable alternatives to debt for enterprise financing. We may conclude that, as far as size is concerned, factors linked to credit supply still tend to outweigh those connected with credit demand in determining the financial structure of enterprises. The expected relationship between size and indebtedness of a firm, taking both theoretical and empirical aspects into consideration, is thus positive.

In the empirical analysis, the indicator used to define the size latent variable is the natural logarithm of revenues from sales of own production and services (Insal); it is assumed that this indicator is able to identify exactly the latent variable and that the relationship with it is positive. It was decided to take the variable in logarithm, the expectation being that the size effect, if present, would affect smaller enterprises much more\(^{11}\). The indicator was calculated in t-1.

3.3 COLLATERAL

Different theoretical models predict both a direct and an indirect relationship between collateral and indebtedness. Models focusing on supply elements predict a positive relationship. In these models, in fact, collateral availability allows enterprises to offer guarantees over debt; the financier is thus protected and gives credit to the firm. Furthermore, when credit rationing arises, collateral availability may be a necessary condition to gain access to credit markets (Holmstrom and Tirole 1994).

As already mentioned, the positive relationship with the indebtedness variable persists as long as adequate laws regulate collateral and creditors therefore receive enough protection. If this is not the case, the guarantee value of collateral may be substantially lower than its nominal

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\(^{10}\) Liquidity has been measured as the ratio between total value of traded equities over market capitalisation.

\(^{11}\) In doing so, I follow Schiantarelli and Sembenedelli (1996).
value; enterprises may be unable to profit from their guarantees potential and thus lose credit markets. In the Czech Republic, the property laws and the registration system are still inefficient, even when compared to Hungarian and Polish laws. The roles on priority lines are doubtful, although the Government does not automatically have a first place in redrafting order. Assured credit is however defined as a third order credit and it can only be satisfied on default by the firm once the costs of liquidation, taxes and debts to the social system have been paid. Last but not least, the secondary markets for assets are quite thin and illiquid. These various factors means that collateral law is still ineffective, so that collateral fails to protect creditors.

Generally speaking, the positive relationship between collateral and indebtedness should be more pronounced when bank debt is considered, owing to the greater ability of these credit institutions to apply market rules when allocating their resources. Informal and trade credits, as well as those allocated according to the planned economy tradition, do not consider collateral to be a relevant variable.

A negative relationship between indebtedness and collateral is stressed in models which assume control and agency problems (Jensen and Meckling 1976, Myers 1977, Grossman and Hart 1992). However, due to the peculiarities of transition economies, it seems more plausible that the guarantee power of collateral outweighs agency and control effects. We would thus expect a positive relationship to arise whenever market rules regulate credit allocation policies. A negative relationship could be the consequence of the persistence of planned credit and non economic rules in the allocation of resources.

The two indicators considered in identifying the latent variable collateral are IGPTA and IFA, which are both linked to collateral by a positive sign. The first indicator is the total of tangible fixed assets plus inventories and other financial activities over total assets and represents, in terms of stock, collateral availability. However, due to the low liquidity of assets in transition economies, this is not an effective measure with which to evaluate the guarantee ability of enterprises. The second indicator is the ratio between gross investment and fixed assets, and it is thus a measure in terms of flows. The reason why the second indicator is included is that it testifies to the growth in enterprise collateralizable properties. In transition economies, in which the face value of inventories is seldom representative, new capital has a reliable value and is thus a good measure of the guarantees that a firm can provide. Both indicators have been calculated in t-1.

3.4 GROWTH

In agency models, enterprises with high growth opportunities usually have low indebtedness ratios. The reason for this negative relationship between debt and growth is the interest conflict that arises between managers and financiers (creditors in this case). In particular, when an enterprise displays large growth opportunities, managers generally prefer to adopt riskier projects, financing them through debt. Should the project fail they will suffer only up to the value of the collateral; should it succeed, they will profit by the whole gain. Financiers internalise this possible agency problem; when dealing with enterprises with high growth potential, they offer less advantageous debt contracts and they limit long term financing. The negative relationship between debt (especially of the long term type) and growth is thus explained.

