Corporate finance in Germany and France: a comparative analysis

This article describes the main results of a joint research project undertaken by staff of the Deutsche Bundesbank and the Banque de France.[1] The subject of the study was a detailed analysis of the liabilities and assets structures of west German and French incorporated enterprises in the manufacturing sector, supplemented by econometric modelling of their borrowing behaviour.

The study shows that corporate financing in the two countries displays considerable structural differences, which are principally related to the specific legal framework and the role played by the banking sector. With the aid of panel econometric methods, it is also possible to identify meaningful determinants of the borrowing behaviour of industrial firms in the two countries. The reaction patterns are similar in respect of some factors, especially the variable profit, whereas marked differences emerge in respect of firm size and the time factor. The results of the study may serve as an important component for analysing the monetary transmission mechanism in EMU.

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1 See Sauvé, A., Scheuer, M. (eds.): Corporate Finance in Germany and France, A Joint Research Project of the Deutsche Bundesbank and the Banque de France, Frankfurt am Main, 1999.

Database for the study

Selection of the data

The study is based on individual annual accounts of incorporated enterprises in the manufacturing sector contained in the base material of the Deutsche Bundesbank's corporate balance sheet statistics and the Central Balance Sheet Data Office *(Centrale de Bilans)* of the Banque de France for the period 1987 to 1995. This review period appeared appropriate as the Fourth EC Directive on the harmonisation of the accounting rules for individual accounts was translated into German law in the year 1987 – in France it had been implemented somewhat earlier. This substantially improved the conditions for harmonising annual accounts data.

Harmonisation of balance sheet items

Even following the implementation of the aforementioned EC Directive, considerable accounting differences remain between the French *Plan Comptable Général* (PCG) and the German Commercial Code (HGB). Consequently, a basic part of the work of the German-French research project consisted in the task of harmonising as far as possible the items in the corporate annual accounts in the two countries for this study. The results of this harmonisation are described in detail in the study mentioned at the beginning of this article.

Analysis of liabilities and assets structures

Statistical and methodological basis

Compilation methods

The study of liabilities and assets structures is based on annual accounts data of two-year sliding, overlapping cylindered corporate samples. This compilation method reduces the disruptive effect resulting from the changing composition of the annually recorded corporate population. It also avoids the bias of including only "viable", long established firms in the selection, which would be likely if the chosen corporate sample were constant across the entire observation period.

Coverage of the data

The firms selected according to this procedure comprise around 15,000 French and just over 9,000 west German manufacturing corporations per cylindered sample. Although the selection includes only about 15 % of the incorporated enterprises in the manufacturing sector of the two countries, they account in west Germany for over 70 % of total turnover and in France for nearly 60 % of all employees of the firms in this corporate segment.[2]

Differentiation by size category

It is commonly known that balance sheet structures vary quite perceptibly according to firm size. Consequently, the enterprises included in the study were broken down into five size categories by the number of employees. Small and medium-sized enterprises are

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2 As the official statistics for France do not include turnover figures and those for west Germany do not include employee totals for manufacturing corporations, it was not possible to use a uniform reference variable to measure the representativeness of the samples.

numerically predominant in the datasets (as well as in the basic populations) of both countries, although the two largest size classes are more strongly represented in the German sample than in the French data material, in which firms belonging to the smallest size classes are more common.

Statistical measures employed

Median values are used primarily in the following presentation rather than the weighted arithmetic mean derived from the ratios of the individual enterprises that are customarily employed in structural analyses. The median is the value that lies in the middle in the sequence of the individual enterprises' ratios ranked by size. The use of this measure generally ensures that the balance sheet ratios shown for each group of enterprises are typical and are not dominated by the specific situation of the larger firms. The medians are determined for various ratios independently of one another; they normally represent the circumstances of different firms. Hence the ratios calculated for the individual balance sheet items cannot be aggregated to form a representative "global" balance sheet for the group of enterprises under investigation. Unlike ratios determined as mean values, therefore, median figures cannot yield the mathematical correspondences between the individual balance sheet items. For this reason the weighted arithmetic means are used instead of the median figures for depicting the total liabilities and total assets structures.
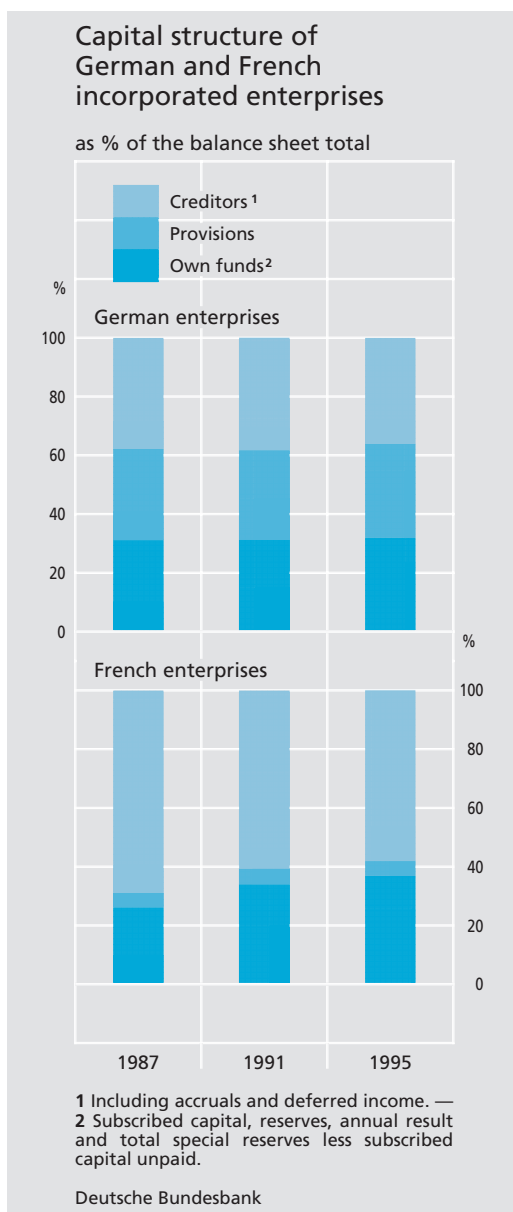
Differences in the liabilities structure

