

## The methodological basis of the Deutsche Bundesbank's corporate balance sheet statistics

The Deutsche Bundesbank has been keeping corporate balance sheet statistics since 1964. It is the most comprehensive analysis of the annual accounts of non-financial enterprises in Germany. These statistics are based on the balance sheets and profit and loss statements which are submitted to the Bundesbank's branch offices in connection with rediscount business. The following methodological article provides an overview of the composition of the data and their suitability as a source of information about economic trends in the enterprise sector. Moreover, the article presents the two methods which the Bundesbank uses for the processing of the data – the expansion by ratio estimate and the cylindered sample – and compares the respective advantages and disadvantages as well as the areas of application. The conclusion outlines the implications of Stage Three of European monetary union on the corporate balance sheet statistics.

### Origin of the statistics and the data

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The Bundesbank's corporate balance sheet statistics form the most comprehensive collection of annual accounts of German non-financial enterprises which are statistically evaluated. They are based on the financial statements which are submitted to the Bundesbank in connection with bill-based rediscount operations. Pursuant to the regulations of the Bundesbank Act, bills of exchange may

*Data basis*

only be bought for purposes of credit institutions' refinancing if they are backed by three parties known to be solvent. Apart from the submitting banks, whose financial position is known to the Bundesbank from current business relations and its involvement in banking supervision, these consist of non-bank enterprises. The Bundesbank checks their solvency within the scope of a comprehensive credit assessment. The assessment is based largely on the respective current annual accounts which the enterprises submit to the competent local branch offices as a rule.

All in all, the Bundesbank thus receives around 70,000 annual accounts from west German and east German enterprises. They are processed along a standardised scheme by the Bundesbank's branches and branch offices, recorded electronically, audited and evaluated for purposes of trade bill transactions.<sup>1</sup> On this basis the branch offices rate the creditworthiness of the debtor of the bill.

### The importance of the corporate balance sheet statistics

#### *Origin*

In the Bundesbank, the annual account data have been used for macroeconomic analyses, too, since 1964, and the results of the corporate balance sheet statistics have been published regularly since 1968. A major objective in assembling these secondary statistics was to close a gap in Germany's federal statistics, in which there were no primary representative surveys on the enterprises' profitability and financing. Up to then, there were only publicly available annual accounts statistics

for the annual accounts published in the Federal Gazette of public limited companies and of incorporated enterprises which were subject to disclosure requirements from the 1987 accounting year. In the framework of the saving measures adopted for the official statistics, this processing was ended in 1995.

Although the corporate balance sheet statistics do not comprise the entire corporate sector, as will be shown in the following, it is a source of information for this core sector of the economy in diverse ways. This holds true, for example, for the national accounts and the resultant financial accounts. The detailed data of the corporate balance sheet statistics on the expenditure and profit situation, asset accumulation and financing operations in the enterprise sector allow insights which cannot be obtained otherwise or which supplement information from other sources. For example, the annual accounts statistics provide micro-economically founded control instruments to measure corporate income. In the national accounts, this aggregate can only be established as a residual balance, with the statistical inaccuracies of the preceding calculation stages, where present, accumulating. The data of the corporate balance sheet statistics likewise serve to check the results of the national accounts for the expenditure side of gross domestic product, namely private fixed capital formation and stockbuilding. In this context, it also has to be taken into account that in the new European System of National

*Contribution to  
the national  
accounts*

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<sup>1</sup> See: Deutsche Bundesbank, Analysis of business insolvencies within the scope of the Deutsche Bundesbank's credit assessments, Monthly Report, January 1992, page 29 ff.

and Regional Accounts – the ESA 95 – which has to be applied from 1999, the corporate sector will no longer be presented as an entity, since enterprises in the legal form of a sole proprietorship will in future be assigned to the household sector. Surveys of the corporate sector as a whole will therefore have to resort even more than before to the data of the corporate balance sheet statistics.

*Regular  
analyses on  
profitability and  
financing ratios*

In addition to its value for the national accounts, where the enterprise sector represents a part of the economy, the Bundesbank's balance sheet statistics also enable surveys to be made which solely cover the enterprise sector – whether as a whole, under regional, industry or size aspects, or broken down by legal form. For example, the initial results of the annual accounts statistics of west German enterprises for each previous year have been presented and analysed annually in the Bundesbank's Monthly Report for a long time; the current version of this special article which covers the 1997 data is to be found on page 25 ff. With the start of German-German monetary union in mid-1990 the Bundesbank also received annual accounts data from east German enterprises. Since 1993 the balance sheet data have been statistically evaluated, published regularly in the Monthly Report and examined more closely.<sup>2</sup> Although there are considerable gaps in the recording of east German enterprises, the available data of the corporate balance sheet statistics have provided manifold insights into the structural change in the corporate landscape of the new Länder.

