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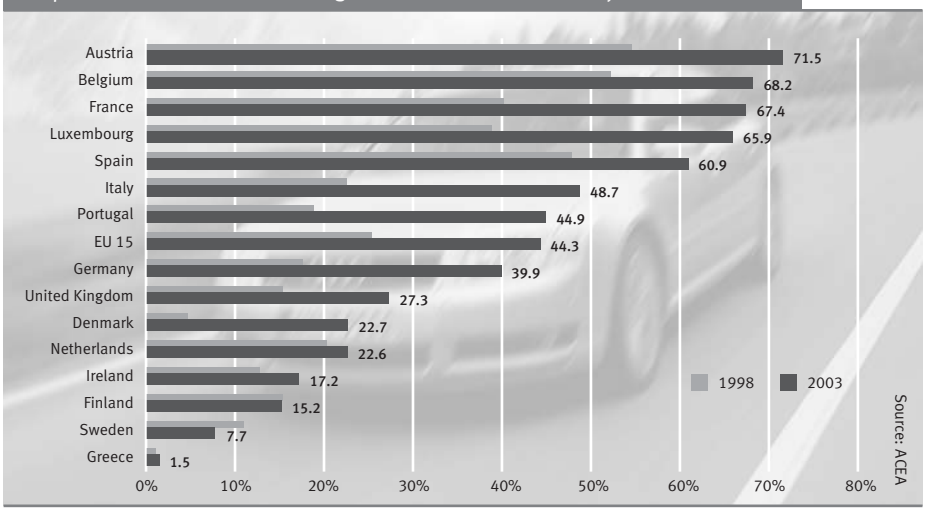
# European Automotive Industry Faces Strategic Challenge

*Europe is home to one of the world's leading automotive industries. However, whether European carmakers can sustain their competitiveness in future in comparison with the American and Japanese automotive industries will depend on the industry's technological performance. The key role played in this context by new drive engineering is highlighted by a study of the competitiveness of the global automotive industry undertaken by the ZEW on behalf of the European Commission.*

Proportion of all new vehicle registrations accounted for by diesel vehicles




Accounting for around six percent of total employment and seven percent of overall output in the European manufacturing industry, the automotive industry injects significant momentum into the European economy. Expressed in absolute terms, the European automotive industry employs a workforce of 1.9 million people and generates annual net value added of 114 thousand million euros. The US automotive industry produces more or less the same volume, but with just 60 percent of the manpower deployed in Europe has considerably more efficient labour productivity. In Japan, the volume of vehicle production is around 65 percent of the value of the EU 15 or USA, but with just 56 percent of the US employment rate, labour productivity in Japan is even higher than in the USA. Since the early 1990s, European productivity in the automotive industry has been catching up with performance in the USA and Japan, however.

The positioning of the European automotive industry vis-à-vis the global competition is inextricably linked to its technological performance, and in this respect drive engineering plays a key role. Continuous increases in demand, particularly from China, mean that crude oil – and thus petrol – prices are unlikely to return to their former lower levels. Private and commercial mobility will presumably remain on a high level. Bearing this in mind, automotive customers around the world are showing increasing interest in energy-saving vehicles. This poses a challenge to the European automotive industry which is grappling with the contradictory signals coming from both its domestic market and its most important export market, the USA, about which technological solution is likely to become established in the medium term.

Most experts concur that hydrogen-powered vehicles are the long term answer. Until this technology is commercially viable and universally applicable, there is a need to produce a robust, low-consumption, petrol-driven transitional solution. In Europe, the decision appears to have been made in favour of the diesel

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engine. On average throughout the EU 15, four of every ten newly registered vehicles have diesel engines (see table on page 1).

### Hybrid vehicles popular in the US

In contrast, only 0.2 percent of new vehicles in the USA are diesel driven, where – owing to low statutory minimum standards – only relatively poor quality diesel fuel and a fragmentary gasoline station infrastructure is available. As a consequence, fuel-saving hybrid vehicles are beginning to make their mark on the American market. These vehicles combine conventional gasoline-powered engines with electric motors.