The liabilities structure ratios calculated from the aggregated annual accounts data reveal marked differences between the financing patterns of incorporated enterprises in Germany and France (see chart on page 32). Whereas the German manufacturing firms financed themselves during the period under review in almost equal proportions from creditors, provisions and own funds, the funding of their French counterparts, in whose balance sheets provisions play a very minor role, was overwhelmingly dominated by creditors, with a share of around 60% of total liabilities. Another striking feature is that the liabilities structure of German enterprises changed very little on balance across the entire observation period – i.e. including during the economic downturn in the first half of the nineties. By contrast, French firms continuously increased their level of own funds in the late eighties and early nineties at the expense of their volume of creditors. At the beginning of the period under review their average own funds ratio was about 5 percentage points lower than the comparable figure of the German firms; in 1995 it exceeded the German equivalent value by approximately the same margin.

Major differences in the overall view

This overall impression (which is based on the weighted arithmetic mean) is heavily influenced by the larger enterprises. When differentiated according to firm size (and based on the median as the more distribution-typical average value), the financing situation of German enterprises appears in a somewhat different light (see chart on page 33 and table

Importance of firm size

Capital structure of German and French incorporated enterprises

as % of the balance sheet total

- Creditors [1]
- Provisions
- Own funds [2]

German enterprises

French enterprises

1987   1991   1995

1 Including accruals and deferred income. — **2** Subscribed capital, reserves, annual result and total special reserves less subscribed capital unpaid.

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ively, had only around one-third as much equity capital as their French counterparts (30 % and 32 %, respectively). In the case of the medium-sized firms (between 100 and 499 employees), too, there was a quite considerable equity gap of almost 14 percentage points.

In contrast to the situation in Germany, firm size has only a minor impact on the liabilities structure of French enterprises. In France the own funds ratios of small and large enterprises are fairly close, whereas in Germany there is a sizeable disparity which actually widened in the first half of the nineties. French firms raised their own funds ratio continuously during the period under review by nearly 10 percentage points across all size classes. In Germany only the large enterprises strengthened their capital base. By contrast, the already narrow capital base of small and medium-sized west German incorporated enterprises was actually eroded further.

The enlargement of the own funds of French firms up to the mid-nineties was due primarily to higher transfers to revenue reserves. Unlike in Germany, substantial incentives to plough back profits were introduced into the French corporation tax regime, particularly towards the end of the eighties, by lastingly lowering the rates of taxation and temporarily taxing distributed profits more heavily than retained earnings. Thus the rate at which retained earnings were taxed in France between 1989 and 1991 was between 3 and 8 percentage points lower than the rate applied to distributed profits, whereas in the years before and after that the two tax rates were identical. In

Influence of the corporation tax regime

on page 34). At the end of the period under review, only the larger German incorporated enterprises (500 or more employees), with a ratio of around 30 % of own funds to total liabilities, came anywhere near the level of capitalisation of the French large firms. The corporations in the two smallest size classes (between 1 and 19 employees and between 20 and 99 employees) in Germany, with an own funds ratio of 10 % and 13 %, respect-
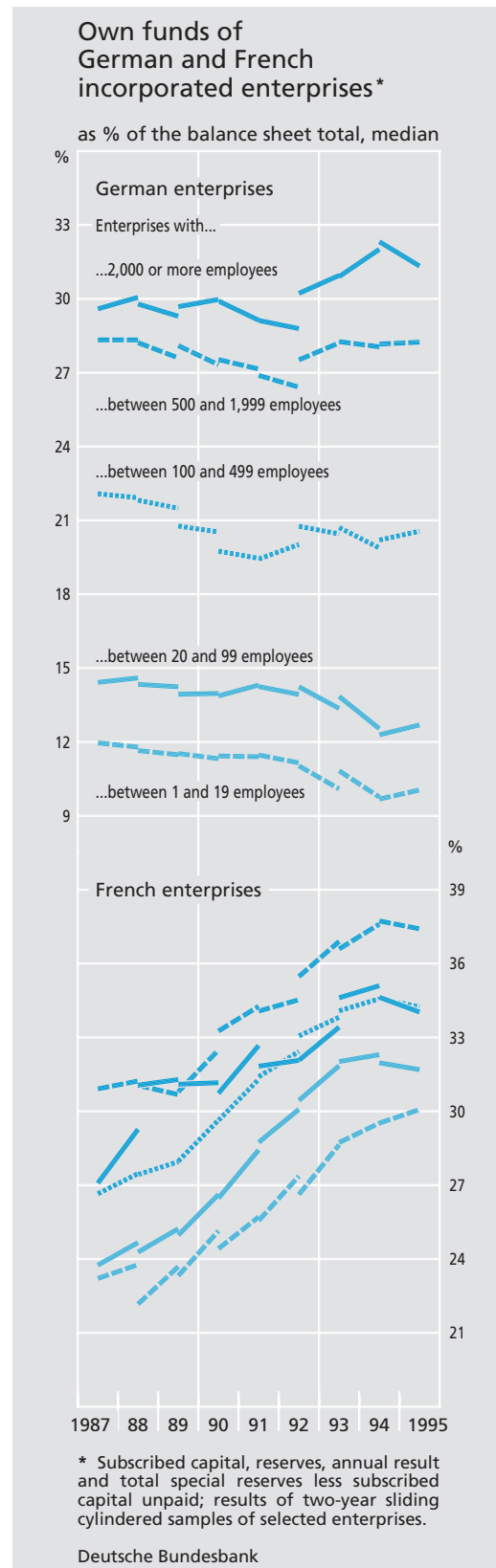
Germany, by contrast, retained earnings were subjected throughout the period under review to a rate of corporation tax that was between 14 and 20 percentage points higher than that applying to distributed profits. Moreover, the wide gap in France between the top income tax rate and the corporation tax rate applying to retained earnings was probably a contributory factor in the marked increase in the level of own funds of French enterprises during the nine years under review.