Besides those regular yearly reports on the results of the corporate balance sheet statistics, the data were used in multiple ways for more medium-term-oriented surveys on structural changes in the enterprise sector, such as the financing or investment behaviour of enterprises and their susceptibility to cyclical changes<sup>3</sup>. Of particular interest to a central bank are those surveys which provide information on the transmission of monetary policy to the enterprise sector. An analysis on this topic was presented in 1996 which looked at the financing structure of enterprises in western Germany and their reaction to monetary stimuli on the basis of the corporate balance sheet statistics.<sup>4</sup> Furthermore, in the wake of the growing European integration and as a consequence of the increasing globalisation, there has been rising demand for internationally comparable annual accounts statistics and subsequent surveys in recent years. The Bundesbank took account of this development early on by providing statistics of specially processed annual accounts of incorporated enterprises for BACH, the harmonised annual accounts database of the

*Special analyses*

*Contribution to  
the BACH  
database*

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<sup>2</sup> See latest: Deutsche Bundesbank, East German enterprises' profitability and financing in 1996, Monthly Report, July 1998, page 33 ff.

<sup>3</sup> See: Deutsche Bundesbank, The significance of enterprises' earnings for capital formation and employment between 1983 and 1986, Monthly Report, April 1988, page 29 ff., Longer-term trends in the financing patterns of west German enterprises, Monthly Report, October 1992, page 25 ff., Comparison of the annual accounts of small and medium-sized enterprises organised in different legal forms, Monthly Report, October 1993, page 33 ff. and Cyclical downswings as reflected in enterprises' annual accounts, Monthly Report, October 1995, page 59 ff.

<sup>4</sup> See: E. Stöß, Enterprises' financing structure and their response to monetary policy stimuli – an analysis based on the Deutsche Bundesbank's corporate balance sheet statistics, Discussion paper 9/96, Economic Research Group of the Deutsche Bundesbank, Frankfurt am Main, November 1996.

European Commission.<sup>5</sup> These data are not only a substitute for the discontinued balance sheet statistics of the Federal Statistical Office, but also allow cross-country comparisons of incorporated enterprises' profitability and financing, since the data in all European countries involved are processed according to a harmonised concept. Over the longer term, these balance sheet statistics may also be an interesting analytical instrument for the European Central Bank.

### Volume and structure of the annual accounts data and their representativeness

#### *Volume of the data*

The volume of the balance sheet data received by the Bundesbank has fluctuated considerably over the past three decades. During the seventies the number of annual accounts rose sharply, not least owing to the sharp increase in rediscount quotas, and reached – in terms of the data evaluated for statistical purposes – an all-time record of 78,000 balance sheets and profit and loss statements in 1979, compared with only around 45,000 annual accounts in 1971. Since then the data stock has shrunk slightly to around 55,000 of late; this is probably due for the most part to the rise in the commitment limits for credit risk assessments, below which no annual accounts are required. This figure does not include the annual accounts of east German enterprises, the number of which was around 5,000 of late.

In addition to the aforementioned annual accounts, the Bundesbank receives other bal-

ance sheets and profit and loss statements which, however, are not included in the corporate balance sheet statistics for a variety of reasons. For example, the financial year is incomplete in some annual accounts, or the turnover, which is important for the analysis, is not reported. Group balance sheets are likewise excluded. The purpose of the corporate balance sheet statistics is to provide an overview of the economic situation of the domestic enterprise sector. This contrasts with the fact that in group balance sheets the individual profits of the foreign subsidiaries are also reflected on consolidation. Because the number of enterprises in the agriculture and services sectors (excluding wholesale/retail trade and transport) is small, they are not included in the balance sheet statistics.<sup>6</sup>

The structure of the balance sheet data is characterised mainly by its lending business origin and the resultant different representation of enterprises by economic sector, size category and legal form. Since the annual accounts are not selected according to the principles of a representative sample survey, this raises the question of whether the balance sheet data available to the Bundesbank is a systematically distorted selection of economically particularly sound enterprises. Such a proposition is initially supported by the assumption that the rediscounting credit institutions will only present such bills to the Bun-

#### *Structure of the balance sheet data by...*

<sup>5</sup> See: Deutsche Bundesbank, *Verhältniszahlen aus Jahresabschlüssen westdeutscher Kapitalgesellschaften von 1987 bis 1996*, Deutscher Beitrag zur Jahresabschlußdatenbank der Europäischen Kommission BACH, March 1998.

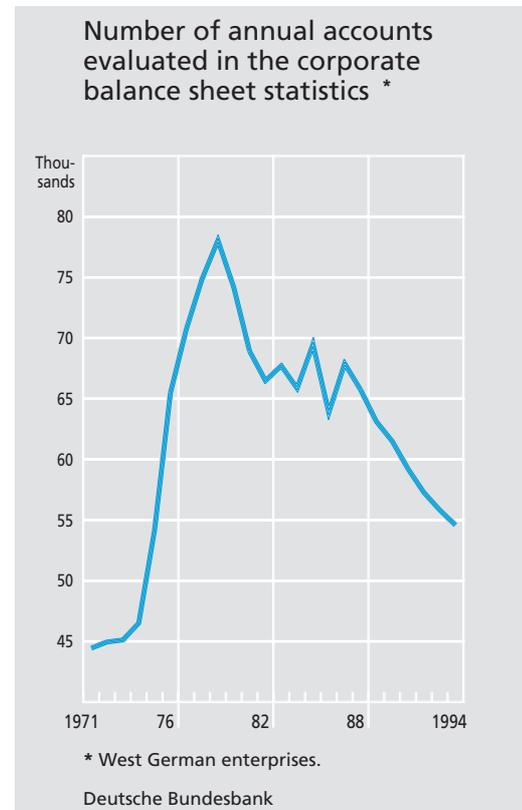
<sup>6</sup> This sector also comprises holding companies, which are likewise excluded, in contrast to the related producing enterprises.

