Calculation of expansion factors
for a business survey in the service sector

by

ULRICH KAISER,[*] MARKUS KREUTER[§] and HILTRUD NIGGEMANN[*]

Abstract: No other area of the German economy has developed so emphatically in the past ten years as has that of business–related services. Regardless of its growing overall economic importance, official statistics fail to provide economic researchers and economic policy with current data on the business–related services sector. In such a situation where quantitative information about certain branches is lacking, data obtained from business surveys give important information on the state of the economy. The outcome of such surveys crucially depends on the expansion factors attached to the responses of individual firms. In this paper it is shown how a robust method of calculating expansion factors can be obtained even if there is only little information on the sampling frame. Robust in this sense means that the expanded data of the ZEW/CREDITREFORM business survey are insensitive to changes in the sample design while the non–expanded data are not.

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Correspondence address:

Ulrich Kaiser

Centre for European Economic Research

Department of Industrial Economics and International Management

P.O. Box 103443

D–68034 Mannheim

Germany

Fax: ++/621/1235–333

Tel.: ++/621/1235–292

eMail: kaiser@zew.de

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[*]Centre for European Economic Research (ZEW)

[§]University of Ulm, intern at the ZEW in August and September of 1998.

[*]Centre for European Economic Research

Non–technical summary

While the business–related services sector has increasingly gained in overall economic importance in recent years, official statistics still fail to provide economic policy and economic researchers with current data on the state of this part of the economy. The ZEW/CREDITREFORM business survey in the business–related services sector aims at filling this information gap at least partially. It is being carried out since the second quarter 1994 and asks questions on recent turnover, profit, price, demand and employment growth.

It is of crucial importantance for any kind of business survey to find reliable expansion factors which are used to weight firms participating in a business survey by its own relative economic importance. The firms participating in the ZEW/CREDITREFORM business survey are weighted by their shares in turnover. Such weights are attached to account for the different implication a large firm reporting, say, decreased turnover has on the entire economy than of a small firm reporting a decrease in turnover. If no expansion takes place, small and large firms would be treated equally, and the differences inherent in firm sizes (or, likewise in sectoral or regional affiliation) would not be accounted for.

This papers shows how a reliable and robust method of calculating expansion factors can be found even if there is little information on the target population.

1   Introduction

In the past year, hardly any other sector of the German economy has developed as dynamically as the service sector. The structural change from manufacturing industries towards services has deepened in the last decade. Even within manufacturing industries a structural change is appearing: firms from the manufacturing sector increasingly offer services such as project consulting, maintenance and repairs. Moreover, structural changes also take place within the services sector. Business–related service are gaining in economic importance while traditional service sectors, such as retail and gross trade are losing in significance.

A main reason for the success of business–related services has been increased outsourcing activities of the manufacturing sector. Tasks not primarily related to the main business field have been transferred to legally independent services firms. However, the strong growth of business–related services has lead to a heightened attentiveness as far as the public, the media and politics are concerned. In official statistics, business–related services still play a rather subordinate role. Although around 80 separate statistics are available, covering varying characteristics such as the number of enterprises, firms and employees, a systematic recording of services is missing.[1] This concerns the industrial classification used by the different statistics, the unit of investigation (firm, plant or person) and the periodity of these statistics. As a result, it is not astonishing that no exact figures can be released which constitute the overall economic importance of business–related services. Even the Federal Statistical Office has only little information on business–related services at its disposal almost.[2] To compensate for the lack of current data on business–related services, the Center for European Economic Research (ZEW) has been carrying out carries out a quarterly business survey for the business–related services sector since June 1994 in collaboration with Germany's largest credit rating agency CREDITREFORM.

Since there is little information on business–related services in official statistics, the ZEW/CREDITREFORM business survey in some ways bears similar importance as the well known ifo–business surveys which were de-

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[1]Link (1996) refers to the usability of official statistics for the service sector more precisely.