Role of banks

However, the national specificities of industrial firms' liabilities structure also reflect the different level of importance of banks for corporate financing in the two countries. In Germany enterprises traditionally meet a large part of their financing requirements through bank borrowing, whereas for French firms bank credit plays a much smaller role (see chart on page 35) – and in the first half of the nineties it experienced a perceptible further decline in significance. At the end of the period under review the average bank borrowing of French enterprises, at 10 % of the balance sheet total, was only about half the amount of German firms. This disparity was particularly marked in the case of smaller firms. Amounting to around 10 % of total liabilities, indebtedness to banks played a similarly minor role for smaller French enterprises as for larger ones. In particular, they took up hardly any short-term bank credit at all (less than 1 %).

By contrast, among German firms of comparable size bank borrowing accounts for more than 20 % of total liabilities, almost half of which is short-term credit. For these firms the

Own funds of German and French incorporated enterprises*

as % of the balance sheet total, median

* Subscribed capital, reserves, annual result and total special reserves less subscribed capital unpaid; results of two-year sliding cylindered samples of selected enterprises.

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Selected ratios of German and French incorporated enterprises for 1995*

as % of the balance sheet total, medians

Ratio	All enter-prises	of which with an employee total of				
		1 to 19	20 to 99	100 to 499	500 to 1,999	2,000 or more
German enterprises						
Own funds [1]	15.7	10.1	12.7	20.6	28.2	31.3
Bank borrowing	18.9	20.8	23.5	17.2	5.0	1.3
of which short-term	7.4	9.2	9.5	6.3	1.7	0.4
Trade creditors	12.0	16.1	13.8	10.2	7.5	5.9
Provisions	12.3	6.3	10.6	15.4	22.9	31.1
of which for pensions	2.8	0.0	1.6	5.0	10.2	15.2
Trade debtors	21.0	24.2	22.8	19.4	15.5	12.6
Liquidities [2]	1.7	1.8	1.7	1.7	1.3	1.2
French enterprises						
Own funds [1]	32.1	30.1	31.7	34.2	37.4	34.0
Bank borrowing	10.0	9.7	10.7	9.5	5.6	2.6
of which short-term	0.9	0.4	0.5	1.7	2.0	1.4
Trade creditors	23.4	25.8	24.7	20.0	16.1	13.3
Provisions	0.4	0.0	0.3	1.2	2.9	4.0
Trade debtors	33.1	34.5	34.6	30.6	24.7	15.7
Liquidities [2]	4.2	5.1	4.4	3.5	2.5	1.3

* Results of a cylindered sample of selected incorporated enterprises in the west German and French manufacturing sectors for 1994–5. — **1** Subscribed capital, reserves, annual result and total special reserves less subscribed capital unpaid. — **2** Cash and investments held as current assets.

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banks are an outstanding source of finance, which is underscored by the fact that their bank borrowing is mostly about twice as high as their own funds. Another notable feature is that this corporate segment's dependence on banks has increased steadily during the nineties. A diametrically opposed picture is presented by the typical bank indebtedness of the larger German incorporated enterprises which – like their French counterparts – show very low and declining bank borrowing ratios; in the two largest size categories they had fallen to only 5 % and 1 %, respectively, at the end of the period under review.

Importance of bankruptcy law

The far greater importance of bank borrowing for small and medium-sized firms in Germany compared with France is due especially to differences in the respective national legal framework and in the country-specific relationships between credit institutions and their corporate clients. Besides a law of property that is tailored to the needs of the business sector, the pro-creditor provisions of German bankruptcy law facilitate extensive bank lending to enterprises in this country, as secured creditors who are entitled to separate their property from the bankrupt's estate *(Aussonderung)* or to receive preferential satisfaction from the assets in the estate *(Absonderung)* enjoy a fairly favourable position in insolvency proceedings.
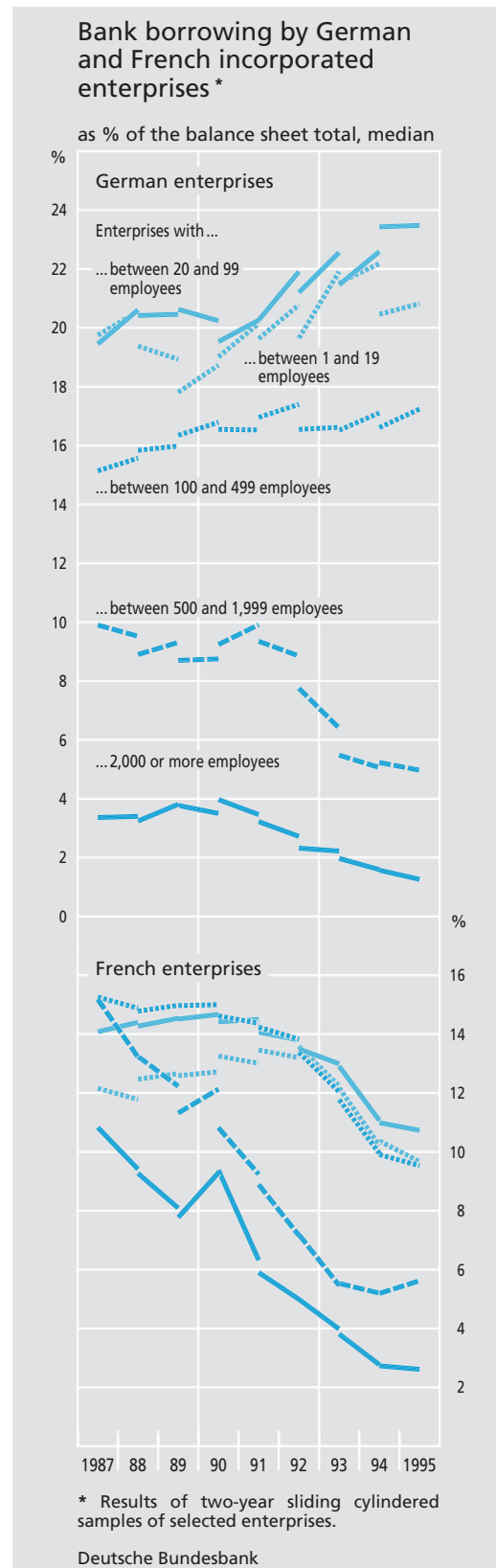
French restructuring insolvency proceedings do not provide such far-reaching protection for loan collateral in the event of bankruptcy since the main aim is not to protect the interests of secured creditors but rather to main-