Myers 1977 assumes a similar situation to show that it is possible to limit monitoring costs by adopting short term financing or bank debt. This explains the possibility of a direct relationship between debt and growth, particularly in the form of short term or intermediate debt. This relationship is more plausible in transition economies, because of the strong attention paid to effective monitoring.

The indicators considered in order to identify the latent variable concerning growth opportunity are the ratio between gross investment and fixed assets in t-1 (IGPA) and the growth rate average in the 1993-1995 period of total activities; both are related to the latent variable by a positive sign.

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12 It is common practice in transition economies to ask for a loan in order to buy a particular mobile asset and then to provide the creditor with a guarantee on the same asset, together with a letter from the supplier in which the latter declares his willingness to take the asset back if the debtor defaults.
3.5 VOLATILITY

The optimal structure models (among them Bradley, Jarrel and Kim 1984) show a negative relationship between volatility and the indebtedness of an enterprise. In particular, when the volatility of earnings increases, in the presence of high bankruptcy costs, the risk of failure increases, and creditors are therefore less willing to finance the firm. Titman and Wessels propose the standard deviation of the percentage change of operating income during the considered period (SIOI) as the only indicator of volatility, linked to the latent variable by a positive sign. This indicator is assumed to exactly identify the latent variable.

3.6 FOREIGN PARTNERSHIP

A foreign partnership can influence the financing choices of enterprises. From a demand point of view, the presence of a foreign partner may imply greater access to sources of finance alternative to debt, capital markets in particular. Owing to the monitoring role performed by the foreign partner, in fact, other investors may decide to enter the firm, thus providing it with new capital. As a consequence, the firm is not forced to use expensive debt, and an indirect relationship between debt and foreign partnership arises. Furthermore, this relationship should be stronger when less advantageous forms of debt for the enterprise are taken into account, for example, with short-term debt.

From the supply point of view, a foreign partnership may provide greater access to the credit market on better conditions, partly because there is some sort of transfer of reputation from the foreign partner to the domestic one, and partly because (thanks to investors’ connections with foreign banks) the possibility of financing in foreign currency is enhanced. In this case the relationship is positive. Thus, whenever supply factors outweigh demand ones, we expect a positive relationship between indebtedness and foreign partnership; if demand factors predominate, we expect a negative relationship.

The DumFOR variable has been chosen as the only indicator for the latent variable foreign partnership, to which it is linked by a positive sign. In particular, it should be interpreted as a continuous truncated “foreign partner share-holding” variable, according to the relationship:

DumFOR = 1 iff foreign partnership implies the acquisition of at least 5% of shares,
DumFOR = 0 iff foreign partners hold less than 5% of shares, where 5% is the threshold. Because this is the only indicator, we assume that it is able to identify exactly the latent variable foreign partnership.

3.7 PROFITABILITY

Signalling models assume an indirect relationship between profitability and indebtedness (Ross 1977). In all these models, in fact, present profitability is considered to be a proxy for future profitability, and it is used by enterprises to signal their quality. This implies that profitable firms may have high indebtedness precisely because they emit highly positive signals concerning their future profitability.

Financial hierarchy models show a negative relationship between leverage and profitability. More profitable firms, in fact, can finance themselves. They are therefore less dependent on debt financing, which they will avoid, especially when credit conditions are particularly bad. A negative relationship is also found in some agency models. Among these, Hart and Moore 1995 show that projects with high expected profitability find less long-term credit because financiers internalise the possibility of opportunistic behaviour by managers, and thus prefer to exploit the control advantages of short-term debt.

In transition economies, as pointed out by Claessens, Djkov and Pohl 1997, a negative relationship between indebtedness and profitability may arise as a consequence of past financing practices linked with the planned economy tradition. Under the plan, in fact, Czech enterprises used to finance investment through equities, while debt was used to finance working capital requirements; hence derived the negative relationship between debt and profitability. Furthermore, owing to the importance of market inefficiencies and to the costs of external finance, one would expect enterprises with enough internal resources to avoid resorting to external funds, so that a negative relationship between indebtedness and profitability arises. A simple descriptive analysis of data on enterprise financing in the Czech Republic reveals that self-financing is the main source of funds for enterprises, accounting for more than 70% of investment funding in both 1994 and 1995.