[2]The Federal Statistical Office estimates, for example, the Gross National Product for business–related services on the basis of turnover tax statistic which is available biennially with a delay of 18 months and a statistic on the number of employees which is processed quarterly by the Federal Labor Office with a delay of about six to seven months.

veloped after World War II to modernize and supplement the official statistics (Strigel, 1997). A further advantage of the ZEW/CREDITREFORM survey is that the results can already be published between one and a half to two weeks after the end of the data collection period. As Oppenländer (1997) claims, this up–to–dateness is an important reason why economic survey data should at least bear equal importance as quantitative data.

In past years, the ZEW/CREDITREFIRM business survey has clearly increased in terms of recognition in the media and economic policy. On the basis of this survey an economic indicator for business–related services was developed in 1998 (Kaiser and Buscher, 1999).

The lack of availability of official statistics on business–related services has an immediate effect on the business survey carried out by ZEW and CREDITREFORM: a target population as the basis for the sampling frame and the calculation of expansion factors can only be determined with difficulties. In this paper we show how robust — in the sense of robustness with respect to changes in the sample design — expansion factors can be calculated in spite of the problematic data situation.

2 The ZEW/CREDITREFORM business survey

The definition of business–related services is cause for a quite controversial discussion in the literature. To our knowledge, no clear and generally–accepted definition of business–related services exists. We follow the convention proposed by Hass (1995), Klodt et al. (1997) and Strambach (1995), who define business–related services by simple enumeration of certain sectors.

In this paper, the following sectors are defined as business–related services (NACE–Rev. I code in parenthesis):

Branche	NACE–Rev. I code
Computer and related activities	72100, 72201–02, 72301–04, 72601–02, 72400
Accounting & book–keeping, tax consultancy	74123, 74127, 74121–22
Management Consultancy	74131–32, 74141–42
Architectural activities	74201–04
Engineering activities	74205–09, 74301–04
Advertising	74844, 74401–02
Renting of automobiles & transport equipment	71100, 71210
Renting of other machinery & equipment	45500, 71320, 71330
Cargo handling and storage	63121, 63403, 63401
Sewage & refuse disposal	90001–90007

According to Hass (1995), business–related services represent an important link between the secondary and tertiary sector. They support the quality and distribution of products. Furthermore, it is presumed in literature that the area of business–related services eases the way to innovation, as is indicated in Licht et al. (1997). Additionally, as Steil (1997) points out, business–related services show a clearly above–average foundation rate. Some authors such as Audretsch and Yamawaki (1991), Hass (1995) and Lichtblau et al.(1996) use Input-Output tables to show that the relationship between services — here, particularly the business–related services — and manufacturing is not way substitutive, as Fourastié (1950) amongst others had stated. The relationship between both areas is complementary instead.

ZEW and CREDITREFORM send out a single–sided questionnaire every three months to about 3,500 firms belonging to the ten sectors listed above. The survey is constructed as a panel data set. It is a stratified random sample, stratified with respect to the ten sectors, five size classes (two for East and three for West Germany), as well as with respect to regional affiliation (East/West Germany). The stratified target population thus consists of 50 cells.

A sample refreshment takes place on an annual basis. Firms which have not taken part in the survey for more than six times in a row are removed from the panel. Survey contents, results of the pilot study and a description of the original sample survey can be found in Saebetzki (1994).

The ZEW/CREDITREFROM business survey starts three weeks prior to the end of a quarter. Questionnaires and a personal letter to the prospective survey respondent are sent out by mail. The questionnaires are re-

turned to the ZEW mostly by fax. After two weeks, those firms who have not replied are sent a reminder. Altogether, the response rate amounts to about 28 percent. As a thank you for filling out the questionnaire, the partaking firms receive an analysis in the form of a four page report containing the main finding of the survey. In addition, they can draw further information over the internet.

The questionnaire is divided into two parts. In the first part the firms are requested to indicate on a three point Likert scale whether their turnover, prices, demand, returns and number of employees have, in the respective previous quarter, either decreased, stayed the same, or increased. Moreover, they are supposed to give an assessment for the forthcoming quarter. The second part of the survey is dedicated to present-day economic and political issues.[3] The following is exclusively concerned first part of the questionnaire.