... credit-  
worthiness  
features ...

desbank where a rejection owing to insufficient creditworthiness of the debtor of the bill is not to be expected. If the corporate balance sheet statistics included an above-average number of sound enterprises, among other things their frequency of insolvency should be relatively low. But a comparison with the results of the insolvency statistics shows that this is not true. In this connection, it has to be taken into account that the balance sheet statistics include not only the annual accounts data of the enterprise which presents the bill to the credit institution, but also those of other parties to the bill (on which the bank concerned sometimes has no information and which cannot be readily included in a positive selection). Against this background, the distortion caused by the selection of credit institutions is likely to remain rather limited. To the extent an advance selection is made, it seems to be limited to the extreme cases of enterprises which are particularly at risk of insolvency. As will be presented in the following, the corporate balance sheet statistics hence contain a comparatively wide range of annual accounts data from enterprises having varying degrees of creditworthiness.

... economic  
sectors ...

The fact that the data are provided in connection with credit business affects not so much the breakdown of the balance sheet data by the creditworthiness of the enterprise but rather its sectoral and regional structure. This becomes evident when comparing it with the data in the Federal Statistical Office's turnover tax statistics, which is a complete survey of all taxpayers with a taxable turnover of at least DM 25,000 per year, and serves as a basis for



the expansion of the results provided by the corporate balance sheet statistics.<sup>7</sup> According to that, only those economic sectors are adequately represented in the annual accounts data where the trade bill is a widespread instrument of financing. According to the 1994 findings (the latest year for which a complete stock of annual accounts is available to the Bundesbank), the degree of representation, in terms of the number of enterprises, was well below 10 % in virtually all economic sectors. However, in western Germany, around 60 % of taxable turnover is recorded. Manufacturing is faring particularly well here, at above 70 %. The corresponding figures for wholesale/retail trade and construction are

<sup>7</sup> See: Federal Statistical Office, Finanzen und Steuern, Fachserie 14, Reihe 8, Umsatzsteuer 1994, Wiesbaden 1997.

## Representativeness of the balance sheet data of the corporate balance sheet statistics

1994

Enterprises	Number of enterprises			Turnover			Western Germany	Eastern Germany
	Germany							
	Corporate balance sheet statistics	Turnover tax statistics	Degree of coverage of the balance sheet statistics in %	Corporate balance sheet statistics	Turnover tax statistics	Degree of coverage of the balance sheet statistics in %		
Number	DM billion							
Total <sup>1</sup>	60,047	1,510,964	4.0	3,076.0	5,438.3	56.6	59.2	25.7
By economic sector								
Manufacturing	24,352	300,493	8.1	1,612.4	2,256.2	71.5	72.9	40.3
Construction	5,683	297,805	1.9	114.2	495.5	23.0	26.3	11.4
Wholesale trade	14,793	214,991	6.9	702.2	1,247.1	56.3	57.2	39.2
Retail trade	12,520	562,486	2.2	396.2	930.5	42.6	45.6	15.1
Others	2,699	135,189	2.0	251.0	509.0	49.3	34.5	6.6
By size								
Up to DM 10 million	32,186	1,457,856	2.2	133.3	1,286.1	10.4	11.2	6.3
From DM 10 million to less than DM 100 million	23,873	47,931	49.8	712.0	1,246.8	57.1	59.3	36.3
DM 100 million and above	3,988	5,177	77.0	2,230.7	2,905.4	76.8	77.5	55.6
By legal form <sup>2</sup>								
Public limited company	800	1,292	61.9	947.3	1,189.5	79.6	.	.
Private limited company	31,026	263,539	11.8	1,207.2	1,679.4	71.9	.	.
Partnership	15,990	148,012	10.8	742.3	1,545.4	48.0	.	.
Sole proprietorship	9,505	958,648	1.0	58.3	660.1	8.8	.	.
Others	772	13,815	5.6	61.7	177.6	34.7	.	.

<sup>1</sup> Producing sector, wholesale/retail trade and transport (excl. railways and excl. communication). — <sup>2</sup> Excl. transport.

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much lower, at just over 50 % and 25 %, respectively. The figures for the services sector, where the trade bill is traditionally only of very minor importance as a financing instrument, are particularly low.

Regional differences in the corporate balance sheet statistics result in particular from the fact that the bill is much less common in the new Länder than in the old ones. This has a corresponding impact on the representativeness of the east German base material. The available annual accounts of enterprises in east Germany cover only around 25 % of turnover (here and in the following according to the definition of the turnover tax statistics) of the producing sector, wholesale/retail trade and transport; even in manufacturing, the figure is only 40 %. In view of this rela-

tively low degree of coverage, a meaningful expansion through the turnover tax statistics cannot be carried out for eastern Germany – in contrast to western Germany. This would have made even less sense in the first few years after reunification, since the number of enterprises recorded was still much lower and there were sharp fluctuations in the volume of those enterprises.

In respect of size categories, there are also distinct differences in the degree of coverage in the corporate balance sheet statistics. In terms of turnover of the turnover tax statistics, more than two-thirds of the annual accounts of large and medium-sized enterprises are covered, whereas just over 10 % of smaller enterprises are represented, as is shown by the table above. The situation is similar when

... turnover size categories and legal forms

... old and new Länder ...

looking at the diverse legal forms, which are strongly correlated with enterprise size. In the case of sole proprietors, the available annual accounts represent less than 10 %, whereas 80 % and more than 70 % of public limited companies and private limited companies (again in terms of turnover) are covered, respectively.