13 Revoltella (1997).
The indicators used to identify the profitability latent variable are the ratio between cash flow\(^\dagger\) and total assets (SFTA), calculated in t and the ratio between operating income and sales (OIS) calculated in t-1. Both indicators are linked to the latent variable with a positive sign.

### Table 1: Expected relationship between indicators and latent variables

<table>
<thead>
<tr>
<th>Indicator</th>
<th>SIZE</th>
<th>COLL</th>
<th>GRO</th>
<th>VOL</th>
<th>FOR</th>
<th>PROFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnSiz</td>
<td>+</td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>IGPTA</td>
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<td>IFA</td>
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<tr>
<td>GTA</td>
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<tr>
<td>SIOI</td>
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<tr>
<td>DumFOR</td>
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</tr>
<tr>
<td>SFTA</td>
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<tr>
<td>OIS</td>
<td></td>
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</tr>
</tbody>
</table>

\(^\dagger\) Cash flow is formally defined as the sum of all internal resources which do not drive from new stockholder investments or de-investment. Due to the fact that information on dividends paid was unavailable, cash flow has been approximated by change in reserves plus depreciation.

### 4. Model Specification

The econometric analysis is an application of structural equation models with latent variables. Joint estimation of a measurement and a structural model will show how the specific firm variables previously mentioned influence indebtedness choices. In particular, in the specification adopted, six specific firm latent variables (the \( \xi \) vector is a 6 x 1) are considered, namely size (SIZE), collateral availability (COLL), growth opportunities (GRO), volatility of earnings (VOL), foreign partnership (FOR) and profitability (PROFIT). Each latent variable is related to one or more indicators taken from enterprise balance sheets, according to the relationships highlighted in table 1. The \( x \) vector is thus an 8 x 1, while the loading coefficient matrix \( \Lambda \) is a 8 x 6. In analytical terms:

\[
\begin{bmatrix}
\text{ln sal} \\
\text{IGPTA} \\
\text{IFA} \\
\text{OIS} \\
\text{SFTA} \\
\text{GTA} \\
\text{SIOI} \\
\text{DumFOR}
\end{bmatrix} = 
\begin{bmatrix}
\lambda_{11} & 0 & 0 & 0 & 0 & 0 \\
0 & \lambda_{22} & \lambda_{23} & 0 & 0 & 0 \\
0 & 0 & 0 & 0 & 0 & \lambda_{4,6} \\
0 & 0 & 0 & 0 & 0 & \lambda_{6,6} \\
0 & 0 & 0 & 0 & 0 & \lambda_{7,4} \\
0 & 0 & 0 & 0 & 0 & \lambda_{8,5} \\
0 & 0 & 0 & 0 & 0 & \lambda_{8,5}
\end{bmatrix} 
\begin{bmatrix}
\text{SIZE} \\
\text{COLL} \\
\text{GRO} \\
\text{VOL} \\
\text{FOR} \\
\text{PROFIT}
\end{bmatrix} + 
\begin{bmatrix}
\delta_1 \\
\delta_2 \\
\delta_3 \\
\delta_4 \\
\delta_5 \\
\delta_6 \\
\delta_7 \\
\delta_8
\end{bmatrix}
\]

The lnSiz indicator is the only one connected to size, and it is assumed to identify the latent variable exactly; the measurement error is thus equal to 0. The same applies to volatility and foreign partnership, which are perfectly identified by SIOI and DumFOR.

The structural equation links observable dependent variables with non observable latent variables through a linear relationship. In the specification adopted, the observable dependent variables (total indebtedness, short term indebtedness and bank indebtedness) are related to the six latent variables mentioned above. The three latent variables do not have simultaneous connections. The specified model is therefore a reduced form in which each type of indebtedness depends on all the explanatory latent variables. No restriction is imposed in the \( \Gamma \) matrix of structural parameters, which is thus a 3 x 6; the correlation among non observed
variables, like the variance and covariance matrix of the error terms of the structural model $\Theta_G$ is estimated within the model. In matrix terms:

$$
\begin{bmatrix}
\text{DTA} \\
\text{STDTA} \\
\text{BDTA}
\end{bmatrix} = \begin{bmatrix}
\gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} & \gamma_{15} & \gamma_{16} \\
\gamma_{21} & \gamma_{22} & \gamma_{23} & \gamma_{24} & \gamma_{25} & \gamma_{26} \\
\gamma_{31} & \gamma_{32} & \gamma_{33} & \gamma_{34} & \gamma_{35} & \gamma_{36}
\end{bmatrix} \begin{bmatrix}
\text{SIZE} \\
\text{COLL} \\
\text{GRO} \\
\text{VOL} \\
\text{FOR} \\
\text{PROFIT}
\end{bmatrix} + \begin{bmatrix}
\varepsilon_1 \\
\varepsilon_2 \\
\varepsilon_3 \\
\varepsilon_4 \\
\varepsilon_5 \\
\varepsilon_6
\end{bmatrix}
$$

Given the specified model, one must check whether it is identified. Its identification cannot be proved mathematically or through sufficient conditions; however, the empirical test\(^{15}\) yields a positive result.

5. SAMPLE AND DATA DESCRIPTION FOR THE 1995 MODEL

Used here are yearly official balance sheet data for 665 enterprises listed on the Prague Stock Exchange and in the RM System for the 1993-1995 period. Summary statistics for the series of interest are presented in Table 2a. It was not possible to assume normal distribution for any of the relevant series; only two of them appear to be symmetric (Insal and SFTA), while all of them are characterised by excessive kurtosis. Accordingly, estimators will be used which do not require the normality assumption of the data. In the empirical analysis, standardised variables will be preferred.

<table>
<thead>
<tr>
<th>Table 2: Data description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Insal94</td>
</tr>
<tr>
<td>IGPTA94</td>
</tr>
<tr>
<td>IFA94</td>
</tr>
<tr>
<td>OIS94</td>
</tr>
<tr>
<td>SFTA95</td>
</tr>
<tr>
<td>GTA</td>
</tr>
<tr>
<td>SIOI</td>
</tr>
<tr>
<td>DTA95</td>
</tr>
<tr>
<td>STDTA95</td>
</tr>
<tr>
<td>BDTA95</td>
</tr>
</tbody>
</table>

Table 2b shows the correlation matrix among the three dependent variables.

| Table 2b: Correlation matrix among dependent variables |
|-----------------|----------------|----------------|
| | DTA | STDTA | BDTA |
| DTA | 1 | | |
| STDTA | 0.852 | 1 | |
| BDTA | 0.705 | 0.466 | 1 |

6. MODEL ESTIMATION AND EVALUATION

The model is estimated using a Weighted Least Square Estimator in order to obtain asymptotically efficient estimators, although the variables are not normally distributed. Table 3, 4 and 5 present the estimation results; in particular, Table 3 presents the loading factors of the measurement model, Table 4 the correlation matrix among latent variables estimated by the model, and Table 5 the structural parameters. Table 6 sets out some tests to evaluate the overall fit of the model.

\(^{15}\)The empirical test proceeds as follow: the model is estimated and the variance and covariance matrix implied by the model is saved and used as an input matrix for the next estimation. The results of the two estimations are thus compared. Whenever they are identical, the model can be considered identified.
Table 3: Measurement Model - loading factors (test t in parenthesis)

<table>
<thead>
<tr>
<th>Indicators</th>
<th>SIZE</th>
<th>COLL</th>
<th>GRO</th>
<th>VOL</th>
<th>FOR</th>
<th>PROFIT</th>
<th>( \sigma^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insal</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IGPTA</td>
<td>0.630</td>
<td>(4.296)</td>
<td></td>
<td>0.603</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IFA</td>
<td>0.261</td>
<td>0.873</td>
<td></td>
<td></td>
<td></td>
<td>0.439</td>
<td></td>
</tr>
<tr>
<td>(2.204)</td>
<td>(7.378)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OIS</td>
<td>-0.178</td>
<td></td>
<td>0.968</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3.591)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SFTA</td>
<td>-0.692</td>
<td></td>
<td>0.521</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(4.937)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GTA</td>
<td>0.567</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.678</td>
<td></td>
</tr>
<tr>
<td>(8.180)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIQI</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DumFOR</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SIZE: size, COLL: collateral, GRO: growth, VOL: volatility of earnings, FOR: foreign partnership, PROFIT: profitability, Insal: logarithm of sales, IGPTA: tangible fixed assets plus inventories over total assets, IFA: investments over fixed assets, OIS: operating income over sales, SFTA: cash flow over total assets, GTA: growth rate of total assets, SIQI: standard deviation of the percentage change in operating income, DumFOR: dummy for foreign partnership with an equity share greater than 5%.