The European automotive industry consequently faces a strategic dilemma. Should it focus its research activities on the merits of diesel, or should it attempt to catch up with developments in the hybrid sector? Considering the importance of the US market, particularly for most European premium suppliers, and the almost insuperable deficits in the diesel infrastructure in the USA, turning its back on hybrid technology is not a realistic option for the European industry. On the other hand, the sales figures tell a very clear story: While the institute B&D-Forecast predicts that it will be 2015 before three million hybrid vehicles can be sold in the USA, almost 14 million diesel vehicles were sold in the EU 15 alone in 2003.

The European automotive industry therefore has no choice but to pursue a balanced innovation strategy. Given the necessity of continuing research into other potentially fuel-saving technologies (such as cylinder shut-off), this may mean that some suppliers will only be able to offer the hybrid option in collaboration with other manufacturers or on a licensing basis. In the long term, the issue of optimum energy saving drive engineering will depend crucially on the infrastructure and demand in a rapidly growing Chinese market. The task of the European automotive industry at present is to keep its technical, and thus strategic, options open and to secure the future international competitiveness of Europe's automotive industry.

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# Internet Increasingly Dominates Business in Germany

*German companies are increasingly making use of information and communication technologies. The use of the Internet as a procurement and sales channel has particularly gained in importance. But also everyday working life is increasingly bound up with Internet use. An important barrier preventing even greater use of information and communication technology is the lack of IT expertise, as a ZEW survey shows.*

With the financial support of the Landesstiftung Baden-Württemberg foundation, the ZEW surveyed more than 4,400 companies in the fourth quarter of 2004 in order to find out more about how they use information and communication technology (ICT). The representative survey encompassed companies with five or more employees in manufacturing and in selected service sectors.

The study demonstrates that firms increasingly use the Internet as a procurement and sales channel. 69 percent of the companies place orders on the Internet – eight percentage points more than in 2002. Moreover, 48 percent of the companies (+9 percentage points compared with 2002) use the Internet as a sales channel for e-commerce.

### Saturation effects discernible

Saturation effects – albeit at a high level – are discernible for other Internet applications. At the end of 2004, for example, around 93 percent of companies had an Internet connection – similar to the figures for 2002. The prevalence of the companies' operating an own Internet presence increased only marginally. Internet use for advertising and marketing purposes even decreased slightly to 59 percent. This development may, however, be a reflection of the current general reluctance of German companies concerning advertising.

ICT also have a determining and enduring influence on the everyday working life of company employees. 48 percent of employees in the sectors surveyed had access to the Internet at their workplaces by the end of 2004. More than 45 percent of these employees carry out most of their work at the computer and 14 percent receive IT-specific training.

The most important obstacle to more intensive use of new technologies is clearly the lack of internal IT-experts. Other obstacles are the high investment and follow-up costs, uncertainties about the quantifiable benefits from ICT applications, as well as inadequate know-how of employees in IT applications. In contrast, lack of financing options and security risks are less important in comparison, and the employees' willingness to engage with new technologies is a rare reason for the failure of IT projects.

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RESEARCH FINDINGS

# Evaluating the Progress of the Lisbon Process Using Structural Indicators

*Indicator based co-ordination processes are becoming increasingly popular within the EU. An indicator list constructed in a sensible way is a precondition for the success of any such approach. This holds true in particular with regard to the EU structural indicators which are to assist in evaluating member countries' progress towards reaching the Lisbon objectives. This list's variety of issues but also its mere size leaves the derivation of general conclusions a challenging undertaking. With this background a new ZEW-study aims at a double objective: Firstly, to derive recommendations for the list's development. Secondly, to give hints for the application of the existing list.*

In the first part of the ZEW-study a consistent grid of criteria is developed which lays the basis for the assessment of currently used and potential future key variables on the list of structural indicators. These criteria correspond to the indicators' function within the institutional framework of the so called open method of co-ordination.