tain the firm as a going concern for economic and employment policy reasons. In order to ensure that the bankrupt's estate cannot be liquidated prematurely, creditor rights are temporarily frozen. Moreover, even following the reform of French insolvency law in 1994, it is still next to impossible for creditors to realise loan collateral because all claims arising during the insolvency proceedings, such as wage and salary payments, the legal costs of the proceedings and moratorium loans to the estate, have to be met before the claims of secured creditors can be considered. In the opinion of experts, this means that collateral securities are virtually worthless in bankruptcy cases. Since the losses suffered by French banks when their customers default – in terms of loans outstanding – are consequently much higher than in Germany, it is hardly surprising that French banks seek to minimise the risk of providing credit to the corporate sector by limiting the amount they lend and diversifying their loan portfolio as widely as possible.

Relationship banking

In Germany corporate financing via banks is also encouraged by especially favourable institutional conditions associated with the concept of relationship banking. Medium-sized firms, in particular, often have close links to a particular "house-bank" or principal banker. Over time such relationship banking forges a strategic and binding link which – in addition to the provisions of German insolvency law – substantially lowers the credit risk to banks. Thanks to long-term business relationships and the concentration of creditors, the usual information asymmetries between debtor

Bank borrowing by German and French incorporated enterprises *

as % of the balance sheet total, median

German enterprises

Enterprises with ...

... between 20 and 99 employees

... between 1 and 19 employees

... between 100 and 499 employees

... between 500 and 1,999 employees

... 2,000 or more employees

French enterprises

1987 88 89 90 91 92 93 94 1995

* Results of two-year sliding cylindered samples of selected enterprises.

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and creditor are lessened, thus reducing the agency cost of bank lending.

For French firms, by comparison, the institutional conditions for bank borrowing are much less favourable. As relationship banking is relatively uncommon in France and given the weak position of creditors under French insolvency law, French banks base their assessment of the creditworthiness of their corporate customers very largely on the level of equity capital as shown in the balance sheet. Small and medium-sized firms are therefore obliged to match their own funds ratio to that of large enterprises. Under such conditions equity capital clearly assumes a relatively high degree of importance for French firms.

Trade creditors in France

The limited access of French firms to short-term bank credit is doubtless also one of the main reasons why the trade creditors of French enterprises, which on average account for approximately 23 % of total liabilities, are almost twice as high as those of German firms. Among smaller incorporated enterprises this source of funding is nearly one-and-a-half times as high as bank borrowing. Trade creditors thus represent a key instrument of short-term corporate finance in the French system. In the German system this function is performed primarily by bank credit – particularly in the form of overdrafts.

Differences in payment patterns

Besides the fact that the periods customarily allowed for payments in merchandise trade are about three times as long in France as in Germany, the high level of trade creditors in the balance sheets of French firms also mirrors different payment patterns. French pay-

ment patterns – in contrast to the situation in Germany – are not shaped by reservation-of-ownership rules designed specially to safeguard the interests of creditors and by corresponding payment terms. The German legal system strongly encourages the settlement of trade creditors. The far-reaching legal claim, in the form of the extended or expanded reservation of ownership *(verlängerter Eigentumsvorbehalt, erweiterter Eigentumsvorbehalt),* also assures the seller who has agreed such a clause with the purchaser the right of access to the processed product and a claim to the proceeds of a later resale and expands the reservation of ownership to claims on the corporate group as a whole or to existing current account debtors. Such provisions are largely unknown under French property law. In addition, the practice of granting a cash discount if the invoice is paid promptly – which is customary in Germany (usually as part of the general terms and conditions) and acts as a strong payment incentive to the cost-conscious customer – is far less widespread in France.

Accumulation of provisions

Another major difference in corporate finance between the two countries is the importance of provisions which, as mentioned, play only a very minor role for French corporations. Even in the case of the largest French firms, provisions average no more than around 4 % of the balance sheet total. In Germany, on the other hand, they represent a mainstay of corporate funding, though this applies principally to firms in the two biggest size classes, whose provisions on average account for 23 % and 31 % of their available capital, compared with about 6 % for small

enterprises. The main reason for these marked size-specific differences among German firms in the ratio of provisions to total liabilities is the divergent importance of provisions for pensions. Thus whereas pension provisions attain substantial dimensions in the case of larger enterprises, they hardly feature at all in the balance sheet of smaller firms, which evidently are not large enough to operate direct company pension schemes.

Scope of company pension schemes

The differing degree of dissemination of company-based pension schemes also appears to be one of the chief reasons behind the sizeable disparity between Germany and France in the level of provisions. Such schemes are not at all usual in France because profit-sharing by the employees is of far greater significance in that country, not least owing to corresponding statutory regulations. What is more, the few French firms that do grant supplementary pension benefits route them almost exclusively through external pension funds since transfers to pension provisions cannot be offset against tax. By contrast, company pension schemes operated directly by the employer predominate in Germany on account of a different institutional context. The average ratio of pension provisions to total liabilities disclosed in the annual accounts of German firms in the two biggest size categories, at 10 % and 15 %, respectively, shows that this source of financing is of great importance for larger German enterprises. While company-based pension schemes have become noticeably less attractive in recent years owing to the sharp decline in interest rates on the capital market, they still offer some major advantages. These in-

clude the temporary tax saving associated with transferring earnings to provisions and the increase in financial flexibility resulting from the fact that the amounts thus accumulated can be freely used by the firm over a prolonged period as an internal source of finance.