Table 4: Correlation Matrix among Latent Variables

<table>
<thead>
<tr>
<th></th>
<th>SIZE</th>
<th>COLL</th>
<th>GRO</th>
<th>VOL</th>
<th>FOR</th>
<th>PROFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE</td>
<td>1</td>
<td>-0.073</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COLL</td>
<td>-0.071</td>
<td>1</td>
<td>-0.592</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRO</td>
<td>0.071</td>
<td>-0.113</td>
<td>0.105</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VOL</td>
<td>0.046</td>
<td>-0.078</td>
<td>0.104</td>
<td>0.143</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>FOR</td>
<td>0.254</td>
<td>0.078</td>
<td>0.104</td>
<td>0.143</td>
<td>1</td>
<td>PROFIT</td>
</tr>
<tr>
<td>PROFIT</td>
<td>-0.309</td>
<td>-0.112</td>
<td>-0.255</td>
<td>0.204</td>
<td>0.060</td>
<td>1</td>
</tr>
</tbody>
</table>


Table 5: Structural Model - structural parameters estimation (t test in parenthesis)

<table>
<thead>
<tr>
<th></th>
<th>SIZE</th>
<th>COLL</th>
<th>GRO</th>
<th>VOL</th>
<th>FOR</th>
<th>PROFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTA</td>
<td>0.319</td>
<td>0.175</td>
<td>0.549</td>
<td>0.004</td>
<td>0.098</td>
<td>0.638</td>
</tr>
<tr>
<td>(2.412)</td>
<td>(0.900)</td>
<td>(2.451)</td>
<td>(0.051)</td>
<td>(-1.242)</td>
<td>(2.495)</td>
<td></td>
</tr>
<tr>
<td>STDTA</td>
<td>0.260</td>
<td>-0.276</td>
<td>0.201</td>
<td>-0.046</td>
<td>-0.153</td>
<td>0.444</td>
</tr>
<tr>
<td>(2.467)</td>
<td>(-1.335)</td>
<td>(1.063)</td>
<td>(-0.679)</td>
<td>(-2.250)</td>
<td>(2.273)</td>
<td></td>
</tr>
<tr>
<td>BDTA</td>
<td>0.278</td>
<td>0.501</td>
<td>0.644</td>
<td>0.038</td>
<td>-0.063</td>
<td>0.599</td>
</tr>
<tr>
<td>(2.035)</td>
<td>(1.838)</td>
<td>(2.365)</td>
<td>(0.446)</td>
<td>(-0.750)</td>
<td>(2.325)</td>
<td></td>
</tr>
</tbody>
</table>

SIZE: size, COLL: collateral, GRO: growth, VOL: volatility of earnings, FOR: foreign partnership, PROFIT: profitability, DTA: debt over total assets, STDTA: short term debt over total assets, BDTA: bank debt over total assets

Table 6: Test - overall model fit

<table>
<thead>
<tr>
<th></th>
<th>( \chi^2 ) with 13 degrees of freedom</th>
<th>NFI</th>
<th>NNFI</th>
<th>CFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSEA</td>
<td>0.0332</td>
<td>0.999</td>
<td>0.999</td>
<td>0.999</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.996</td>
<td>0.999</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Generally speaking, the signs of the parameters in the structural model do not contradict the a priori expectations arising from the theoretical analysis and from empirical considerations specific to experience of credit markets in the Czech Republic. Moreover, all the coefficients of indicators in the measurement model are significant and the latent variables appear to
be adequately identified. The results of tests in table 6 reveal the overall goodness of the model.

While considering the first equation, it is important to note that the debt ratio is positively linked to the size latent variable. As previously mentioned, a positive relationship between these two variables may be a consequence of various factors. First, it may be the consequence of asymmetric information and agency problems, which means that creditors prefer to lend to larger enterprises because they have a reputation advantage arising from their size. In transition economies, in fact, large enterprises are subject to stricter rules in terms of information disclosure (consider the enterprises listed on the Prague Stock Exchange, which must produce quarterly balance sheet information) and use informal, non registered debt only to a limited extent. The existence of economies of scale in monitoring and thus in lending is another possible explanation for the easier access to credit markets enjoyed by large productive units.

