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Exporter Performance in the German Business Services Sector: First Evidence from the Services Statistics Panel*

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A wide range of empirical studies has analysed exporter performance, especially the relationship between exports and productivity in the manufacturing sector. By contrast, a detailed investigation of the services sector has remained largely neglected. To close this gap, this paper focuses on the relationship between exports and several performance characteristics in the German business services sector—average wage, productivity, size and turnover profitability—in order to determine whether export premia and self-selection into export markets exist in the business services sector. To ensure the comparability of the results with those from the manufacturing sector, empirical models used to analyse the manufacturing sector are transferred to investigate the business services.

Keywords: export premia, self-selection into export markets, business services

JEL-Codes: F14, L89

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* The access to the services statistics panel was provided via remote data access at the Research Data Centre of the Statistical Office of Berlin/Brandenburg. For more details about the data access, see Zühlke, Zwick, Scharnhorst and Wende (2004). All calculations were performed using Stata 10. All do-files are available from the author on request. Many thanks go to Joachim Wagner for helpful comments and to Ina Lachnit for running the do-files in the Research Data Centre.

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1 Motivation

A wide range of empirical studies has analysed exporter performance, especially the relationship between exports and productivity in the manufacturing sector, but a detailed investigation of the service sector remains largely neglected, even though the service sector has particular importance for the economy. Nearly 70% of the gross value-added in Germany is contributed by the tertiary sector, and it engages more than 70% of employed persons (see Federal Statistical Office, 2007a). Furthermore, services are no longer non-tradable; according to the German balance of payments, the trade with non-residents for services is 20% of the trade with non-residents for goods (see Deutsche Bundesbank, 2008).

Despite their importance for the economy and the fact that services have become tradable, very little is known about the determinants of international trade of services on the micro level. Empirical evidence about the link between exporting and enterprise performance has been derived almost solely from the manufacturing sector. Previous research in the manufacturing sector has shown that exporters are larger (based on employees and total turnover) and more productive than non-exporters, and that they pay higher wages. Furthermore, high-performing firms self-select into export markets (e.g., Bernard & Jensen, 1999; Mayer & Ottaviano, 2007). It would be useful to know if these findings are transferable to the service sector, especially with regard to the economic effect of sector-support programs.

To close this gap, this paper contributes to the literature by focusing on the relationship between exporters and enterprise characteristics of average wages paid, productivity, size and turnover profitability (a performance dimension that is only rarely investigated in the manufacturing sector; see Fryges & Wagner, 2008) for the German business services sector.[1] Even though the business services sector covers a wide range of

[1] Unless otherwise stated, business services are defined in this paper as NACE divisions 72 (e.g., hardware and software consultancy, data processing, software publishing and database activities), 73 (i.e., research and development) and 74 (e.g., business, management and tax consultancy, advertising, legal activities, market research, and architectural and engineering activities).

activities, business services are traded more than most other services,[2] and these activities have in common that they provide primarily intermediate inputs. The purpose of the paper is to determine whether export premia and self-selection into export markets exist in German business services enterprises. To ensure the comparability of the results, empirical models used to analyse the manufacturing sector (cf., e.g., Bernard & Jensen, 1999) are transferred to business services.

The study uses a dataset from the recently released German services statistics panel from 2003-2005, which contains, among other things, information about the export activities, number of employees, total turnover, and average wage of more than 25,000 business services enterprises per year. This data facilitates performance analyses of exported German business services on an enterprise level over time. The dataset also contains information about the regional location of each enterprise, which can be used to compare the export behaviours of East and West Germany, considering that the East German economy, even 18 years after the German reunification, still differs from the West German economy.

Section 2 begins with an overview of the literature about exports and performance in the manufacturing sector and presents considerations and studies of the export activities in the business services sector. The dataset and data preparations are described in Section 3, while Section 4 presents the empirical results, starting with a descriptive overview, followed by the econometric analyses of the export premia and the test of the self-selection hypothesis. Section 5 concludes.

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[2] According to the German balance of payments, business services (defined as advertising, engineering, commercial and computer services) have by far the highest trade volume of any service other than travel and transport (cf. Deutsche Bundesbank, 2008). In addition, Jensen and Kletzer (2005) classified nearly all business services as tradable, based on the geographic concentration of service activities in the United States.

2 Exports and performance

Performance differences between non-exporters and exporters have been widely investigated in the manufacturing sector. Recent surveys show strong evidence that firms that export are more productive than non-exporting firms and that more productive firms self-select into export markets. (cf. Greenaway & Kneller, 2007; Wagner, 2007). Even when further performance dimensions are considered, exporters in the manufacturing sector show superior performance, and superior performing firms self-select into export markets. For example, exporting firms are larger in terms of employees and total turnover, generate higher value-added (cf., e.g., Bernard & Jensen 1999 for the U.S.; Bernard & Wagner, 1997 for Germany; Mayer & Ottaviano, 2007 for a number of European countries), pay higher wages (e.g., Schank, Schnabel & Wagner, 2007 for a survey), and have slightly higher profitability (Fryges & Wagner, 2008).