The small amount of provisions disclosed in the annual accounts of French enterprises is also partly attributable to the specific disclosure and valuation rules under French accounting law. The overall results of the study indicate that, in the past, German firms more or less exhausted the discretionary latitude granted by German accounting law in order to set up provisions rather than reserves – mainly for tax reasons. By contrast, French firms – not least because of the narrower latitude available to them under French accounting law – sought to strengthen their internal financing by retaining profits, which to some extent was encouraged by the tax regime.

Accounting differences

Comparison of assets structures

The differences between the assets structures of German and French incorporated enterprises are less pronounced on the whole than the divergencies between their respective liabilities structures; they also display similar trends. Thus more than 43 % of the assets side of the annual accounts of German firms at the end of the period under review, measured as the weighted arithmetic mean, comprised fixed assets (intangible assets, tangible assets and financial assets), compared with 39 % for French firms. However, these aggregated figures mask the fact that the assets-

Assets structures fairly similar, ...

side ratios of the German enterprises – like their liabilities structure – show greater size-related variation than the French firms. These divergencies in the assets structure can be explained largely by different accounting rules in the two countries, especially concerning the definition of production cost and accounting for leasing items and intangible assets.

... but some differences of detail

There are notable divergencies, however, as regards trade debtors and liquidities. It is striking that the accounts receivable of French firms, amounting to around 33 % of total assets, are roughly one-and-a-half times as high as those of German firms. This is connected with the aforementioned different legal framework and payment patterns in the two countries. In the upshot, therefore, the differences are less significant than the corresponding liabilities-side item, considered in isolation, might at first lead one to suppose.

Finally, French corporations – with the exception of large enterprises – typically tie up more than twice as much liquidity as German firms in the form of cash and investments held as current assets. Although this fact is of fairly minor importance in the balance sheet context, it is a further indication that the patterns of financing of French enterprises, especially small and medium-sized ones, differ markedly from those of their German counterparts. These French firms evidently feel obliged to hold a deep liquidity cushion in order to bridge any temporary shortages of funds, as they cannot draw on flexible overdraft facilities from credit institutions on the scale that German firms can.

Econometric analysis of corporate finance

Database and methodology

Statistical basis

Additional insights into corporate financing habits in the two countries are provided by a comparative analysis of determinants of the borrowing behaviour of German and French firms using panel econometric methods. The statistical basis for this is constituted by individual balance sheets of manufacturing corporations which for both countries were compiled as balanced panel samples for the period 1987 to 1995. Together with the elimination of statistical outliers, this ensures that the two samples, containing 2,899 French firms and 1,275 west German firms, are far smaller than the datasets used in the study of the liabilities and assets structures. An important point to note is that the balanced panel data comprise not just large enterprises but also many small and medium-sized enterprises, thus allowing size-specific aspects to be captured as well. To enhance comparability, the balance sheet items of the German and French samples were again harmonised as far as possible, as explained earlier in this article.

Heterogeneity of the firms

The panel econometric analysis of the borrowing behaviour can be carried out, in principle, using the traditional ordinary least squares method. But its crucial drawback is that it fails to take account of the heterogen-

Panel econometric methods

Panel data are combined cross-sectional and longitudinal data which normally relate to households or enterprises but may also embrace regions or states as objects of analysis. Compared with alternative datasets, panel data usually comprise a large number of observations, thus increasing the number of degrees of freedom and reducing the technical problem of collinearity in the estimation. In addition, panel data can more fully reflect the heterogeneity of features. As a result, the efficiency of the estimation improves perceptibly.

To study corporate borrowing behaviour, variance analysis may be used as a first step. This examines the extent to which the variation in the dependent variables is due to the change in the explanatory factors measured at least in nominal values. From a methodological point of view, the total variance is decomposed into an explained and a non-explained variance (error term) and the contribution of each factor to the variance is determined. The debt function used in this study is specified as follows:

$$y_{it} = \beta_1 x_{1it} + \beta_2 x_{2it} + \beta_3 x_{3it} + \beta_4 x_{4it} + \beta_5 x_{5it} + \alpha_j + \lambda_t + \varepsilon_{it}$$

$$(i = 1,...,N,\ t = 1,...,T,\ j = 0,...,5)$$

where y_{it} is the variable that is to be explained, i.e. the debt ratio (sum of creditors excluding provisions in relation to total liabilities), of firm i at time t. $x_{1it},...,x_{5it}$ stand for the following explanatory variables: growth (growth rate of the balance sheet total), collateral (tangible fixed assets and stocks in relation to total assets), profit (net profit for the year in relation to the balance sheet total), cost of finance (interest expenditure in relation to financial creditors) and measure of risk (squared relative difference between the firm-specific profit-turnover ratio and the average profit-turnover ratio). The factor α_j represents the size classes defined for the two datasets, while λ_t and ε_{it} denote the time factor and the error term, respectively.

Various econometric approaches to estimating the debt function, i.e. the individual coefficients, are possible on the basis of panel data. One approach is the well-known least squares method, which yields identical behavioural parameters for all enterprises. This cannot exclude a heterogeneity bias, however, as it takes insufficient account of the diversity of different firms. By contrast, the fixed effects approach has the advantage of proxying heterogeneity by using firm-specific constants. A third basic alternative is the random effects variant in which the constant is regarded as a random variable. For the debt function this approach is unambiguously rejected for Germany and France by the Hausman test. Using the fixed effects approach the above specification is altered so that firm dummies α_i (i = 1,...,N) are used instead of the size factor α_j. Additionally, the time dummies are intended to capture macroeconomic trends. The error term is based on the usual assumptions such as homoskedasticity and the absence of autocorrelation.