Furthermore, due to the stock nature of this analysis, the positive relationship between debt and size may be a consequence, on the one hand, of the persistence of planned policies of resources allocation, which were directed at the larger units, and on the other, of the age of firms, the longer established of which have cumulated greater indebtedness. If only this result is considered, it is impossible to say whether it is the consequence of new allocation policies regulated by market forces, or on the contrary of soft budget constraint attitudes linked to the idea that large enterprises are “too big to fail”. Because the positive relationship still persists when short term debt and bank debt are considered, it seems that the first explanation is the most appropriate, although the influence of past policies is definitely important in a stock analysis.

Total indebtedness depends positively on growth opportunities for the enterprise. Generally speaking, it seems obvious that financiers prefer those enterprises with the highest growth opportunities. This is a proof of new market discipline in credit allocation: firms with an high potential obtain credit.

The relationship between debt and profitability is direct. It should be noted, however, that the SFTA and the OIS indicators define the latent variable PROFIT indirectly (with a negative sign). It is thus possible to simplify the interpretation of the results by considering the relationship between debt and profitability as negative and the one between indicators and the latent variable as positive. A formal demonstration for this simplification can be provided.

\[
\begin{align*}
x &= \Lambda \xi + \delta \\
y &= \Gamma \xi + \epsilon
\end{align*}
\]

The two equations are jointly estimated; thus the signs in the matrix of structural parameters are linked to the fact that the second equation must be respected (which means that, when the sample correlation between \( x \) and \( y \) is negative and that of \( x \) and \( \xi \) is positive, than the coefficient between \( x \) and \( \xi \) should necessarily be negative). With this simplification in mind, it is possible to support the assumption of a financial hierarchy; firms with enough internal resources tend to self finance and use credit markets to a lesser extent, probably because of the high cost of debt. A similar conclusion has been reached by Carare and Perotti (1997) and by Cornelli, Portes and Schaffer (1995), analysing Romanian, Hungarian and Polish firms.

The coefficients for the other latent variables do not appear to be significant for \( \alpha = 0.05 \); in particular, the collateral coefficient is not significant, so that the availability of guarantees is not a determinant in the overall indebtedness ratio of a firm. This result may indicate a general lack of financial discipline at the level of overall indebtedness, which may be also influenced by bad debt and soft budget constraint problems. Furthermore, due to the stock nature of the study, it may be that factors linked to past credit policies are still influential. In fact, in planned economies, enterprises generally used debt to finance working capital, while fixed assets (the measure of collateral used here) were financed through equities. Nor do the latent variable FOR, of a foreign partnership, and the VOL one, volatility of earnings, have significant coefficients.

The second equation relates specific enterprises variables to short term debt indebtedness. This form of debt allows for closer monitoring and, since it is a new form of finance connected with transition, it should give rise to greater financial discipline. The results are substantially in line with those of the previous regression.

Firm size is positively related to short term debt, testifying to the above mentioned information problems. The coefficient in the regression is lower than the corresponding one in the previous regression. This should be interpreted as showing that the same change of one unit of standard deviation of the latent construct implies a higher expected change in terms

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16 An age variable could not be created owing to the lack of data; however, in transition economies, the relationship between age and dimension is extremely close.
of standard deviation units of total debt, with respect to short term debt. In economic terms, this ensues from the fact that age problems are less relevant. Also the coefficient concerning profitability has a positive and significant sign. However, because of the negative relationship between the two indicators and the latent variable, we should interpret this as signalling a negative relationship between profitability and short term indebtedness. This result bears out the financial hierarchy hypothesis, especially if we consider that short term debt is an extremely expensive form of finance for enterprises, because of renegotiation costs.

The coefficient of the foreign partnership variable (FOR) is negative and significant for \( \alpha = 0.05 \). It is interpreted as confirming the assumption that enterprises involved in joint ventures with foreign partners use short term debt to a lesser extent because of the high costs in terms of renegotiation that this implies. Furthermore, one notes that a foreign partnership implies organisational, institutional and competitive monitoring, so that discipline imposed by short term debt is no longer required. The other three latent variables (COLL, GRO and VOL) are not significant for \( \alpha = 0.05 \).