3 Recording of business–related services in official statistics

Out of the 80 individual statistics which the Federal Statistical Office has available, four are potentially usable to highlight growth and importance of business–related services. These are: (1) the Mikrozensus, (2) the turnover tax statistic, (3) the quarterly cost–structure statistic and (4) the employee statistic. Although all four statistics are not primarily constructed for the recording of the service sector, they can be included as secondary statistics. In general there is the problem that all four statistics are only available with considerable delays and are therefore only partly suitable for current economic analysis. Another problem is the fact that the four statistics are not really comparable since they are based on different levels of investigation. In this regard the Mikrozensus is a household survey, the turnover tax statistic is targeted at the firm level (just like the quarterly cost-structure statistic), and the employee statistic on the plant level.

By collecting the information available on the business–related services sector from the four statistics listed above, we are able to report some figures on growth and economic importance of business–related services. While

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[3]Examples for papers dealing with the second part of the questionnaire are Kaiser (1998a and 1998b) and Kaiser and Stirböck (1999).

total employment has fallen by about about 11 percent between 1982 and 1996 — from around 8.1 to 7.2 million —, the number of employees in the service sector (including services brought about by the state) rose by about 22 per cent, from 10.2 to 12.4 million. Within the service sector the area of business–related services has particularly gained in importance — above all the sectors of advice, engineering, rental and waste disposal. In these areas, the number of employees has increased in the period, from merely 1 million to 1.8 million: a rise of 89 per cent.

4 Determination of the survey population

The target population of the ZEW/CREDITREFORM business survey are all firms belonging to the ten sectors listed above. We attach turnover expansion weights to the firms in the sample because turnover is the variable which is looked at in economic analysis. Since we use turnover expansion factors, we have to gather information on total turnover of each of the sectors. Furthermore, distinctions between East and West Germany as well as between the five size classes also have to be made. The basic information on total turnover of the business–related services sector are obtained from the turnover tax statistic which is the only information available at the disaggregated sectoral level used in the ZEW/CREDITREFORM business survey. This basic information does not distinguish between size classes and is only available at a biennial basis with a delay of 18 month. In the turnover tax statistic, every company which has more than 25,000 DM of taxable turnover per year is recorded. The Federal Statistical Office make these data available at a five digit classification level.

The original sample of the ZEW/CREDITREFORM business survey which was drawn in spring 1994 was stratified into the ten branches sectors, East and West Germany, and *six* size classes (1–49, 50–99 and more than 100 employees). In order to guarantee an equal distribution of firms across the sample cells, we introduce a new system of dividing things up. It is now layered according to ten branches, three size classes for West Germany (1–19, 20–59 and more than 60 employees) and two categories for East Germany (1–24 and more than 25 employees). This is done to ensure that "small" firms are considered sufficiently well in the expansion.

A further categorization of large firms (60 or more employees in West Ger-

many 25 or more in East Germany) does not appear necessary. Out of all firms which took part in the 17th wave of the ZEW/CREDITREFORM survey, 85 per cent of them had less than 100 employees. Only 22 of the 976 firms had more than 500 employees. A categorized recording of these "large" firms according to sectors and regions can be seen as rather useless, since not enough firms would be available per cell.[4] The 17th wave of the ZEW/CREDITREFORM business survey is used as the reference wave here.

In each of the 50 cells containing the target population of the ZEW/CTEDITREFORM business survey, the turnover of each responding cell firm is expanded onto the total cell turnover. The stratification of the target population is essential, since not only the sample design (e.g. over–proportional content of East German firms) of the survey differs between individual sectors and between East and West Germany; the response behaviour does as well. Amongst the West German firms, the response rate lies at around 20 per cent, whereas it is at around 33 percent in East Germany. It also differs between individual sectors. The smallest response rate is seen amongst accounting, book–keeping & tax consultancy where it is at about 18 per cent. The highest response rate, with around 28 percent, is in the sewage & refuse disposal sector.[5]

The turnover figures obtained from data from the turnover tax statistic have to be divided up into East and West Germany, five size classes and ten sectors.