Explanations for the self-selection of the most efficient firms into export markets are found in the more intensive competition in international markets as well as in additional costs expended for, for example, transportation, tariffs, market research, product adaptations, and setting up new distribution networks. Only the more productive firms can expect good results from entering a more competitive market, and only more productive firms are able to absorb the additional costs and to overcome the entry barrier. In the economics literature, more recent models of internationalisation have shown that the self-selection of more productive firms into export markets is due to sunk entry costs and per-unit trade costs (e.g., Melitz, 2003, as the workhorse of this literature, and Bernard et al., 2003). Higher wages in enterprises that export or will soon export are expected because of the link between productivity and wages. For example, rent-sharing motives could determinate the wage preferences of the workers, such that the fair wage depends, in addition to other effects, on the productivity level of the enterprise (cf., an extension of the Melitz, 2003, framework by Egger & Kreickemeier, 2007). More productive enterprises employ workers with more skills, so exporting enterprises tend to

pay higher wages (cf. Yeaple, 2005). On the other hand, the effect could be reversed, as higher wages could cause higher productivity (cf. Akerlof & Yellen, 1986). Higher monitoring costs in larger firms could also lead to higher wages in enterprises that export or plan to export (e.g., Davis & Harrigan, 2007, based on Melitz, 2003, and the efficiency wage model of Shapiro & Stiglitz, 1984).

A different approach to explaining internationalisation is found in the business and management literature. According to traditional models, internationalisation is an incremental process that depends on the ability to accumulate knowledge through exposure to foreign markets. The business and management literature has also recognised that additional costs and uncertainties are inevitable when an enterprise enters a foreign market, but the literature has focused on the processes that explain how potential barriers are overcome. A more recent focus on "born global" enterprises has also included resources and capabilities as crucial, but has also considered other aspects, such as the role of joint-ventures as a means to overcome initial resource and competency gaps, e.g., sunk entry costs (see Harris & Li, 2005, for a review of this literature). The management literature has used resource-based theory to explain the relationship between exporting and enterprise size and has argued that larger enterprises have a greater ability to engage effectively in export activities and that larger enterprises can better absorb the risks associated with internationalisation (cf., e.g., Aaby & Slater, 1989). Further, enterprise size plays a critical role in influencing the attitudes of the management toward internationalisation (cf., e.g., Javalgi et al., 2003).

In contrast to goods, services are usually immaterial, not storable, and highly customized and they require direct contact between user and provider. Thus, three modes of delivery are possible (following WTO, 1994; Copeland & Mattoo, 2007): the foreign user consumes the service at the domestic location of the supplier, the service provider opens a foreign commercial presence (foreign direct investment), and the services are supplied by independent or employed natural persons in the foreign country. There are also exceptions to

these characteristics: If services can be stored in some medium (e.g., paper, CD), cross-border delivery is possible, and new forms of telecommunication and information technology also allow long-distance delivery of services that were once limited to a physical place.

The key differentiating factor for the internationalisation of services firms and manufacturing firms seems to be the inseparability between consumer and producer (cf. Erramilli 1990). However, due to the characteristics of business services, exports in form of personnel travelling to foreign markets, the provision of services to foreign costumers in the home market but also in form of embodied (e.g. reports, letters) and wired (e.g. telephone conversations, data transfers) services play a significant role in the internationalisation process of business services enterprises (see e.g. Roberts, 1999). Thus, the paper focuses on a part of the services sector, where exporting has some similarity to the export of goods.

Considering the self-selection hypothesis, the business service sector is comparable to the manufacturing sector in terms of three types of costs and barriers. First, the need for resources (e.g. Javalgi et al., 2003; Winstead & Patterson, 1998) and the need for knowledge concerning marketing, foreign markets (i.e., market research), and so on (e.g. Winstead & Patterson, 1998) are important barriers in both sectors. Second, while shared with the manufacturing sector, cultural and language differences represent barriers and costs that are more critical in the business services sector since, because of the high level of interaction between user and provider, exporters of services must have good language skills, a high level of intercultural competence, and the ability to customize and adapt services to the specific market (cf. McLaughin & Fitzsimmons, 1996; Winstead & Patterson, 1998). Regulatory barriers, like the need for locally recognised professional qualifications or other country-specific requirements, can also affect the fixed costs of entering an export market and the variable costs of servicing that market to a greater extent for service enterprises than for manufacturing enterprises (cf. Kox & Nordås, 2007). Finally, while shared with manufacturing enterprises, elements that represent a lower cost barrier for service enterprises

include transportation costs. While service enterprises may see additional costs in the form of personal transport costs if the service is supplied by a person in a foreign country, transportation costs tend to play a secondary role in the case of cross-border delivery of services, primarily because of communication technology, while they play a primary role in the delivery of goods. Lower transportation costs could allow less productive service firms to enter export markets (cf. Melitz, 2003). However, due to similarities in internationalisation between the business services and manufacturing sectors (Roberts, 1999) a similar self-selection effect of business services enterprises into export markets that are larger and more productive and that pay higher wages is expected.