Such a comparison of the results of the corporate balance sheet statistics and the data provided by the turnover tax statistics is certainly not completely unproblematical, since the two types of statistics have certain conceptual differences. In contrast to the corporate balance sheet statistics, which cover the smallest legally independent corporate units owing to the direct link to the trade bill, the turnover tax statistics are compiled according to the principle of consolidated enterprises, which means enterprises which are associated in a financial, economic and organisational way form a reporting unit. As a result, the turnover tax statistics only cover the external turnover of the group companies, whereas the corporate balance sheet statistics also cover internal (intragroup) turnover, i. e. turnover between legally independent group members. As a consequence, the level of representation of the corporate balance sheet statistics for incorporated enterprises tends to be overestimated.

*Coverage of  
unincorporated  
enterprises*

The Bundesbank's corporate balance sheet statistics are internationally the only annual accounts statistics which cover the corporate sector irrespective of legal form. Normally, statistical evaluations of annual accounts have to be limited to the incorporated enter-

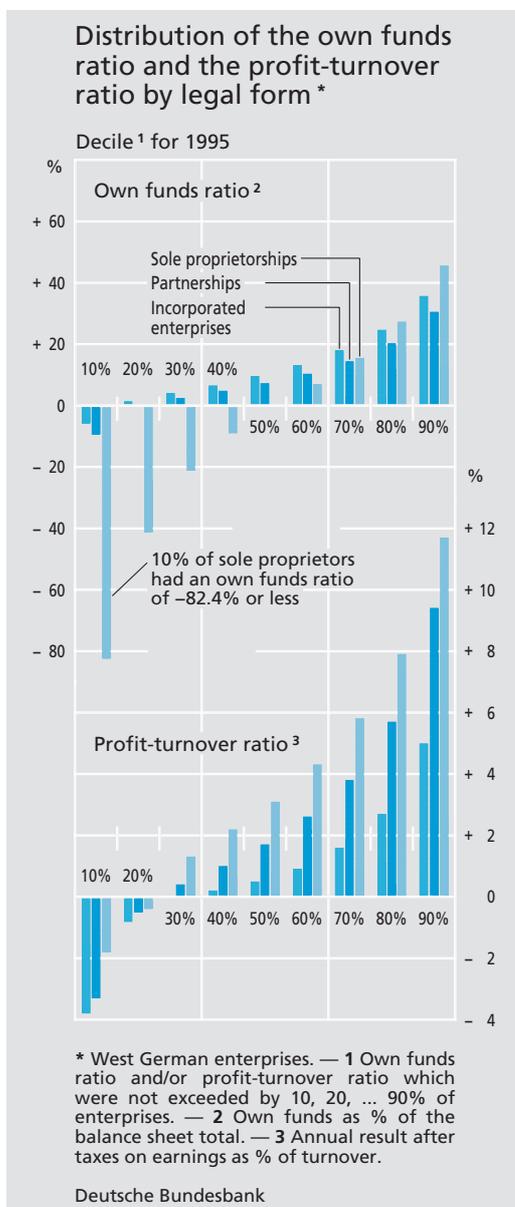
prises which are subject to disclosure and/or deposit requirements, since there is usually no access to the annual accounts of enterprises of other legal forms, which are primarily produced for internal purposes. By contrast, around 45 % of the data of the corporate balance sheet statistics are based on the annual accounts of enterprises which have the legal form of a partnership and sole proprietor. These corporate forms are typical in particular of smaller and medium-sized enterprises, which represent a core segment of the enterprise sector which is of major significance in Germany, but also in other European countries. Thus it is really a shortcoming that there are no corresponding statistical data for this segment in the partner countries.

However, the recording of enterprises having various legal forms leads to a relatively large degree of heterogeneity of the base material, which is reflected in a sharp dispersion of the results. This is due primarily to the fact that the reflection of the financial situation in the annual accounts, especially that of sole proprietors, inevitably remains incomplete as a result of the unclear separation of corporate and private spheres of the enterprise owner as a consequence of the lacking limited liability. Therefore the situation depicted is comparable only to limited degree with the typical results of incorporated enterprises.<sup>8</sup> The chart above shows that – seen in purely statistical terms – half of the sole proprietors covered in the Bundesbank's balance sheet data have ex-

*Dispersion  
of the data*

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<sup>8</sup> For details see: Deutsche Bundesbank, Comparison of the annual accounts of small and medium-sized enterprises organised in different legal forms, Monthly Report, October 1993, page 33 ff.



cessive debts; one-tenth even have balance sheet debts exceeding 80 % of the balance sheet total. In the case of partnerships and incorporated enterprises, however, comparatively few enterprises have excessive debts according to what is shown in their balance sheets.<sup>9</sup> This unfavourable capital structure of the sole proprietors as reflected in the statistics has to be put into perspective, however. A typical feature of this legal form is that a

considerable portion of the liable capital is held as private assets and is therefore not reflected in the balance sheet. For that reason, the financing patterns shown in the annual accounts thus appear in a much too unfavourable light. This holds true, in particular, if – not least for tax reasons – the creation of such off-balance assets is also made by ongoing withdrawals from the capital accounts of those enterprises.