Since the Federal Statistical Office separated the turnover tax data into East and West Germany only up until 1994, categorization of the turnover into the two regions for the subsequent years proves problematic. For 1996 and the years following, we must therefore determine turnover of each region from the figures for the whole of Germany. We therefore assume constancy in the share of East and West German firms in total turnover of the business–related services sector. The total turnover is thus split up between East and West Germany according to the 1994 shares. This proceeding can be justified by the fact that the share of turnover, which was allotted to East and West Germany in 1992 and 1994, remained fairly constant in the individual sectors. The largest shift amongst turnover shares was seen in management consultancy. Here, the share which was profited in West Germany rose from 84.5 per cent to 91.9 per cent between 1992 and 1994. In general, the share of turnover of West Germany in 1992 de-

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[4]Dealing with "large" firms in the projection is commented on later in this report.
[5]These figures relate to the 17th wave of the survey (II. quarter of 1998).

viates from the mean turnover share of 1994 by two percent at the most. For the shift of turnover share in the individual sectors from East to West Germany (or vice versa), no tendency can be established.

While the turnover shares between East and West Germany remained fairly constant over time, the distribution of turnover varies considerably across the ten sectors in consideration. The shares of East and West German firms for the other sectors are found somewhere between these two extremes. These sector–specific differences in the distribution of turnover across West and East Germany makes it necessary to split up total turnover into East and West Germany separately for every sector.

Due to the publication lag and the bienniality of the turnover tax statistic, further preparatory work must be done with regard to setting up the stratified target population. Turnover figures for 1998 are established through extrapolation of the growth rate from 1994 to 1996 for the ten sectors separately. Turnover figures for the years between the official recordings, i.e. 1995 and 1997, are established by interpolation.

For the calculation of the expansion factors, the turnover figures of the firms taking part in the ZEW/CREDITREFORM business survey must still be defined. These figures are gathered from the so called "MARKUS" firm data base made available to the ZEW by the CREDITREFORM. This data base also forms the sampling frame of the ZEW/CREDITREFORM business survey. The MARKUS data base does not reveal the turnover figures for all of the partaking firms.[6] The missing values must therefore be estimated.

The most important input factor in the make–up of services is that of work. If output is approximated by turnover, the number of employees stands in direct proportion to the size of turnover. We therefore explain turnover by the number of employees and replace the missing turnover values with the estimated values. The information which has been collected in the MARKUS data base reveals workforce numbers for almost all of the firms in our sample. Since, apart from the number of employees, sectoral and regional effects may also influence turnover figures, these variables are also taken into account for the estimation of the missing values.

The data collected in the MARKUS data base identifies around 70,000 firms in the business–related services sector.[7] For around 30,000 firms (of which about 6,500 come from East Germany), the MARKUS data contains

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[6]The MARKUS–data base only contains turnover figures for around 75 per cent of the firms. (Base: 17th wave (II. Quarter of 1998) and MARKUS from July 1998.)

[7]Referring to the MARKUS data from November 1997.

both turnover figures and the number of employees. These data forms the basis for estimating the missing turnover values by means of a median regression.[8] The estimations were carried out separately for East and West Germany.

Finally, it should still be pointed out that of course turnover figures are estimated which appear not to be usable, since they are "too small", negative, or "too large". In these cases, a separate way of estimating the missing turnover data is taken up. The turnover figures of the firms are estimated via the average turnover per employee. In addition, the mean of the turnover per employee ($Uprom$) is calculated individually for East and West Germany. In order to avoid the situation where a large bias occurs through a company having extremely large or small turnover, those firms which have a turnover per employee of either more than 1 million DM or less than 100,000 DM are not taken into account. If the turnover per employee of firm i is below than 20,000 DM or above 1 million DM, then the turnover of this firm (U_i) is replaced with $U_i = \text{Uprom} * m_i$, whereby for $Uprom$, the corresponding mean of the turnover per employee is chosen with respect to sectoral affiliation and with respect to the firm either being in East or in West Germany. The variable m_i denotes the number of employees of firm i.