In contrast to studies of the manufacturing sector, there are only a few economics-based empirical studies about the determinants of export activities in the service sector. Similar to the manufacturing sector, innovativeness in the service sector (e.g., measured by an innovator dummy or the intensity of innovation expenditures) is positively associated with the likelihood of exporting (cf. Chiru, 2007; Ebling & Janz, 1999; Gourlay, Seaton, & Suppakitjarak, 2005; Love & Mansury, 2007). The effect of size on exporting in the service sector has only mixed evidence: Love and Mansury (2007) found a positive effect, Gourlay et al. (2005) showed a hump-shaped relationship, Chiru (2007) showed a u-shaped relationship, and Ebling and Janz (1999) found no significant effect. Empirical studies about the relationship between exports and productivity showed that a higher productivity in period *t* (cf. Love & Mansury, 2007) or *t-1* (cf. Harris & Li, 2007) increased the likelihood of an enterprise's being an exporter in period *t*. However, the literature still lacks a detailed investigation of export premia and self-selection effects related to different performance dimensions that is directly comparable to the approaches used for the manufacturing sector.

3 The data

Only three regularly collected, non-exclusive datasets that include information about the export activities in the service sector are available from German data production facilities. First, the Establishment Panel of the Institute for Employment Research of the Federal Labour Services in Germany (*Institut für Arbeitsmarkt- und Berufsforschung der Bundesagentur für Arbeit*/ IAB), an annual representative survey of establishments, contains nearly 2,000 business services establishments (NACE code K) each year, including these establishments' percentage of exports to total turnover (cf. Kölling, 2000). However, the small sample size of business services establishments does not allow detailed analyses of business services establishments that export. In particular, the number of enterprises beginning export activities is small, which inhibits analysis of the self-selection hypothesis.[3]

The turnover tax statistics panel from the German Federal Statistical Office and the statistical offices of the Federal States, secondary statistics based on the monthly and quarterly advance turnover tax returns (i.e., the turnover tax prepayments of the enterprises), include 800,000 enterprises whose annual total turnover exceed €17,500 (NACE code K). However, the analysis of business services enterprises that export is limited by the fact that the dataset contains only the exporters of goods and not the exporters of services (cf. Vogel & Dittrich, 2008).

Finally, the German Federal Statistical Office and the statistical offices of the Federal States recently released the services statistics panel 2003-2005, with approximately 25,000 business services enterprises (NACE code K) per year. Even if the statistics cover only three years, it is the only dataset that contains enough observations and enough information about

[3] The panel contains fewer than 15 business services enterprises that began exporting in 2003 and had no exports between 2000 and 2002, and fewer than 25 business services enterprises that began exporting in 2004 and had no exports between 2001 and 2003.

the total non-domestic turnover to analyse exporters of business services enterprises over time. This paper uses this dataset.

Based on an initiative of the European Union (European Council, 1996), the statistical offices of the Federal States and the German Federal Statistical Office have collected the annual services statistics (*"Strukturerhebung im Dienstleistungsbereich"*) since the year 2000. The data covers the enterprises and professions (*"Freie Berufe"*) of the NACE divisions I (transport, storage and communication) and K (real estate, renting and business activities) with an annual turnover of €17,500 or more. A stratified random sample is used to select the enterprises. The stratification is based on the federal states (*"Bundesländer"*), 4-digit industries and 12 size ranges (in terms of turnover and employees). For 2005, the following sample sizes are drawn from the three industries analysed in this paper: 18.3% of all statistical units from the NACE division 72 (computer and related activities), 36.9% of all statistical units from the NACE division 73 (research and development) and 12.6% of all statistical units from the NACE division 74 (other business activities). Because the same enterprises that participated in 2003 also participate in 2004 and 2005, it is possible to merge the cross-sectional datasets to a panel dataset that covers the years 2003 to 2005 (cf. Pesch, 2007; Federal Statistical Office, 2007b).

The service statistics panel includes, among other data, information about the economic sector, the number of employed persons (not including temporary workers), total turnover, salaries and wages, and variations in stocks. However, small enterprises with an annual turnover lower than €250,000 are given a reduced questionnaire, so important information, like that concerning export activities, is missing for these enterprises. As a result, only those enterprises with an annual turnover over €250,000 are considered for the analyses. Furthermore, the fewer than 25 "doubles", enterprises that exist more than twice in one year, are excluded from all computations.

The enterprises' export activities are measured by an export dummy (1 if exporting; 0 if not) and export intensity (percentage of exports in total turnover). Unfortunately, the dataset contains no information about the target countries for exports or other international activities such as partnerships, direct investments or imports.

The number of employees is based on the number of employed persons and, because the information is not included in the dataset, not on full-time equivalents. This difference has to be considered while interpreting the labour productivity measurements value-added per employee (computed in line with the definition by the European Commission, 1998) and turnover per employee. The average wage of an enterprise is computed by the total amount of wages and salaries, divided by the number of wage and salary earners. The turnover profitability is generated as gross firm surplus, which is the surplus generated by operating activities after the labour factor input has been recompensed (see European Commission, 1998), divided by total turnover, minus the change in stocks of goods and services.