However, the annual accounts of enterprises of diverse legal forms show a different picture in view of profitability. In contrast to incorporated enterprises, for one thing enterprises of dependent legal status and sole proprietors cannot book management costs (managers' remuneration and pension provisions for the proprietors) as labour cost, which means (*ceteris paribus*) the pre-tax profit of those enterprises is much higher. For another, the annual accounts of unincorporated enterprises do not include income-related taxes (which accrue only in the privacy of the proprietors). As a result, the profit/turnover ratio after profit tax is much higher than that of incorporated enterprises – across the entire profitability range.

The vast majority of enterprises submit their tax balance sheets to the Bundesbank. It is true that more than half of the base material of the corporate balance sheet statistics consist – as already mentioned – of the annual accounts of incorporated enterprises, which

*Large proportion of tax balance sheets*

<sup>9</sup> Here, it also has to be taken into account that valueless assets, such as subscribed capital unpaid, proprietors' or partners' loans, goodwill and discount are – in line with the Bundesbank concept – deducted from the equity capital.

are as a matter of course obliged to produce annual accounts conforming to the provisions of the Commercial Code; nevertheless, 90 % of balance sheets presented to the Bundesbank are tax balance sheets which are normally less detailed and which deviate distinctly from the annual accounts conforming to the provisions of the Commercial Code, although the commercial balance sheet is binding for the tax balance sheet as a matter of principle, and in part vice versa for some annual accounts items. This not only limits the depth of the evaluation but also has to be considered when interpreting the results.

*Availability of  
the annual  
accounts*

The high proportion of tax balance sheets is probably also the reason why a major portion of the annual accounts is submitted to the Bundesbank relatively late. After all, the compilation periods provided for by the Commercial Code are relatively short: the balance sheet and the profit and loss statement generally have to be drawn up in the first three months after the end of the financial year – or in the first six months in the case of small incorporated enterprises. The relevant tax law regulations, however, generally provide for compilation periods of up to one year. The example of the 1994 balance sheet year shows that, in practice, these different regulations result in not inconsiderable delays in the submission of the balance sheets. Although the fiscal and calendar years are identical for almost 90 % of enterprises, only one-third of the annual accounts are submitted to the Bundesbank by around September of the calendar year following the financial year. Another third is submitted by the middle of the next calendar year. It is not until over a year

later – that means around three years after the balance sheet date – that the respective balance sheet figures are virtually completely available.

### Processing methods

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The number of enterprises covered in the corporate balance sheet statistics fluctuates from year to year, and the composition of the sample of reporting enterprises changes, as enterprises do not continuously participate in bill operations; some enter and others exit definitely. For that reason, the aggregated results do not allow, for example, a meaningful year-on-year comparison, not to mention comparisons over longer periods. The data therefore have to be processed in such a way that these disturbing influences on comparisons are eliminated. Suitable procedures are the expansion by ratio estimate and the formation of cylindered samples. In the case of the expansion by ratio estimate, representative results for all enterprises of the economic sectors included are deducted from the available data by crossing these partial results with additional data from a complete survey of all enterprises. This procedure is basically used in the framework of west German enterprises' regular reports on profitability and financing. A cylindered sample includes only the results of those companies whose annual accounts are available for the entire period under review on a consistent basis.

*Expansion  
versus  
cylindered  
sample*

The expansion procedure used by the Bundesbank is based, as already mentioned, on the results of the Federal Statistical Office's

*The expansion  
procedure*

turnover tax statistics, which comprise virtually all enterprises of the relevant sectors. The first step of the processing involves classifying the available annual accounts by economic sector and then, within that sector, breaking them down by size in conformity with the turnover size categories of the turnover tax statistics. Since the selection of the enterprises included in the Bundesbank's balance sheet statistics can be regarded – with some reservations – as a sample of the aggregate of the enterprises comprised in the turnover tax statistics, the results of this sample can be expanded group by group to the aggregate of the enterprises in the turnover tax statistics by using a criterion included in both surveys. The reference variate, and hence the key for the expansion of the corporate balance sheet statistics, is the taxable turnover of the turnover tax statistics. The factor for the expansion of the diverse annual accounts items of a group is calculated from the share of turnover which the turnover tax statistics report for the respective combination of sector and size category relative to the corresponding turnover in the base material of the corporate balance sheet statistics (for details please see the Annex on page 63).

*Basis of the  
expansion*

The turnover tax statistics are especially suited to expanding the results of the corporate balance sheet statistics, since they provide a sufficiently detailed breakdown by sector and size category. They allow the virtual elimination of the structural distortions inherent in the base material. As described, not all size categories of the enterprises nor all sectors are represented to the same degree in the sample as in the universe of the turnover tax

statistics; for example, smaller enterprises are clearly underrepresented. The resulting distortion of the findings for a sector, for example, or also for all sectors can be avoided by using the weightings of the universe for the expansion.

However, not all the distortions in the base material can be eliminated in this manner. This holds true in particular for the different composition of the sample and the universe in respect of the legal forms. In order to selectively eliminate distortions caused by legal forms, a combined expansion by legal form, economic sector and turnover size category would be necessary; the required data from the turnover tax statistics, however, have not been available so far. But a good deal of such influences owing to legal form are indirectly taken into account by the expansion by turnover size category, since the proportion of incorporated enterprises in the size categories tends to increase in line with turnover.