In the majority of cases, estimating the turnover by way of the regression suffices. Only for firms with up to seven employees does it lead to negative turnover in the individual sectors or rather, as is the case in the above comments, to turnovers per employee which are regarded as being too small.[9]

As a basis for splitting up the target population into different size classes, the MARKUS data are used again. Since these data contain employment figures for almost all firms, splitting up the total turnover of the target population taken from the turnover tax data into different size classes is done by calculating the shares of each size class and splitting up total turnover by these shares for each stratum of the population.

In order to avoid a bias in favor of the large size class category, firms with more than 1000 employees were not considered — that was 0.15 percent of the total number of firms (according to the MARKUS data of August 1997).

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[8]Because of outlier problems, a median regression was preferred over an OLS regression.

[9]In the 17th wave for example, only three firms, which had only five employees, were affected by this correction. Out of the "large" firms, none of them were affected by the turnover correction introduced here.

5 Calculation of expansion factors

Attaching expansion factors to firm data implies accounting for the overall economic relevance of a large firm reporting, e.g., decreased turnover figures compared to a small firm reporting the same. While for both firms the percentage decline may be 10 percent, the absolute decrease for, say, the large firm may be 1 million DM and for the small firm only 1,000 DM. The share of answers from the 17th wave of the ZEW/CREDITREFORM business survey (II. quarter of 1998) clarifies this issue. Without expansion, a total of 40.6 percent of business–related services revealed that they had experienced increased turnover in relation to the I. quarter of 1998. For 40.2 per cent of the firms, the turnover stayed the same and amongst 19.2 per cent, turnover figures declined. If turnover expansion factors are used using the method which is described in this paper, then a different picture arises. In that case, 54.2 percent of the firms admit to having increased turnovers, 31.5 percent report unchanged turnover figures, and 14.3 per cent claim to have a decrease in turnover. For the expanded values, this means that 54.2 percent of the firms have a positive turnover development behind them. Formulated in a different way, amongst 21.14 billion DM (39 billion DM · 0.542), an increase in turnover occured.

In that respect though, no evidence of the complete development of turnover in the sector of business–related services can be found. This would only be possible if quantification techniques were used.[10]

In order to formally describe the way expansion factors are calculated, it is useful to define indicator variables. The indicator variable $\mathbb{1}_i^{increased}$ takes the value 1, if company i has stated that, in comparison to the last quarter, it has recorded increased turnover (prices, returns, demand, number of employees). If this is not the case, then $\mathbb{1}_i^{increased}$ is coded with 0. In analogy, we proceed with the indicator variables $\mathbb{1}_i^{equal}$ (for unchanged turnover) and $\mathbb{1}_i^{decreased}$ (for decreased turnover). Thus $j \in \{1, \cdots, 50\}$. $U_{i,j}$ denotes the turnover of company i from cell j, with $i \in \{1, \cdots, n_j\}$, whereby n_j represents the number of firms of each cell in our sample. Subsequently $n = \sum_{j=1}^{50} n_j$ is the sum of firms in our sample survey. $U_j = \sum_{i=1}^{n_j} U_{i,j}$ is the turnover in our sample which is gained in one cell.

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[10]See Seitz (1989) for a survey.

Furthermore, G_j represents the turnover which is gained in one cell of the target population and G the turnover of the target population.

The expansion is to be carried out over individual cells. In the calculation of the expansion factors, the turnover of each individual responding firm is to be taken into account:

$$H_j^A = \frac{G_j}{\sum\limits_{i=1}^{n_j} (U_{i,j})}$$

$$\text{or} \qquad H_j^A = \frac{G_j}{U_j} \qquad \forall\, j \in \{1,\ \ldots,\ 50\}$$

$$\tag{1}$$

If this cell factor H_j^A is multiplied with the turnover of the company, then the individual expansion factor $H_{i,j}^A$ for company i comes about as follows:

$$H_{i,j}^A = U_{i,j} H_j^A$$

$$\text{or} \qquad H_{i,j}^A = U_{i,j} \frac{G_j}{U_j}$$

$$\forall\, i \in Z_j \ \wedge\ \forall\, j \in \{1,\ \ldots,\ 50\}.$$

Below it will be explained, how firms which come out of the expansion as "special cases" are dealt with. These firms are only taken into account in the calculations on one occasion. That means the factor H_{ij}^A is set to u_{ij} for the ith of cell j firm classified as a special case. The following types of firms are considered as special cases: (1) firms with large turnover or (2) firms with large turnover per employee, both relative to the turnover figures in the corresponding cell. Naturally, this action influences the calculation of the expansion factors of the remaining firms in every cell that contains a special firm because $\sum_{i=1}^n H_{ij}^A$ has to be fulfilled. This will be explained in greater detail below. In the case of a turnover share which is "too high" in the corresponding cell:[11]

1. Determination of the turnover share of an individual firm which would arise from a uniform distribution of the turnover figures across all firms in the cell. This results from $\frac{1}{n_j}$ $\quad \forall\, j \in \{1,\ \ldots,\ 50\}$.

2. Determination of the turnover share of an individual firm in the sample. This results from $\frac{U_{i,j}}{U_j}$ $\quad \forall\, i \in Z_j \ \wedge\ \forall\, j \in \{1,\ \ldots,\ 50\}$.

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[11]The following explanation therefore always relates to a particular cell, even when it is not explicitly specified.

3. If the actual turnover share of an individual firm is more than twice of the turnover share arising from a uniform distribution of turnover across all firms in the cell, this firm is considered as a special case.

Turnover per employee being "too high" therefore comes about when the turnover per employee exceeds 1 million DM. In that instance, the company is treated as a "special case".

In the 17th wave, 35 of the 972 firms were categorized as "special cases" and were expanded with a factor of 1. This represents 3.6 per cent of the total firms. For these firms, the following notation is to be introduced. In it, $I\!D_j$ represents the amount of firms who are in the jth cell and are special cases.

Since the special cases are not considered in the expansion, the total turnover $U_j^\star$ of a company in a cell, for which the expansion is to be carried out, decreases. This is a result of $U_j^\star = \sum\limits_{i \notin I\!D_j} U_{i,j}$. Likewise, in order to reduce the corresponding turnover figures, total turnover of the cell is: $G_j^\star = G_j - \sum\limits_{i \in I\!D_j} U_{i,j}$. The expansion is then taken up using $G_j^\star$. From that, the corrected expansion factor come about as follows:

$$H_{i,j}^\star = U_{i,j} \frac{G_j^\star}{U_j^\star} \qquad \forall \ i \ \notin \ I\!D_j$$

Since the special firms are only included in the calculation with their own turnover (i.e. without cell factor), the following is obtained:

$$H_{i,j} = U_{i,j} \qquad \forall i \ \in \ I\!D_j.$$

Firms taking part in the survey may leave one question unanswered. This is called "item non–response". The value of the corresponding variable is then replaced by "missing". If a company i is in one cell, then: $1\!\!1_i^{increased} + 1\!\!1_i^{equal} + 1\!\!1_i^{fallen} \neq 1$, where $I\!M_{j,k}$ is the amount of firms which have a missing in the jth cell at the kth variable. For the affected variable, these firms are not taken into account. Thus, for total turnover in the sample which is relevant for the expansion, the following comes about:

$$U_j^{\star\star} = \sum_{i=1}^{n_j} U_{i,j} \qquad \forall \ i \ \notin \ (I\!D_j \cup I\!M_{j,k}).$$

From that, the expansion factors are given by:

$$H_{i,j}^{\star\star} = U_{i,j}\frac{G_j^\star}{U_j^{\star\star}} \qquad \forall\, i \notin (I\!\!D_j \cup I\!\!M_{j,k}).$$

If missing values emerge amongst individual firms, then the corresponding expansion factors are set at 0.