If it is assumed that the level of a firm's debt may also depend on its level in the preceding period, the equation for modelling borrowing behaviour is given a dynamic character by the new term y_{it-1}. However, this gives rise to the technical estimation problem that the lagged endogenous variable and the residuals are correlated. To avoid this, it is customary to estimate in first differences, which requires that the lagged endogenous variable is instrumented. Efficient estimators can be obtained by using the generalized method-of-moments (GMM) approach, which enables heteroskedasticity in the residuals to be included. If one further allows for the possibility that all the aforementioned right-hand-side variables may be endogenous, they must be instrumented, too. To this end it is customary to use correspondingly lagged variables (in levels). The problem of the measurement error is technically related to this difficulty. As it is often impossible to capture variables precisely, i.e. they contain a margin of error, these are not used directly (as calculated from the data) but instead are likewise estimated using instruments. When taking this approach it must always be ensured that the instruments and the residuals do not correlate. The null hypothesis of the validity of the instruments is tested by using the Sargan test.

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eity of the firms which may be expected in view of the size of the two cylindered samples. The fixed effects approach, which is described in the box on page 40, is clearly superior in this respect as it takes heterogeneity into account through a special formulation of the constant of the debt function. Each enterprise is characterised by a separate dummy variable which can be interpreted as a firm-specific constant term. This greatly enhances the explanatory power of the estimation.

Possible explanatory approaches

The task of estimating the influence of various determinants on the realised demand for borrowed funds ultimately leads to a test of various hypotheses concerning corporate finance strategies. This enables us to determine further common features and differences in the credit demand of industrial firms in Germany and France, albeit limited to the important segment of incorporated enterprises in the manufacturing sector.

Irrelevance theorem

The theoretical starting point of the econometric study is the pioneering work of Modigliani and Miller, who argued that, under certain conditions, a firm's chosen liabilities structure has no bearing on its overall value, its total cost of capital and the financial utility of the providers of capital.[3] The conditions for the validity of this theorem are homogeneous expectations of market players, the free provision of information, a neutral system of taxation and, not least, the assumption of equal market conditions for all participants. As a conceptual reference model the irrelevance theorem thus provides a clear theoretical framework for assessing the practical financing strategy pursued in the enterprise sector.

Possible determinants

If the strict assumption of a perfect capital market is abandoned and, in particular, the existence of asymmetric information is assumed between firms and lenders, the theoretical literature contains a variety of determinants of corporate finance in general and the level of firm debt in particular. One striking feature is that even identical determinants can often be assessed ambivalently. In the following we shall take a closer look at those variables that were carefully tested for their explanatory content in the empirical study described in this article.

– Firm size: On the one hand, large corporate units usually have better access to the market for equity capital than medium-sized or small firms, which implies that firm size and the degree of indebtedness are negatively correlated (cost-of-access hypothesis). On the other hand, lending to smaller firms might be subject to greater restrictions, owing to their often poorer creditworthiness, than is the case for larger enterprises. This would suggest a positive correlation between the two variables.

– Growth: Dynamic firms need sizeable credit, especially in their start-up phase,

3 Modigliani, F., Miller, M. H. (1958), The cost of capital, corporation finance, and the theory of investment, American Economic Review, Vol. 48, pages 261 to 297, and Miller, M. H. (1988), The Modigliani-Miller propositions after thirty years, Journal of Economic Perspectives, Vol. 2, pages 99 to 120.

which increases their borrowing require-
ments. Moreover, rapidly expanding firms
usually have positive earnings prospects
(signalling approach), which in turn in-
creases the propensity of capital providers
to make external financial resources avail-
able. However, the financier has to take
into account comparatively high agency
costs as the possibilities of monitoring
such enterprises from the outside are
quite limited. That may induce creditors to
take a cautious lending approach.

– Collateral: In conditions of asymmetric in-
formation, the position of the creditor,
and hence his willingness to lend, can be
improved by the posting of collateral,
such as a pledge. This would imply a posi-
tive correlation between debt and collat-
eral.

– Profits: The trend in profits or profitability
may signal to the lender that the enter-
prise will be able to repay its debt on time
and in full. This leads on the supply side to
a positive correlation between profit and
debt. An alternative approach is based on
the concept of a hierarchy of financing
choices (pecking order approach). This
postulates that firms prefer, for cost rea-
sons, to meet their financial needs in the
first instance out of retained earnings and
only as a "second-best" solution by rais-
ing additional borrowed funds or external
capital. This demand-based approach as-
sumes a negative correlation between
profit and debt.

Results of variance analysis *

Explanatory variable	France [1]		Germany [2]	
	Explanatory contribution of each factor as % of			
	total variance	variance explained	total variance	variance explained
Time factor	3.7	14.3	0.2	0.5
Size factor	0.3	1.0	16.9	46.0
Time and size	0.1	0.2	0.1	0.2
Growth	1.0	3.9	1.4	3.8
Collateral	2.4	9.2	6.0	16.4
Profit	14.8	57.6	8.8	24.0
Cost of finance	2.9	11.2	3.3	9.0
Measure of risk	0.7	2.6	0.03	0.1
Memo item Total variance explained	25.7	100	36.8	100

* Estimation period: 1989–1995. — [1] 2,899 enterprises. — [2] 1,275 enterprises.

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– Cost of finance: This variable, which is en-
countered especially in macroeconomic
studies of credit demand, can likewise be
taken into account on the basis of the
available balance sheet data by means of
a panel econometric analysis. It is founded
on the notion that borrowed funds be-
come less attractive to firms in proportion
to the rising cost of external finance.
Firms will therefore try to reduce their
debt position, which thus implies a nega-
tive correlation between cost of finance
and debt.