4 Empirical analyses

This section investigates whether a relationship between exporting activity and performance (described in section 2) exists in the German business services sector. A descriptive overview about the intensity of export activity, the participation in export activity, and the differences between exporting and non-exporting business services enterprises is followed by more detailed analyses of self-selection into export markets.

Some additional notes: In all analyses, values are stated in 2003 prices. To avoid bias by outliers, the 1st and 99th percentiles of the distribution of the performance variables are excluded from all computations. Finally, the federal state of Berlin is included in the East Germany analysis.

4.1 Descriptive overview

All three business service industries (computer and related activities, research and development, and other business activities) showed a slight increase in the percentage of exporting enterprises (export participation) as well as in terms of exports to total turnover (export intensity) between 2003 and 2005.[4] The highest export participation was in the research and development sector, followed by computer and related activities. The heterogeneous sector of "other business activities" contains industries whose percentage of exporting enterprises is around 20%; these are legal activities, market research and public opinion polling, business and management consultancy, technical testing and analysis, and advertising. Overall, the business services enterprises in East Germany showed a lower export participation compared to the West German enterprises (Table 1).

(Table 1 about here)

Only a few descriptive studies have provided information about the export participation in the German business services sector. The German turnover tax statistics panel indicated that 11.9% of the enterprises in the NACE Divisions 72 and 74 with one or more employees that are liable for paying social insurance export. Because this statistic covers only exports of goods, the 11.9% could be seen as a lower limit (Vogel, 2008). Based on the pilot survey "Sales of Services", Redling (2007) found an export participation of 21% for enterprises in NACE divisions 72 and 74. Ebling and Janz (1999) reported an export participation of 21% based on the Mannheim Innovation Panel in the 1997 Service Sector, containing enterprises offering business-oriented services (IT, consulting, advertising and cleaning) with 5 or more employees. The IAB-Establishment Panel indicated that 14.1% of the establishments in NACE Divisions 72 and 74 in 2004 were exporting establishments (Vogel, 2008). The services statistics panel 2003-2005 used in the current research states a

[4] A more detailed presentation of the export participation between 2000 and 2005 based on the cross-sectional services statistics can be found in Eickelpasch (2008).

15.4% export participation among enterprises in the NACE divisions 72 and 74. Even if it is difficult to compare the different datasets and concepts directly, 15.4% is inside the 10-20% range of export participation previously found in the German business services sector.[5]

Table 2 reports the results from the comparison of exporting and non-exporting business services enterprises. Because of lower average wage and productivity levels in East Germany, the results are presented separately for both parts of Germany. The average values of the performance variables, as well as index values of the variables are compared between exporters and non-exporters in order to consider the different nature of the activities inside the heterogeneous services industries. These index values are computed as the percentage difference of the respective variable in an enterprise from the average value of all enterprises from the same 4-digit industry. Thus, the values are controlled for different levels of the variables among the business services activities.

On average, business services enterprises that export are larger (have higher total turnover and more employees), more productive (higher turnover and value added per employee) and pay higher average wages than enterprises that serve only the domestic market. For West Germany, t-tests show statistically significant (alpha=1%) differences for all mean and index comparisons while this is not true for the productivity variables for East German enterprises. The mean differences of the turnover and value added per employee are significant (alpha=5%), but the preferred comparison of the 4-digit industry based index shows no statistically significant differences.

(Table 2 about here)

In contrast to the manufacturing sector, where a higher turnover profitability of exporting enterprises is shown (cf. Fryges & Wagner, 2008), East German and West German

[5] Many products that are exported by manufacturing firms include both components of both services and goods, so one important aspect of export activities of services enterprises, especially business services enterprises, is the indirect export of services via manufactured goods and the servicing of exports (cf., e.g., Daniels, 2000). However, data about such indirect exports is hard to collect.

business services enterprises both have a statistically significant lower turnover profitability than do non-exporting enterprises. One possible reason for this is that, in the more labour-intensive business services sector, it is more difficult for exporters to absorb completely the extra cost of exporting or higher wages by means of their higher productivity. However, this performance dimension is a very new point in the manufacturing literature as well (cf. Fryges & Wagner, 2008), so more research is necessary to assess this result.

4.2 Export premia

Following Bernard and Jensen (1999) and the International Study Group on Exports and Productivity (2008) the exporter premia are investigated in this section by computing the ceteris paribus percentage differences of several enterprise attributes between exporters and non-exporters. These premia are computed from a regression of several (logarithmised) variables (*X*) on the current export status dummy and a set of control variables:

$$(1)\ \ln X_{it} = ß_0 + ß_1\ export_{it} + ß_2\ control_{it} + e_{it},$$

where *i* is the enterprise index, *t* is the index of the years between 2003 and 2005, *e* is the error term, and *X* indicates the enterprise characteristics of number of employees, turnover, average wage, turnover per employee, value added per employee, and turnover profitability (with all values given in 2003 prices). In the first model, the vector *control* contains in a first model a full set of interaction terms of year and economic activity (4-digit) dummies. In the second model, the number of employees and its squared value are also included, except in the case of the employment regression.