The third equation concerns bank debt. The usual result is obtained, namely that more profitable firms prefer self financing, which demonstrates the high costs of credits (the relationship between BDTA and PROFIT is still interpreted as negative). Furthermore, the coefficients of GRO and SIZE are significant and positive, testifying that bank debt is positively related to both growth opportunities and size (age) of the firm. When comparing the magnitude of the coefficients with those of the correspondent variables in the other two regressions, one finds that a one unit change in terms of standard deviation of the GRO variable determines a higher change (in terms of standard deviation) in bank indebtedness, when compared to other forms of debt. This means that enterprises with high growth opportunities ask for and obtain bank debt. The coefficient of the size variable is similar in the three equations.

When considering the collateral variable, it should be noted that its coefficient is now positive and significant for \( \alpha = 0.1 \), meaning that collateral availability influences enterprises indebtedness to banks. Moreover, comparing this result with the corresponding one estimated for the 1994 model shows that the relationship is strengthened and that the coefficient is now significant, testifying to an improvement in bank credit allocation policies. In the 1994 estimations, in fact, the coefficient linking bank debt and collateral was positive but not significant; in quantitative terms, the coefficient was 0.268 in 1994 and 0.501 in 1995, demonstrating its greater influence on bank indebtedness over time. This result seems to provide important proof of the fact that bank debt is allocated according to economic and prudential rules, and is thus linked to the availability of adequate guarantees. Moreover, it should be noted that banks are more effective than other financiers in recovering credits in an inefficient legal framework like the Czech one, so that collateral may be a real guarantee in bank debt contracts. More than other creditors, therefore, banks are thus forcing enterprises to pursue financial discipline.

To sum up, the analysis allows some important conclusions to be drawn concerning the effects of firm specific variables on indebtedness and thus on financing decisions. A first important result concerns profitability. Owing to credit and capital market inefficiencies, enterprises prefer to use internal resources first; this is true whatever source of finance is considered. Similar conclusions have been drawn by other research work concerning both developed and developing countries.

A second result is the importance of enterprise size in gaining access to credit markets, independently of the form that the latter assume. This suggest that projects should be developed to help small and medium enterprises, especially when the homogeneous growth of the economy is the main objective of governments. Schemes of this kind are almost entirely lacking in the Czech Republic, where even a clear definition of small and medium enterprise is not available. However, it should be borne in mind that size is closely related to age, and consequently that the greater indebtedness of large enterprises may be a consequence of their age.

Finally, comparison among the results of the three regressions confirms that bank debt plays a more powerful monitoring role over enterprises. Bank debt, in fact, is the only form of debt strictly linked to collateral availability. Furthermore, the value and significance of the coefficient of collateral variable is increasing over time, proving that banks are now following prudential and economic rules in the allocation of credit. It thus seems that the banking system should play a greater role in transition economies; in particular, the link between banks and enterprises should be developed, without thereby creating a mixture of property and wrong incentives. This recommendation applies especially to the Czech Republic, where a transition process dominated by the creation of investment funds which own and are owned by the banks is creating concern for the overall stability of the financial system.

Finally, it should be noted that the only equation in which the foreign partnership dummy is significant is the one for short term debt,
testifying that enterprises with foreign partners prefer other sources of
finance and neglect short term debt because it prevents the long term
planning of economic activities and entails re-negotiation costs.

7. FURTHER INVESTIGATION.

In order to give closer specification to the monitoring role of banks,
compared with that of other creditors, a further analysis was conducted,
using OLS estimation methods to relate bank debt (BDTA, bank debt over
total assets) to profitability (SFTA, cash flow over total assets), size (lnsal,
logarithm of sales), collateral availability (IGPTA, tangible fixed assets plus
inventories over total assets), growth opportunities (IFA, investments over
fixed assets) and enterprise arrears\(^\text{17}\) (TATA, enterprise arrears over total
assets). The idea was that if banks pursue prudent and efficient policies in
the allocation of credit, they will not finance enterprises which are highly
indebted to trade partners. The estimated equation was:

\[
\text{BDTA}_{t} = a + b_1 \ln \text{sal}_{t-1} + b_2 \text{IGPTA}_{t-1} + b_3 \text{SFTA}_{t-1} + b_4 \text{IFA}_{t-1} + b_5 \text{TATA}_{t-1}
\]