– Risk: A higher risk of return or liquidity risk
is often accompanied by a greater likeli-
hood that the firm will default. Conse-
quently, creditors will reduce their willing-
ness to lend as the risk increases. Contrary

ations of which as observed in Germany seem to support the cost-of-access approach. The other determinants have the same ranking in the two countries as regards their contribution to explaining the variance in the debt-to-total liabilities ratio. The variable profit has by far the greatest significance, followed by the cost of finance and collateral. By contrast, the rate of corporate expansion and entrepreneurial risk play a less important role in determining the pattern of firms' borrowing behaviour.

Estimation of the static debt function [o]

Explanatory variable	France [1]		Germany [2]	
	OLS [3, 5]	FE [4, 5]	OLS [3, 5]	FE [4, 5]
Growth	0.22***	0.11***	0.23***	0.09***
	(0.01)	(0.003)	(0.01)	(0.004)
Collateral	0.01	0.06***	0.26***	0.17***
	(0.01)	(0.01)	(0.01)	(0.01)
Profit	– 1.37***	– 0.55***	– 1.07***	– 0.80***
	(0.02)	(0.01)	(0.04)	(0.02)
Cost of finance	0.57***	0.05***	1.24***	– 0.11***
	(0.02)	(0.02)	(0.05)	(0.03)
Measure of risk	– 0.35***	0.00	– 0.24***	0.01
	(0.03)	(0.01)	(0.07)	(0.03)
R^2	0.26	0.91	0.24	0.91

[o] Estimation period: 1989–1995. */**/***: significant at a level of 10 %/5 %/1 %. In parentheses: standard errors. — [1] 2,899 enterprises. — [2] 1,275 enterprises. — [3] Ordinary least squares estimation. — [4] Fixed effects estimation. — [5] Including time dummies.

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Fixed effects approach

Using the fixed effects model of estimation, the Modigliani-Miller theorem is clearly rejected (see adjacent table). In addition, most of the determinants have the same signs for both countries. Only the variable measure of risk appears to have no significance. The positive signs for firm growth and collateral support the signalling hypothesis, whereas the negative influence of profit supports the pecking order approach. The coefficient of the variable cost of finance has the expected negative sign solely for Germany.

to this conventional view, conditions for a positive correlation can also be found. For example, during an economic downturn, in which the risk position usually worsens, firms need more bridging loans, which in fact creditors are frequently willing to grant.

Empirical results

Variance analysis

Findings on corporate borrowing behaviour can be obtained using variance analysis (see also the box on page 39). As the contents of the table on page 41 show clearly, the factor time has a perceptible explanatory value for the change in debt incurrence in France – in the context of that country's tax policy – but not in Germany. The opposite is true when it comes to the variable firm size, the grad-

Dynamic specification

However, this rather simple statistical approach ignores the evident persistence of debt or the existence of adjustment costs. The latter arise because an enterprise cannot always realise its optimal, desired indebtedness but needs time to do so. This suggests the hypothesis that the amount of debt at time t also depends on the amount of creditors at time t-1. In technical terms the debt function is given a dynamic character by including the endogenous variable lagged by one period. The estimation results show that this specification is meaningful (see table on

Estimation of the dynamic debt function [o]

	France [1]				Germany [2]			
	Exogenous approach	Endogenous approach		Measure-ment error	Exogenous approach	Endogenous approach		Measure-ment error
Explanatory variable	GMM [3]	GMM [4]	GMM [5]	GMM [6]	GMM [3]	GMM [4]	GMM [5]	GMM [6]
Debt (t-1)	0.85***	0.80***	0.77***	0.87***	0.55***	0.49***	0.50***	0.55***
	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)	(0.05)	(0.05)	(0.05)
Growth	0.19***	0.32***	0.31***	0.20***	0.14***	0.18	0.16**	0.14***
	(0.01)	(0.07)	(0.06)	(0.01)	(0.08)	(0.16)	(0.07)	(0.01)
Collateral	0.02**	− 0.05	− 0.07	0.10**	0.12***	0.90	0.10	0.11
	(0.01)	(0.05)	(0.05)	(0.06)	(0.02)	(0.14)	(0.09)	(0.09)
Profit	− 0.77***	− 0.81***	− 0.82***	− 0.72***	− 0.68***	− 0.60**	− 0.47***	− 0.63***
	(0.02)	(0.11)	(0.09)	(0.04)	(0.05)	(0.26)	(0.13)	(0.05)
Cost of finance	− 0.29***	− 0.002	− 0.02	− 0.30***	− 0.72***	− 0.25	− 0.11	− 0.69***
	(0.03)	(0.06)	(0.06)	(0.04)	(0.06)	(0.33)	(0.14)	(0.06)
Measure of risk	0.02	0.19	0.25***	0.16*	0.004	0.50*	0.69***	0.63***
	(0.02)	(0.12)	(0.10)	(0.10)	(0.04)	(0.26)	(0.21)	(0.22)
Memo item								
P – K [7]	11 – 12	11 – 12	11 – 17	11 – 13	11 – 12	11 – 12	11 – 17	11 – 13
m1 [8, 10]	0	0	0	0	0.0001	0	0	0
m2 [8, 10]	0.85	0.85	0.93	0.98	0.0005	0.07	0.004	0.0003
Sargan [9, 10]	0.83	0.66	0.33	0.45	0.68	0.79	0.18	0.05

[o] Estimation period: 1991–1995. */**/***: significant at a level of 10 %/5 %/1 %. In parentheses: standard errors. Generalized method-of-moments estimations in first differences (two-step results) including time dummies, instruments in levels. — [1] 2,899 enterprises. — [2] 1,275 enterprises. — [3] Instruments: lagged endogenous t-3 and t-4, all other variables exogenous. — [4] Instruments: lagged endogenous t-3 and t-4, all other variables t-2. — [5] Instruments: lagged endogenous t-3 and t-4, all other variables t-2 and t-3. — [6] Instruments: lagged endogenous t-3 and t-4, collateral t-2, measure of risk t-2 and t-3, all other variables exogenous. — [7] Number of parameters and instruments, respectively. — [8] Test for first and second-order correlation, respectively. — [9] Test for validity of the instruments. — [10] Error probability.