Two variants are estimated for the *export* variable. Equation 1 is estimated with an export dummy indicating the export status of the enterprise (1 if exporting, 0 if not). The exporter premia (computed as $100*(\exp(\beta_1)-1)$) shows the average percentage difference of the characteristics between exporting and non-exporting enterprises, controlling for the characteristics included in the vector control. In a second variant, the export intensity is

included in the equation in order to investigate whether the export premia increases with an increase in the percentage of exports to total turnover. To account for a possible non-linear relationship, both the export intensity and its squared value are included.

In addition to the pooled regression of equation 1, the panel structure of the dataset is used to estimate a fixed effects model that controls for unobserved, time-invariant heterogeneity.[6]

Table 3A reports the results of the estimations of the (log of the) enterprise characteristics on the export status, and Table 3B reports the results for the estimations on the export intensity. Even for business services enterprises, the results of the pooled regression show statistically and economically significant export premia for every characteristic except turnover profitability in the years 2003 to 2005. By far the largest differences between exporting and non-exporting enterprises occurred in the number of employees and total turnover; West German exporters are more than 60% larger than non-exporters, and in East Germany they are more than 50% larger. The differences in the average wage and the labour productivity variables range from nearly 10% to nearly 20%. As discussed in section 4.1, exporters show a statistically and economically significant lower turnover profitability than non-exporting enterprises.

After controlling for unobserved heterogeneity by including fixed enterprise effects, the analyses show that differences in size are still present, even though on a much lower scale. For all other characteristics, there are no significant differences between exporters and non-exporters. The much smaller export size premia and the insignificant differences concerning the other characteristics in the fixed effects model (compared to the pooled regression) suggest that the exporter status variable is positively correlated with the unobserved effect.

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[6] Both the pooled regression and the fixed effects model are estimated with cluster robust standard errors, relaxing the assumption of independence of the observations. Independence is assumed only between enterprises. To control for unobserved, time-invariant heterogeneity, a first differences model was also estimated. Because results were similarity to the results of the fixed effects model, these results are not presented.

This drop in the premia is consistent with the idea that enterprises that are more "able" are also more likely to export. Thus, in the pooled regression, a large part of the export premia reflect that, even if they were not exporting, exporting enterprises would be more productive and would pay higher wages.

(Table 3A about here)

A second variant of the estimation shows the relationship between the enterprise characteristics and the export intensity. In both parts of Germany, the results are similar to the estimation on the export status dummy: If the export intensity increases, based on the pooled regression, the results show a significant increase (with a slight degressive character) of the export premia of all characteristics, except the turnover profitability. Again, the size variables show the highest differences. When controlling for unobserved, time-invariant characteristics, no significant differences occur.

(Table 3B about here)

In summary, German business services enterprises that export are clearly larger (in terms of turnover and employees) than business services enterprises that do not export. In line with the manufacturing sector, business services enterprises that export are more productive and pay higher average wages, even when controlled for size and industry. In contrast to the evidence for the manufacturing sector, however, exporters in the more labour-intensive business services sector have a lower turnover profitability. The comparison of the results from the pooled regression and the fixed effects model indicates some evidence that the more "able" enterprises are more likely to export. When it is controlled for unobserved, time-invariant characteristics, e.g., management ability, no significant differences between exporters and non-exporters concerning productivity, profitability and average wages is found. The question concerning whether enterprises that are larger and more productive and that pay higher wages self-select into export markets is investigated in the next section.

4.3 Self-selection hypothesis

The estimated export premia concerning the differentials between exporting and non-exporting enterprises (section 4.2) do not provide any information about the causality between exporting and the performance variables under consideration. Therefore, this section reports on tests of whether the export premia reflect a self-selection of better performing enterprises into export markets.[7] Following the standard approach from the literature of the manufacturing sector (cf. International Study Group on Export and Productivity, 2008), the hypothesis that enterprises that begin exporting perform better than non-exporters, even several years before they begin to export, is investigated. Therefore, with only those enterprises with no export activities between *t-2* and *t-1* taken into consideration, the average differences of several enterprise characteristics in periods *t-2*, *t-1* and *t* from enterprises that start to export in period *t* and enterprises that do not export in any period are estimated. These pre-entry differences are estimated from a regression of several (logarithmised) variables (*X*) in *t, t-1*, and *t-2* on an export starter dummy (in *t*) and a set of control variables:

$$(2)\ \ln X_{it-\rho} = ß_0 + ß_1 \text{ export starter}_{it} + ß_2 \text{ control}_{it-\rho} + e_{it}, \qquad \text{with } 0 \leq \rho \leq 2$$

And where *i* is the enterprise index, *t* represents the starting year 2005, ρ represents the time-lag to the starting year, *e* is the error term and *X* indicates the characteristics of employees, turnover, average wage, turnover per employee, value added per employee, and turnover profitability (with all values in 2003 prices). In the first model, the vector *control* contains dummies for the economic activities (4-digit), and the second model contains the number of employees and its squared value as well, except in the employment regression.