The independent variables used in the regression, with the
exception of SFTA, were calculated in \(t-1\), in order to internalise the fact
that bank credit allocation decisions rely on the available data, which
are those of the previous year. The dependent variable was the ratio between
bank debt and total assets. The analysis was developed for two consecutive
years (1994 and 1995) in order to show the change over time in the
relationships among the variables and thus the change in banks’ credit
policies, although one year is too short a period for real changes to take
place in policies. For this reason, the results should be interpreted
cautiously.

\[\text{Equation 1: Bank debt in 1994 (t test in parenthesis)}\]

\[\text{BDTA}_{94} = 0.084 + 0.004 \ln \text{sal}_{93} + 0.039 \text{IGPTA}_{93} - 0.403 \text{SFTA}_{94} - 0.0004 \text{IFA}_{93} - 0.053 \text{TATA}_{93} \]

\[\begin{array}{ccc}
(0.267) & (3.670) & (1.675) \\
& (-5.975) & (0.387) \\
& (-1.799) & \end{array}\]

\[\text{Equation 2 - Bank debt in 1995 (t test in parenthesis)}\]

\[\text{BDTA}_{95} = -0.08 + 0.01 \ln \text{sal}_{94} + 0.12 \text{IGPTA}_{95} - 0.421 \text{SFTA}_{95} + 0.022 \text{IFA}_{94} - 0.121 \text{TATA}_{94} \]

\[\begin{array}{ccc}
(-2.115) & (3.825) & (3.764) \\
& (-4.628) & (6.234) \\
& (-3.380) & \end{array}\]

In 1995 the parameter for the measure of arrears (TATA94) is
negative and significant. Thus the presence of arrears negatively influenced
the availability of bank debt in 1995. This result is interpreted as a change in
bank lending policies towards more prudent behaviour. The existence of this
change in bank allocation policies is also shown by the collateral
coefficient, which is now positive and significant. Generally speaking,
although this further analysis is extremely simple, it corroborates the results
previously obtained concerning the financial discipline arising from bank
behaviours.

\(^{17}\) Only one indicator was chosen for each of the significant latent variables in the previous
model.
8. CONCLUSIONS

This paper demonstrates the importance of firm-specific variables in determining the level of indebtedness. In particular, a first interesting result concerns the positive relationship between size and access to external debt. This suggests that programmes should be developed for small and medium enterprises, especially when the goal of transition is to achieve homogeneous industrialisation, by means of active entrepreneurship.

It has also been shown that inefficiencies in external markets induce enterprises to prefer internal resources; this is true of all three kinds of debt. When external resources are used, it seems that supply conditions dominate; in particular, credit rationing and high interest rates are major hindrances to enterprise development. In terms of economic policy, this suggests that credit markets should be further developed and that the legal framework should be made more effective.

Finally, the empirical analysis has shown the greater monitoring role performed by banks and their disciplinary role vis-à-vis enterprises. It seems that banks are changing their credit policies, and that they are starting to follow prudential and economic rules. Consequently, as transition proceeds, a link should be developed between banks and enterprises by promoting forms of joint restructuring, although without producing a mixture of property between banks and enterprises. In the Czech Republic, ineffective mass privatisation has given rise to large amounts of cross ownership between banks and enterprises, creating substantial concern for the overall stability of the system. Prudential regulation in this respect should be developed.

Generally speaking, the foregoing analysis seemingly provides evidence that a transformation in credit allocation policies is in progress, with a consequent growth of enterprise financial discipline. Owing to the stock nature of the study, the effects of past allocation policies may still persist, but especially when bank debt or short term debt are considered, they are fading. Supply factors still significantly determine the financial choices of enterprises. Because of legal and institutional inefficiencies linked to a great lack of information, real market failures still occur, requiring active measures at least in the short run. However, the risk is that these measures may cause the bad debt problems to persist. A possible solution is the development of intermediate debt, mainly bank debt, with a sound and stable financial system in which agents operate according to market rules and prudential criteria.

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