Within the study's extensive second part the complete current long-list of EU structural indicators is analysed in detail. The analysis highlights both technical shortcomings of a number of indicators and conceptual problems which limit the informational value of indicator based country comparisons.

## Condensation of the indicator list

The study's final part is devoted to the question if and how a condensation of the existing indicator list could be achieved in the course of the imminent Lisbon mid-term review. In particular the potential role of scoreboards, rankings, multivariate statistics and efficiency considerations is discussed on the basis of exemplifying applications. Key findings are the following:

- Detail critique: In their present definitions, numerous indicators do not allow meaningful cross-country comparisons. An overall problem of many indicators is a significant distortion by the business cycle.
- Non-covered policy field: The public sector is currently not covered in a systematic way. In the course of developing the indicator list, this deficit should be overcome by the inclusion of an indicator group focused at the public sector.
- Missing type of indicator: Concerning relative weights of important types of indicators particular attention should be paid to the development of efficiency indicators.
- Impact of qualitative reforms: Economic reforms such as the ongoing German labour market reforms have only a punctual and lagged impact on the current indicators.
- Indicators of regulation: Approaches to quantify changes of a qualitative nature and to depict them through indicators should be taken into account in the further improvement of the indicator list.
- Forward-looking analyses: Even with a much improved indicator list a sensible evaluation cannot do without the prospective consideration of ongoing reforms' expected effects.
- Rankings: Within the imminent Lisbon mid-term review, indicators whose conceptual design or data quality do not allow cross-section analyses must not be used for country comparisons or even rankings.

- Methods: The Lisbon mid-term review can fruitfully be supported by the application of efficiency considerations using the existing indicators. The application of standard tools of multivariate statistics has a potential for indispensable background analyses.
- Lisbon overall indicator: The idea of summarizing the manifold information of the indicator list by a single aggregate indicator or even an overall Lisbon ranking has to be rejected.

It can be concluded generally that it is an illusion to believe that a multifaceted and complex process like the Lisbon process could be depicted and managed comprehensively by a set of quantitative indicators. Hence, any mechanical and schematic evaluation of structural indicators without substantial background analyses must be avoided.

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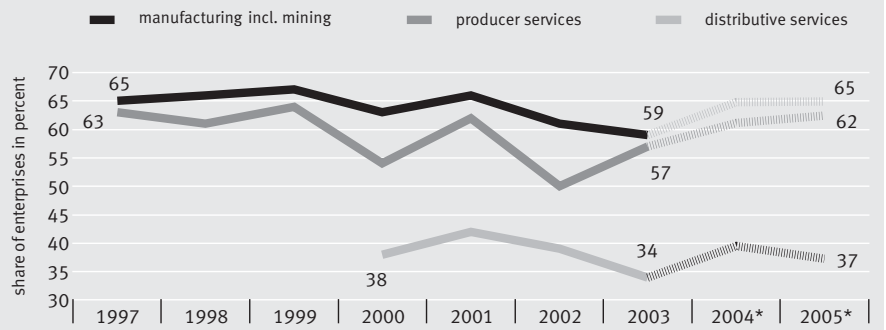
RESEARCH FINDINGS

# German Enterprises Once Again Focus on Innovation

*In 2003, the share of manufacturing enterprises investing in new products or processes increased for the first time in three years. This is likely to be followed by a considerable increase from 59 percent to 65 percent in 2004 based on the enterprises' plans in Spring 2004 (the time of survey). Nevertheless, industrial firms remain cautious when it comes to 2005: The share of innovative enterprises is unlikely to increase further. Producer service providers also displayed increased optimism in 2004 and focused on innovation. The share of enterprises with innovation activities is expected to rise in this sector from 57 percent in 2003 to 61 percent in 2004 and may further increase to 62 percent in 2005. These are the findings of the 2004 innovation survey conducted by the ZEW on behalf of the Federal Ministry of Education and Research. For the largest innovation survey in Germany, the ZEW interviewed a total of 8,000 manufacturing enterprises and service providers.*

Enterprises with innovation activities 1997 to 2005




Source: ZEW (2005) – Mannheim Innovation Panel
Note: Enterprises with innovation activities as a percentage of all enterprises with five or more employees.
* Data for 2004 and 2005 are based on projected firm figures and expectations at Spring 2004. Distributive service figures from 2000 are not comparable with those from previous years and are only shown for 2000 and later. All figures are projected for the total enterprise population in Germany.