Export starter is a dummy variable that indicates the export status in *t* (1 if the enterprise starts to export, 0 if not). The average percentage differences in the specific

[7] In addition to the self-selection hypothesis, it has been hypothesised in the literature that exporting improves the performance of the enterprises (cf., e.g., Bernard & Jensen, 1999). The manufacturing sector has demonstrated only mixed evidence concerning this hypothesis (cf., e.g., Wagner, 2007). However, because the dataset covers only a short time period, it is not possible to test this learning-by-exporting hypothesis.

characteristics at *t-2, t-1 and t* between enterprises that begin to export at *t* and enterprises that do not is computed from the estimated coefficient β_1 by 100*(exp(β_1)-1).

Table 4 presents the pre-entry premia of enterprises that began to export in 2005 for two years before starting to export, one year before starting to export and at the starting year. Overall, prospective exporters in West Germany and East Germany are, on average, around 30% larger (in terms of employees and turnover) and pay around 10% higher average wages, even in the periods before they being to export. These results are statistically significant, mostly at the 0.01 level. Concerning the productivity variables, positive productivity differences are found for the enterprises in the dataset, but these difference are not statistically significant in every time lag. Especially in East Germany, the lack of significance may be caused by the small number (about 100) of enterprises that began to export.

Considering the two years before the enterprises began to export, for enterprises in both parts of Germany, the pre-entry premia concerning the average wage and the turnover per employee are nearly constant, the size variables (number of employees and turnover) show slight increasing pre-entry premia, and the gap between exporters and non-exporters in value added per employee decreases. In West Germany, the turnover profitability of future exporters is significantly lower than the turnover profitability of enterprises that never export in this period for all time lags. In East Germany, a higher turnover profitability of prospective exporters is found in the years before exporting starts. However, these differences are not significant or show only weak significance.

(Table 4 about here)

Thus, in line with evidence from the literature about the manufacturing sector, these results indicate that enterprises in the business services sector also self-select into export markets. In terms of productivity, not all periods show a significant difference between enterprises beginning to export and those that are not. Nonetheless, the positive premia found

in the dataset suggests weak evidence that self-selection of more productive enterprises is also present in the business services sector.

5 Conclusion

The relationship between exports and enterprise performance has been widely investigated in the manufacturing sector, but no detailed investigation of the services sector has been performed. To close this gap, this paper provides first evidence about export premia and the self-selection into export markets in the German business services sector.

Similar to the manufacturing sector (cf., e.g., Bernard & Jensen, 1999; Mayer & Ottaviano, 2007), German business services enterprises that export are clearly larger (in terms of turnover and employees) than are non-exporting business services enterprises. Business services enterprises that export are also more productive and pay higher average wages, even when controlled for size and industry. This finding is also is line with studies of the manufacturing sector (cf., e.g., Wagner, 2007; Schank, Schnabel & Wagner, 2007) and with previous productivity studies of the service sector (cf. Harris & Li, 2005; Love & Mansury, 2007). In contrast to the evidence for the manufacturing sector (cf. Fryges & Wagner, 2008), exporters in the business services sector seem to have a lower turnover profitability, indicating, for example, that it is more difficult for business service exporters to absorb completely the extra costs of exporting, especially higher wages, by means of their higher productivity. However, when it is controlled for unobserved, time-invariant characteristics, such as management ability, there are no significant differences between exporters and non-exporters concerning productivity, profitability or average wages. Thus, the export variable may be correlated with these unobserved characteristics, which may provide some evidence that the more “able” enterprises are more likely to export.

To analyse whether the export premia reflect the self-selection of better performing enterprises into export markets, the hypothesis is tested that enterprises that begin exporting

perform better than non-exporters, even several years before they begin to export. In line with evidence from the literature about the manufacturing sector, the results indicate that in the business services sector, as in the manufacturing sector, large enterprises self-select into export markets. In terms of productivity, only weak evidence for self-selection was found because the differences between enterprises that begin exporting and those that do not were not significant in all pre-export periods.

Because of the very short time period of the data, the question of whether the export premia considered here reflect a learning-by-exporting effect remains open. Even in the manufacturing sector, only mixed evidence concerning this hypothesis is available (cf., e.g., Wagner, 2007), so further research based on longer panel data is needed in this area. Future research could also consider the specific export markets to analyse any differences between enterprises that export to neighbours and those that export to more distant markets. However, as of this writing, no dataset with such information and enough observations is available for Germany.