Another problem results from the aforementioned conceptual differences between the turnover tax statistics and the corporate balance sheet statistics. Consolidating the turnover of legally independent enterprises in the turnover tax statistics, as opposed to aggregation according to the smallest legal unit in the corporate balance sheet statistics, may lead to distinct deviations in the sector classification of enterprises in the two sets of statistics, which may distort the result of the expansion distinctly, especially in the case of smaller sectors. Though these distortions largely offset one another, if a sufficiently broadly defined economic sector, such as

manufacturing, is analysed, they should be taken into account when analysing individual sectors.

*Preconditions  
for the  
expansion ...*

A major precondition to adjusting the structural differences in the base material is that a sufficiently large number of annual accounts are available for the individual sectors/size categories, so that representative results can be calculated for the corresponding group of the universe. This criterion has to be implemented differently, depending on the size category. In the upper categories where there are only comparatively few enterprises in the individual sectors, even in the universe, it is very important to achieve a high proportion of turnover in order to reflect the situation in the respective segment well. By contrast, in the more populated lower size categories, statistically significant statements are often even possible if only a sufficiently large number of enterprises is covered. Despite the low degree of coverage (see table on page 54), meaningful results can be achieved for such segments. Given the different situation in the individual sectors, it is vital to define the size category structure in a way that the frequencies, especially in the lower size categories, meet the requirements of the sample theory. Thus, a very complex structure may be selected for sectors comprising many medium-sized enterprises, where the corporate balance sheet statistics also has a sufficient number of enterprises in the lower size categories.

*... sufficient  
frequencies*

*... and  
elimination  
of outliers*

The quality of the expansion also depends on the ability to neutralise extreme values in the base material. Especially in size categories

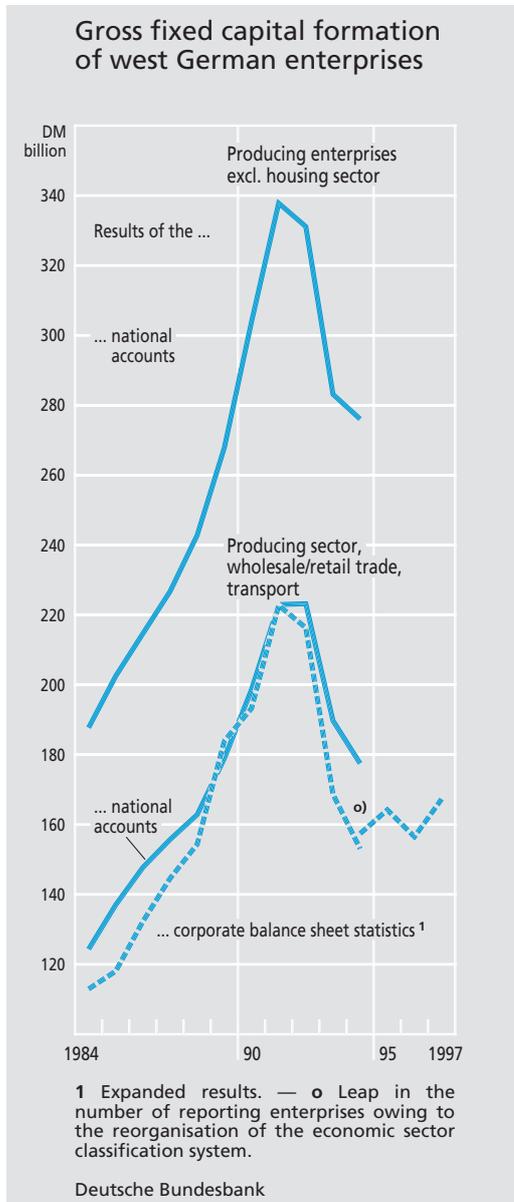
with particularly large expansion factors, "outliers" may have a strong impact on the expanded results. This initially suggests not including such enterprises in the expansion in order to improve the results. Actually, however, the adjustment of extreme values cannot be made schematically and be based, for example, on purely statistical procedures which are oriented to distribution parameters. On the contrary, it has to be examined in each case to what extent the extreme value reflects economic factors which are expected to play a role in other cases (which are not included in the sample) and thus should also be reflected in the result.

An important aspect of the expansion is that its result also reflects changes in the range of enterprises covered. The same holds true for most macroeconomic indicators used in ongoing economic analysis which are broken down, for example, by sector. Hence, the expansion procedure is suitable for analyses with a macroeconomic background or for analyses of individual sectors. The following example of gross fixed capital formation of enterprises (as defined in the national accounts) shows which results the expansion procedure produces and how these results can be used.<sup>10</sup> Despite the conceptual differences (in the balance sheet statistics, depreciation is booked at purchase price or lower value, whereas the national accounts use the replacement cost principle), the expansion

*Areas of  
application for  
the results of  
the expansion ...*

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<sup>10</sup> For further comparisons: F. Müller, T. Buch, *Aufwendungen und Erträge der Unternehmen im Spiegel der Jahresabschlussstatistik der Deutschen Bundesbank und der Volkswirtschaftlichen Gesamtrechnungen – Ein Vergleich –*, Allgemeines Statistisches Archiv, 70. Band, 1986, page 281 ff.



procedure provides a similar picture regarding the development of gross fixed capital formation as the national accounts (see chart on this page) for the sample of enterprises from manufacturing, wholesale/retail trade and transport.