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page 43). The adjustment coefficient is significant for both the German and the French firms. A lower speed of adjustment is shown for France than for Germany. In this exogenous approach, as in the static model, the risk variable has no influence on borrowing behaviour. All the other determinants have the same signs in both specifications. In the French case the cost of finance now also has the expected negative effect.

So far the "right-hand variables" have been considered as exogenous variables. But as they have been calculated from balance sheet data, this approach is rather questionable. If it is assumed that all the explanatory factors in turn may be dependent on debt, the precision of the estimation is reduced considerably. In such an approach only the lagged

variable and profit have a clear explanatory value for both countries, thereby supporting the pecking order approach in each case.

The variables collateral and measure of risk give rise to a measurement problem in this context in that these two determinants cannot be precisely quantified using exclusively balance sheet items. An estimation which takes account of this comes to the surprising result that the risk variable has a significant positive impact on borrowing behaviour. However, this relation probably holds only up to a certain "risk tolerance threshold" that it is impossible to define exactly, whereas additional lending to firms that are highly vulner-

Dynamic debt function for selected size classes [o]

Explanatory variable	France			Germany		
	Enterprises with an employee total of					
	20 to 99	100 to 499	500 to 1,999	20 to 99	100 to 499	500 to 1,999
Debt (t-1)	0.81***	0.97***	0.92***	0.46***	0.45***	0.89***
	(0.07)	(0.10)	(0.13)	(0.08)	(0.07)	(0.14)
Growth	0.20***	0.18***	0.14***	0.13***	0.13***	0.18***
	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)	(0.03)
Collateral	0.01	0.06***	− 0.04	0.12***	0.11***	0.00
	(0.01)	(0.02)	(0.06)	(0.03)	(0.03)	(0.09)
Profit	− 0.80***	− 0.77***	− 0.71***	− 0.86***	− 0.64	− 0.31**
	(0.03)	(0.04)	(0.09)	(0.09)	(0.06)	(0.13)
Cost of finance	− 0.22***	− 0.47***	− 0.51**	− 0.60***	− 0.77***	− 1.11***
	(0.03)	(0.06)	(0.25)	(0.11)	(0.10)	(0.20)
Measure of risk	0.03	0.03	0.02	− 0.08	0.03	0.09
	(0.02)	(0.03)	(0.07)	(0.09)	(0.05)	(0.08)
Memo item						
Number of enterprises	1 519	841	201	449	518	153
m1 [1, 3]	0	0	0	0	0	0
m2 [1, 3]	0.99	0.38	0.39	0.10	0.003	0.01
Sargan [2, 3]	0.31	0.14	0.93	0.95	0.38	0.36

[o] Estimation period: 1991–1995. */**/***: significant at a level of 10 %/5 %/1%. In parentheses: standard errors. Generalized method-of-moments estimations – exogenous approach – in first differences (two-step results) including time dummies. Number of parameters or instruments: 11 and 12, respectively.

Instruments (in levels): lagged endogenous t-3 and t-4, all other variables exogenous. — **1** Test for first and second-order correlation, respectively. — **2** Test for validity of the instruments. — **3** Error probability.

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Analysis by size class

able to insolvency would probably be granted only in exceptional circumstances.[4]

Broken down by size category, the borrowing behaviour of firms shows divergencies which in some cases are quite substantial (see table above). Although the pecking order hypothesis is confirmed in both samples independently of this, the influence of interest rates on the incurrence of debt grows with increasing firm size. One possible explanation for the greater interest rate sensitivity of firms in the larger size classes might be that large enterprises, thanks to their easier access to the capital markets, are better placed – if, say, the cost of external finance rises – to adjust their liabilities structure by decreasing their recourse to borrowed funds in favour of using more own funds. In addition, in the German

sample loan collateral performs a more important signalling function in the case of small and medium-sized enterprises than for large firms, owing to the institutional specificities.

Summary

Analysis of balance sheet structures

The comparison of the liabilities and assets structures of German and French incorporated enterprises showed that the corporate finance systems in the two countries differ considerably. The corporate financing structure in France, unlike in Germany, is relatively

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4 For the link between lending and the downgrading of the credit rating, see Elsas, R., Krahnen, J. P. (1998): Is relationship lending special? Evidence from credit-file data in Germany, Journal of Banking and Finance, Vol. 22, pages 1283 to 1316.

uniform across the different size classes. In Germany relationship banking and a pro-creditor legal framework foster a comparatively high level of bank borrowing, which is used principally by small and medium-sized enterprises; the capital base of such firms tends to be smaller as a result. The necessary financial flexibility is assured above all by overdraft credit facilities granted by the house-bank. The patterns of financing of large enterprises, on the other hand, are characterised by a high level of provisions and a broad capital base, which ensure extensive financial autonomy and adaptability.

Besides the almost total lack of relationship banking, corporate finance in France is marked by the weak position of creditors under insolvency law, as a result of which French firms have a more limited access to bank credit than their German counterparts. Consequently, they require a higher level of own funds and are obliged to maintain a fairly high level of liquidity. These freely available financial resources, together with a fairly high incidence of trade creditors, form the requis-ite cushion in the event of short-term financing requirements. The absence of both the necessary accounting options and of corresponding tax incentives hampers an extensive build-up of provisions.

In line with the analysis of liabilities and assets structures, major differences in the financing patterns of German and French firms can also be found using panel econometric methods. Significant variances are found especially if the variables firm size and time are included as determinants of debt. Despite all the country-specific peculiarities, there are also determinants changes in which trigger a very similar reaction profile by firms in respect of their financing activities. For example, by far the most stable factor affecting the liabilities structure in both datasets is the profit variable, an increase in which is invariably reflected in a reduction of creditors. Overall, the ir-relevance theorem posited by Modigliani and Miller is rejected equally for the German and French manufacturing corporations analysed in the study.

Econometric results