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Tables

TABLE 1
EXPORT PARTICIPATION OF BUSINESS SERVICES ENTERPRISES
IN WEST AND EAST GERMANY

Industries (NACE Code)	share of exporting enterprises (in %)		average export intensity (in %)			
			all enterprises		exporters only	
	2003	2005	2003	2005	2003	2005
West Germany						
Computer and related activities (72)	25.2	26.4	3.2	5.3	18.5	20.3
Research and Development (73)	33.3	35.3	10.4	11.5	31.3	32.7
Other business activities (74)	12.6	14.8	2.1	2.8	16.7	18.6
Legal activities (74.11)	19.6	18.5	2.3	2.6	11.7	14.3
Accounting, bookkeeping and auditing activities; tax consultancy (74.12)	7.7	9.9	0.4	0.6	5.2	6.4
Market research, public opinion polling, business and management consultancy (74.13, 74.14)	19.4	23.2	4.8	6.6	24.8	28.5
Management activities of holding companies (74.15)	9.2	7.5	2.9	2.9	32.0	28.6
Architectural and engineering activities (74.2)	9.8	14.0	2.1	3.2	21.3	22.7
Technical testing and analysis (74.3)	18.3	29.7	3.7	6.8	20.4	22.8
Advertising (74.4)	19.0	22.3	2.4	2.4	12.9	10.9
Labour recruitment (74.5)	6.6	8.6	1.1	1.1	16.1	12.7
East Germany						
Computer and related activities (72)	19.2	20.3	3.4	4.8	17.6	23.6
Research and Development (73)	34.4	38.9	7.4	10.0	21.5	25.7
Other business activities (74)	7.3	8.8	1.3	1.4	17.7	16.0
Legal activities (74.11)	12.1	13.9	0.6	1.2	4.8	8.6
Accounting, book-keeping and auditing activities; tax consultancy (74.12)	4.3	6.0	0.3	0.4	7.9	7.1
Market research, public opinion polling, business and management consultancy (74.13, 74.14)	15.3	15.7	3.8	4.6	24.6	29.3
Management activities of holding companies (74.15)	5.3	3.0	2.0	0.9	37.2	31.1
Architectural and engineering activities (74.2)	6.6	7.8	1.7	1.7	25.8	21.5
Technical testing and analysis (74.3)	15.5	19.1	1.9	2.9	12.5	15.3
Advertising (74.4)	7.7	12.2	0.3	0.7	3.5	6.1
Labour recruitment (74.5)	4.2	5.9	1.1	0.8	26.2	14.7

Note:
Only enterprises with a turnover greater than €250,000 are considered. All values are weighted with cross-sectional weights.

TABLE 2
EXPORTERS VS. NON-EXPORTERS IN THE WEST AND EAST GERMAN BUSINESS SERVICES SECTOR 2005

	Non-exporters		Exporters	
	Mean	index (in %)	mean	index (in %)
West Germany				
Number of Employees	22.5	91.4	25.3	142.8
Turnover (in € 1,000)	1,426.5	87.4	2,635.6	163.2
Average wage (in € 1,000)	28.6	97.7	34.6	111.3
Turnover per employee (in € 1,000)	125.2	98.2	143.3	109.0
Value added per employee (in € 1,000)	67.7	99.4	70.9	103.2
Turnover profitability (in %)	27.3	103.7	21.8	81.4
Number of observations (unweighted)*	15,916		3,923	
East Germany				
Number of Employees	23.4	94.5	27.3	145.1
Turnover (in € 1,000)	1,113.9	93.8	1,824.2	151.2
Average wage (in € 1,000)	22.8	98.6	28.4	111.4
Turnover per employee (in € 1,000)	92.6	99.1	103.4	107.0
Value added per employee (in € 1,000)	48.5	99.7	52.9	102.5
Turnover profitability (in %)	23.4	102.0	19.2	83.6
Number of observations (unweighted)*	4,420		637	

Note:
The index is computed as the percentage difference of the respective variable in an enterprise, compared to the average value of all enterprises from the same 4-digit industry. T-tests show statistically significant (alpha=1%) differences for all mean comparisons except the productivity variables in East Germany. Only enterprises with a turnover greater than €250,000 are included. The 1st and the 99th percentiles of the distribution of the variables are excluded from all computations. All values are in 2003 prices and weighted with cross-sectional weights. (*) Reported are the average available unweighted number of observations over all characteristics.

TABLE 3A
EXPORT PREMIA OF BUSINESS SERVICES ENTERPRISES
IN WEST AND EAST GERMANY (2003-2005)

	Estimation of (the log of) enterprise characteristics on export status and controls in t				Number of observations
	pooled regression		fixed effects model		
	1	2	1	2	
West Germany					
Number of Employees	61.0**	-	2.8**	-	55,993
Turnover	84.7**	68.0**	3.1**	3.0**	58,502
Average wage	18.0**	18.0**	0.0	0.1	55,364
Turnover profitability	-18.0**	-16.9**	-4.0	-4.0	49,275
Turnover per employee	15.5**	16.6**	0.7	0.8	57,741
Value added per employee	10.2**	10.7**	-1.5	-1.4	56,556
East Germany					
Number of Employees	53.9**	-	1.7	-	14,521
Turnover	64.8**	54.4**	4.1*	3.7*	14,831
Average wage	16.0**	15.8**	-1.0	-1.1	14,321
Turnover profitability	-13.5**	-12.1**	-10.2+	-10.3+	12,615
Turnover per employee	14.2**	15.4**	1.7	1.9	14,717
Value added per employee	8.3**	8.9**	-4.6	-4.4	14,476

Note:
The estimated regression coefficients and the levels of significance (+ indicates significance at the 10% level, * at the 5% level, and ** at the 1% level, based on cluster robust standard errors) are presented from two estimations of the logarithmised respective variables on the export status at t. Model 1 is controlled for a full set of interaction terms of year and economic activity (4-digit) dummies. Model 2 also controls for the number of employees and its squared values. To facilitate the interpretation, the estimated coefficient for the export dummy has been transformed by 100(exp(ß)-1). The transformation shows the average percentage difference of the respective variables (ceteris paribus) between exporters and non-exporters. The 1st and the 99th percentiles of the distribution of the variables are excluded from all computations.