To sum up, the following expansion factors $H_{i,j}$ come about:

$$H_{i,j} = \begin{cases} U_{i,j}\frac{G_j^\star}{U_j^{\star\star}} & : & i \notin (I\!\!D_j \cup I\!\!M_{j,k}) \\ U_{i,j} & : & (i \in I\!\!D_j) \wedge (i \notin I\!\!M_{j,k}) \\ 0 & : & i \in I\!\!M_{j,k}, \end{cases}$$

for the ith company in the jth cell.

The expansion for the characteristic "increased" (e.g. turnover) of a survey variable is:

$$\sum_{j=1}^{50} \left(\sum_{i=1}^{n_j} H_{i,j} \cdot \mathbb{1}_i^{increased} \right).$$

6 Discussion

For the representation of survey data, balances are often formed from the individual firm responses. This balance — such as the one obtained from the question relating to turnover — results from the share of firms which indicated that they recorded increased turnover, minus the share of firms which indicated that they recorded decreased turnover. If the *non–expanded* balance is positive, then the majority of *participating* firms were able to realize a growth in turnover. It can, however, still be possible, that the business–related services sector actually realized a decrease in turnover. This happens if small firms experienced growth while large firms experienced a decline.

In the ZEW/CREDITREFORM economic survey there has twice been the phenomenon that, without expansion of the turnover variables the turnover balance slipped into the negative area, whereas with expansion it never ranged in the negative area. This occurred due to the over–proportionally of East German firms, which, until end of 1994 onwards, had turnover

evaluations clearly better than that of their West German competitors.[12] The expansion corrects for this effect resulting from the sample design. Expanded and not expanded turnover balances are shown in Figure 1.[13]

Figure 1: turnover balances weighted and unweighted

Since there are no formal tests with which the quality of expansion methods can be checked, an evaluation of our expansion factors turns out to be difficult. A piece of information regarding the robustness of our expansion factors, however, is given by the effects changes in the design of the sampling frame have on the the outcome of the ZEW/CREDITREFORM business survey. Since the beginning of the ZEW/CREDITREFORM business survey, the number of firms in the sample has increased twice, notably in the second quarter of 1995 (an increase from 1046 to 1807 firms) and in the second quarter of 1997 (an increase from 1755 to 4166 firms). In the second enlargement, the over-proportional representation of East German firms was removed with since, in the course of time, it had come to light that the response rate of East German firms is better than that of their western counterparts. Figure 2 represents the total number of participants in every wave of the ZEW/CREDITREFORM economic survey and the relationship between the West and East German firms who answered. In the second enhancement this relationship changed from 1.5 (first quarter of 1997) to 2.9 (second quarter of 1997).

Due to the better turnover evaluations of West German firms, it is to be expected that the sample enlargement leads to an unusually large and positive increase of the turnover balance. In fact the unweighted balance increases by 24.1 per cent whereas if expansion factors are attached, it does so only by 18.8 percent. Our expansion factors thus seem quite good at correcting changes in the sample design.

Figure 2: # of participating firms

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[12]Originally, an over-proportional amount of East German firms were included in the sample survey, because little was known about their response behaviour.

[13]It is clear from Figure 1 that the survey data exhibit seasonal fluctuations. A suitable method to resolve this seasonality for a short time series is suggested in Kaiser and Buscher (1999).

7 Summary and Outlook

In spite of its growing economic importance, the service sector is still insufficiently recorded in official statistics. In situations constituted by a lack of data, business surveys become a very important instrument in observing the economy.

With the example of the ZEW/CREDITREFORM business survey for business–related services, we show how a suitable method of calculating expansion factors can be found even when there is little information on the target population. On the basis of data from turnover tax statistics and from a data base provided by a credit rating agency, the target population is set up and stratified into ten sectors, East and West Germany as well as into five size classes (three for West Germany, two for East Germany). The target population is thus divided up into 50 cells. The responses of the individual firms are expanded proportionally to their turnover share in one of the related 50 cells. A comparison of expanded and not expanded survey results shows that we have found a robust method of calculating expansion factors since the expanded balances do not respond to changes in the sample design as the not expanded figures do.

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Figure 1

Comparison of expanded and not expanded turnover balances

Figure 2

Total number of participating firms and ratio of East to West German firms II/1994-II1998