In contrast to the expansion, the processing method based on the cylindered sample is suitable for analysing, for example, the behav-

our of all or specific enterprises in terms of their non-financial or financial decision parameters (for example, fixed capital formation, stockbuilding and/or diverse forms of financing). Moreover, this procedure can also be used when more complex results are needed which can no longer be reliably established by using the expansion procedure owing to the sampling error. The enterprises of cylindered samples can be broken down and analysed by any feature (such as turnover size category, quartiles of ratios, legal forms). This processing method is also used for the annual reporting of enterprises' profitability and financing, for which expanded results cannot be calculated for the reasons already mentioned. In addition, the Bundesbank's contribution to the European Commission's balance sheet database (BACH) comprises cylindered samples of incorporated enterprises. However, it should be stressed again that the results of such analyses are generally less representative than the results obtained by way of expansion.

The formation of cylindered samples (unchanged over the course of time) entails the problem that the available stock of data will increasingly shrink the longer the period under review is, since enterprises no longer participate in bill transactions or exit from the sample of reporting enterprises for other reasons; this applies, in particular, to smaller and medium-sized enterprises. A systematic error ("survivor bias") ultimately occurs in longer-term cylindered samples, since the results are strongly determined by large enterprises. By using short and regularly changing cylindered samples, the selection problem can be reduced, but changing the sam-

*Long versus short cylindered samples*

*... and the cylindered sample*

ple of reporting enterprises reduces the longer-term comparability of the results.

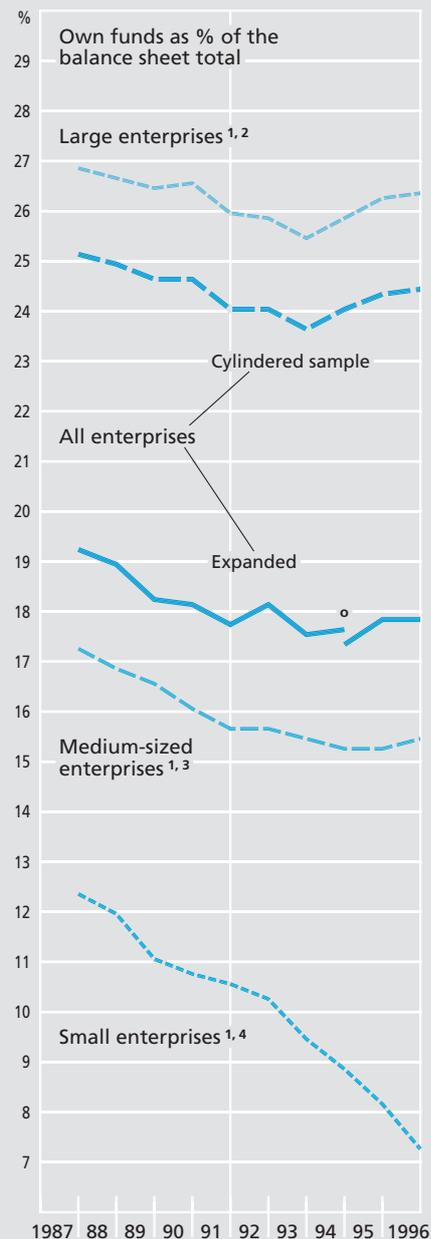
*Comparison of the two evaluation procedures*

The practical implications of the two processing methods are shown in the chart on this page by a comparison of the own funds ratio, i.e. the ratio of own funds to the balance sheet total, in the period from 1987 to 1996. The level, and to some degree the course of the aggregated own funds ratio, are quite different. The divergence is primarily due to the fact that in the cylindered sample the larger enterprises, with their comparatively high own funds share, are having a stronger impact than the smaller and medium-sized enterprises. This means that, owing to this distortion, the result of the cylindered sample should not be used for representative statements on the own funds ratio of the enterprise sector, but, rather, only that of the expansion.

*Combination of the procedures for estimates*

The two statistical procedures – the expansion and the cylindered sample – are also used in combination in the field of corporate balance sheet statistics. This permits the identification of initial trends on the development of enterprises' profitability and financing in the financial year just ended as early in autumn of that year, based on a still very incomplete sample of reporting enterprises comprising of up to one-third of the annual accounts. For this purpose, the available annual accounts of a cylindered sample of enterprises are expanded for the last two years, broken down by sector and size category. The year-on-year rates of change provided by this calculation are then used to extrapolate the results of the year before last which were expanded on the basis of

Own funds ratio in relation to corporate size and processing procedure \*



\* West German enterprises. — 1 Cylindered sample. — 2 Turnover of DM 100 million and above. — 3 Turnover from DM 10 million to less than DM 100 million. — 4 Turnover of up to DM 10 million. — o Leap in the number of reporting enterprises owing to the reorganisation of the economic sector classification system.

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the complete data for the enterprises, starting with individual items of the balance sheet and profit and loss statement. It goes without saying that the results estimated by this procedure can only provide an initial approximation of the economic trends in the enterprise sector. For that reason, the estimates are only published for the total economic sectors, but not for individual sectors. Despite the inaccuracies inherent in such an initial estimate, the procedure is an acceptable compromise which allows the deduction of the most up-to-date statements possible on macroeconomic trends in view of the given delays in the submission of the balance sheets.