Since 2000, corporate participation in innovation projects has gradually decreased. Initially, the shortage of qualified labor was responsible for the decrease in numbers. As of 2001, the global economic recession and the continued stagnation of the German economy provided unfavorable conditions for innovation activities. However, from 2003 onwards, enterprises have refocused on innovation primarily because of the economic recovery witnessed worldwide and the resulting boom in exports. At the same time, innovation activity has shifted towards process innovation. The rise in innovation participation is mainly due to firms introducing new processes. The rationalization of processes in order to cut costs and to counter pricing pressure is an important motive in this context.

## Innovation expenditures on the rise

In 2003, innovation expenditure of the German enterprise sector reached 96.1 billion Euros, i.e. 2 percent more than the previous year. In 2001 and 2002, growth rates amounted to 4 percent and 6.5 percent respectively and were thus considerably higher than in 2003. The plans for 2004 show a further slight nominal increase of about 1 percent. In 2005, innovation expenditure is again expected to increase slightly, i.e. by 0.7 percent, and to reach 98 billion Euros.

The German economy's increasing innovation efforts are offset by shrinking direct returns from innovation. In manufacturing, the share in sales generated by new products dropped from 30 percent (in 2000) to 25 percent in 2003. In 2003, producer service providers obtained merely 16 percent of their sales from new products as compared to 23.5 percent in 2001. The same scenario applies to process innovation: The cost cutting obtained with the help of new processes decreased from approximately 7 percent in the years from 1997 to 1999 respectively to 4.5 percent in 2003. For producer service providers, the decrease is less marked (4 percent in 2003 after 5 percent in 2001 and 2002 respectively).

## SMEs participate less in innovation

The participation of small and medium-sized enterprises (SME) in innovation is considerably lower than that of large enterprises and was approximately 10 percentage points lower in 2003 than in 1999. While large enterprises continuously increased their innovation expenditure, SME were cautious about spending. In 2003, SMEs in manufacturing spent 16.5 billion Euros on innovation. Although this figure represents a slight increase compared to 2002, it is considerably lower than the spending witnessed in 1998 and 1999, when innovation expenditure amounted to approximately 18 billion Euros respectively. A decline to 15.8 billion Euros is expected for 2004 and the target figures for 2005 are also pointing towards a decrease. The picture looks brighter for SME providing services to corporations: With 8.4 billion Euros, their innovation expenditure reached a new record in 2003. In 2004, a further increase to 8.6 billion Euros is expected, target figures for 2005 foresee merely 7.9 billion Euros.

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RESEARCH FINDINGS

# Taxation of Expatriates: Germany in the European Midfield

*As employee mobility is rising, the focus is increasingly shifting to individual taxation. Comparisons between the tax burdens applicable to expatriates are becoming more and more important for politicians as well as for multinationals. A recent study by the ZEW and PricewaterhouseCoopers addresses the issue as to how attractive Germany is for expatriates in comparison with other European, American and Asian countries.*

The study uses a simulation model developed by the ZEW, the Human Resource Tax Analyzer. It takes all relevant taxes and social security contributions of the countries analysed into consideration. Based on this model, tax costs of foreign staff assignments to Germany as well as 17 other European countries and costs of foreign assignments of German staff were calculated. The study compares the following countries: Germany, Belgium, China, Finland, France, United Kingdom, Ireland, Italy, Luxembourg, the Netherlands, Austria, Poland, Russia, Sweden, Switzerland (Canton of Zurich), Slovakia, Slovenia, the Czech Republic, Hungary, and the USA (State of California).