TABLE 3B
EXPORT PREMIA OF BUSINESS SERVICES ENTERPRISES
IN WEST AND EAST GERMANY (2003-2005)

	Estimation of (logarithmised) enterprise characteristics on the export intensity and controls in t							
	pooled regression				fixed effects model			
	1		2		1		2	
	export in-tensity	export in-tensity^2	export in-tensity	export in-tensity^2	export in-tensity	export in-tensity^2	export in-tensity	export in-tensity^2
West Germany								
Number of Employees	2.66**	-0.03**	-	-	0.19	0.00	-	-
Turnover	3.48**	-0.03**	3.05**	-0.03**	0.10	0.00	0.08	0.00
Average wage	1.04**	-0.01**	1.04**	-0.01**	0.01	0.00	0.02	0.00
Turnover profitability	-0.84**	0.01**	-0.78**	0.01**	-0.49	0.01	-0.49	0.01
Turnover per employee	0.96**	-0.01**	1.00**	-0.01**	-0.03	0.00	-0.01	0.00
Value added per employee	0.73**	-0.01**	0.75**	-0.01**	-0.13	0.00	-0.11	0.00
East Germany								
Number of Employees	2.36**	-0.03**	-	-	0.17	0.00	-	-
Turnover	2.54**	-0.02**	2.31**	-0.02**	0.11	0.00	0.10	0.00
Average wage	0.97**	-0.01**	0.96**	-0.01**	-0.23	0.00	-0.23	0.00
Turnover profitability	-0.70*	0.01+	-0.60+	0.01	-0.51	0.01	-0.51	0.01
Turnover per employee	0.51*	0.00	0.56*	0.00	-0.12	0.00	-0.12	0.00
Value added per employee	0.32	0.00	0.35+	0.00	-0.60+	0.01+	-0.59+	0.01+

Note:
The estimated regression coefficients and the levels of significance (+ indicates significance at the 10% level, * at the 5% level, and ** at the 1% level, based on cluster robust standard errors) are presented from two estimations of the logarithmised respective variables on the export intensity and its squared value at t. Model 1 controls for a full set of interaction terms of year and economic activity (4-digit) dummies. Model 2 also controls for the number of employees and its squared values. To facilitate the interpretation, the estimated coefficient for the export dummy has been transformed by 100(exp(ß)-1). The transformation shows the average percentage difference of the respective variables (ceteris paribus) between exporters and non-exporters. The 1st and the 99th percentiles of the distribution of the regarded variables are excluded from all computations.

TABLE 4
SELF-SELECTION INTO EXPORT MARKETS OF BUSINESS SERVICES ENTERPRISES 2005

	OLS estimation of the (logarithmised) characteristics on export start in t=2005 and controls in t, t-1 and t-2						number of	
	Two years before starting (t-2)		One year before starting (t-1)		In the starting year (t)		export starters	non-exporters
	1	2	1	2	1	2		
West Germany								
Number of Employees	26.0**	-	29.5**	-	32.3**	-	575	9,733
Turnover	32.9**	33.5**	38.1**	36.9**	42.0**	41.1**	572	9,927
Average wage	9.9**	9.9**	7.4**	7.4**	9.3**	9.4**	575	9,934
Turnover profitability	-13.9**	-13.6**	-11.1*	-10.8*	-24.6**	-24.4**	571	9,958
Turnover per employee	6.2+	6.5*	7.5*	7.8*	11.1**	11.5**	579	9,924
Value added per employee	6.5**	6.6**	4.4	4.6	3.5	3.7	576	9,929
East Germany								
Number of Employees	27.7**	-	28.2**	-	40.1**	-	106	2,818
Turnover	29.3**	25.7**	32.5**	29.9**	51.1**	44.0**	106	2,857
Average wage	9.9*	10.0*	9.2+	9.2+	11.3*	11.5*	109	2,781
Turnover profitability	18.0+	21.6*	-1.1	2.6	-13.5	-10.5	107	2,470
Turnover per employee	5.3	6.9	6.5	8.2	8.8	10.7*	108	2,839
Value added per employee	15.8*	16.7*	8.1	9.3	2.5	3.7	109	2,801

Note:
The estimated regression coefficients and the levels of significance (+ indicates significance at the 10% level, * at the 5% level, and ** at the 1% level, based on robust standard errors) are presented from two OLS estimations of the logarithmised respective variables at t-2, t-1 and t. Model 1 controls for a full set of economic activity (4-digit) dummies. Model 2 also controls for the number of employees and its squared values. To facilitate the interpretation, the estimated coefficient for the export dummy has been transformed by 100(exp(ß)-1). The transformation shows the average percentage difference in the respective variables at t-2, t-1 and t between enterprises that begin exporting ("export starters") at t and enterprises that do not start to export. The 1st and the 99th percentiles of the distribution of the regarded variables are excluded from all computations.

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