### Prospects of the corporate balance sheet statistics

#### *Implications of EMU*

The growing European integration and, in particular, the start of Stage Three of European monetary union, will not be without repercussions on the Bundesbank's corporate balance sheet statistics. The bill-based rediscount credit, which has so far been the basis for the submission of the annual accounts to the Bundesbank, will no longer be part of the European Central Bank's set of monetary instruments. In the future, liquidity will be supplied to banks mostly through refinancing transactions. Marketable securities (tier one securities) and non-marketable securities (tier

two securities), such as book credits granted by banks to enterprises, but also trade bills, are envisaged as collateral for refinancing facilities. As regards the terms and conditions of longer-term refinancing operations, the national banks can, subject to approval by the ECB Governing Council, limit the range of collateral to private debt instruments or stipulate a corresponding minimum ratio for such paper.<sup>11</sup> However, tier two securities are only eligible if they are regarded as financially sound, something which is generally ascertained through a banking creditworthiness check in line with the current practice in bill buying. Hence, it can be assumed that, in future as well, the Bundesbank will have a considerable stock of annual accounts from enterprises in the framework of its refinancing operations. However, the volume of the annual accounts data which can be used in future for statistical purposes will also depend on the role which private collateral will play in the operational design of long-term refinancing facilities at the national level and, in particular, to which extent the credit institutions participating in long-term refinancing operations will resort to collateralising private debt instruments to ensure the necessary liquidity.

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<sup>11</sup> See: Deutsche Bundesbank, Geldpolitische Instrumente und Verfahren des Europäischen Systems der Zentralbanken, Newsletter on European economic and monetary union, No. 9, September 1997, page 3 ff.

## Presentation of the expansion procedure using the food industry as an example

Western Germany in 1994

Enterprises with turnover ...	Turnover		Expansion factor	Labour cost		ditto				Memo Item: Number of enter- prises in the corporate balance sheet statistics
	Cumulated individual data			Cumulated individual data	Expanded results	as % of the total sector		as % of turnover		
	Corporate balance sheet statistics	Turnover tax statistics 1				Cumulated individual data	Expanded results	Cumulated individual data	Expanded results	
				Corporate balance sheet statistics						
DM billion		3 = 2 / 1	DM billion		%					
1	2		4	5 = 4 · 3	6	7	8 = 4 / 1	9 = 5 / 2	10	
... of up to DM 2 mil- lion	0.3	24.2	82.4	0.06	5.1	0.3	13.6	20.9	261	
... from DM 2 mil- lion to less than DM 5 million	0.8	10.6	12.9	0.18	2.3	1.0	6.2	21.8	247	
... from DM 5 mil- lion to less than DM 10 million	1.9	8.4	4.5	0.39	1.8	2.1	4.7	20.9	258	
... from DM 10 mil- lion to less than DM 25 million	5.7	15.3	2.7	1.09	2.9	5.9	7.7	18.9	359	
... from DM 25 mil- lion to less than DM 50 million	9.0	16.4	1.8	1.58	2.9	8.5	7.7	17.6	245	
... from DM 50 mil- lion to less than DM 100 million	13.7	21.1	1.5	2.17	3.4	11.7	9.0	15.9	194	
... of DM 100 million and above	115.2	169.3	1.5	13.02	19.1	70.4	51.2	11.3	314	
Total sector	146.5	265.3	.	18.49	37.4	100	100	12.6	14.1	1 878

1 Data provided by the Federal Statistical Office.

Deutsche Bundesbank

## Annex

### Methodological explanations on the procedure of the expansion by ratio estimate

The table above shows how the expansion procedure works, using the food industry as an example. The first step is to break down the annual accounts according to the turnover size category of the turnover tax statistics, and the corresponding group sums are established for all items on the balance sheet and profit and loss statement (column 1), with only the turnover figures being initially reported in the aforementioned table. The expansion factor (column 3) is calculated from the ratio of the turnover reported in the turnover tax statistics for this size category (column 2) to the turnover of this category recorded in the base material of the corporate balance sheet statistics. The

expanded results for the individual size categories are obtained by multiplying the cumulated balance sheet figures by the corresponding expansion factors; the expanded overall result of the sector is established by adding up the expanded results of the size categories. This is shown by the example of labour costs (columns 4 and 5). The procedure causes a shift of the weightings of the individual size categories in the overall result, especially in favour of the lower size categories which occur relatively infrequently in the base material (columns 6 and 7). As a result, their situation may have a stronger effect on the overall result. For example, at 14.1% according to the results of the expansion, the labour cost ratio in the food industry was well above the average figure of 12.6% in the

Bundesbank's base material (columns 8 and 9) in 1994.

The formula for the calculation of the expansion result for a specific annual account item in a turnover size category of an economic sector reads as follows:

$$X_n = X_b \cdot h; h = U_u / U_b.$$

The notations are as follows:

$X_n$  the expanded annual account item of all enterprises in a size category (in the above example, labour costs; column 5);

$X_b$  the corresponding item according to the balance sheet statistics (column 4);

$h$  the expansion factor (column 3);

$U_b$  the turnover of all enterprises in the respective turnover size category according to the balance sheet statistics (column 1);

$U_u$  the turnover of all enterprises in the respective turnover size category according to the turnover tax statistics (column 2).