Cost of assigning US-staff to Europe 2004

| | single | | married |
|---|---|---|---|
| employment in the USA | 100% | | 100% |
| assignment in Europe | | | |
| Czech Republic | 127.5% | France | 173.2% |
| France | 127.5% | Russia | 173.2% |
| Netherlands | 127.5% | Switzerland | 173.2% |
| Russia | 127.5% | Slovakia | 176.7% |
| Slovakia | 127.5% | Czech Republic | 182.7% |
| Switzerland | 127.5% | United Kingdom | 185.2% |
| United Kingdom | 132.3% | Netherlands | 192.2% |
| Luxembourg | 133.1% | Luxembourg | 193.1% |
| Austria | 133.6% | Germany (2005) | 198.4% |
| Finland | 136.6% | Belgium | 203.4% |
| Ireland | 140.6% | Germany (2004) | 203.5% |
| Poland | 143.1% | Austria | 207.6% |
| Hungary | 144.7% | Finland | 210.4% |
| Germany (2005) | 145.7% | Italy | 212.7% |
| Sweden | 147.5% | Poland | 215.6% |
| Italy | 148.2% | Ireland | 220.2% |
| Germany (2004) | 152.7% | Hungary | 222.3% |
| Belgium | 155.7% | Sweden | 235.8% |
| Slovenia | 173.7% | Slovenia | 269.3% |
| Average | 139.6% | Average | 202.6% |

Source: ZEW/PricewaterhouseCoopers

## American managers in Europe

The study analyses Germany's ranking as a workplace for expatriates as compared to other countries. It reveals that the German tax burden is at an average level as compared to the other 18 European countries assessed. From the point of view of a US corporation analysing the cost of assigning staff members to one of the 18 European countries in the study, Germany ranks fourteenth if the employee concerned is single. However, due to the advantageous German income splitting system for married couples, Germany ranks ninth and is thus positioned in the midfield in comparison with other countries if the employee concerned is married. In this context, Germany has benefited from the income tax cuts that took effect at the beginning of 2005 (see table).

## German managers abroad: Russia low-priced, Slovenia expensive

The costs borne by a German corporation for assigning its staff abroad were also analyzed. For a German company, the cost of assigning a (single) German expatriate to Russia is 6.7 percent lower than providing continued employment in Germany (reference base: cost for continued employment in Germany = 0 percent). On the other hand, outbound assignments to Belgium and Slovenia in particular can be more expensive for the assigning company than in Germany (31.8 percent and 46.3 percent respectively). On average, the tax cost of a foreign assignment of a German employee exceeds the tax cost of employment of the same employee in Germany by 13.8 percent.

On the whole, tax planning for expatriates is complex and difficult to assess, since the fiscal and social security systems of different countries need to be coordinated in the process. This situation can also lead to double taxation. Therefore, national regulations throughout the EU need to be harmonized.

This study is accessible at the following Internet address: ftp://ftp.zew.de/pub/zew-docs/gutachten/ExecSum-Expatriates.pdf

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RESEARCH FINDINGS

# Cleaner Production Prevails

*It is a widespread assumption that end-of-pipe technologies still dominate investment decisions in firms. This is because there has been little empirical analysis directed to the determinants of the use of specific types of abatement measures – principally because of the paucity of available data. On the basis of a unique facility-level data set based on a recent survey covering the seven OECD countries Canada, France, Germany, Hungary, Japan, Norway, and the USA, the ZEW finds a clear dominance of cleaner production in these countries.*

Typically, two different types of environmental innovations that mitigate the environmental burden of production can be distinguished: cleaner production and end-of-pipe technologies. Cleaner production reduces resource use and/or pollution at the source by using cleaner products and production methods (e.g. water soluble paint or in-process water recycling), whereas end-of-pipe technologies curb pollution emissions by implementing add-on measures (e.g. diesel particulate filters or desulphurisation facilities). Thus, cleaner products and production technologies are frequently seen as being superior to end-of-pipe technologies for both environmental and economic reasons.

## Several factors hamper the establishment of cleaner production

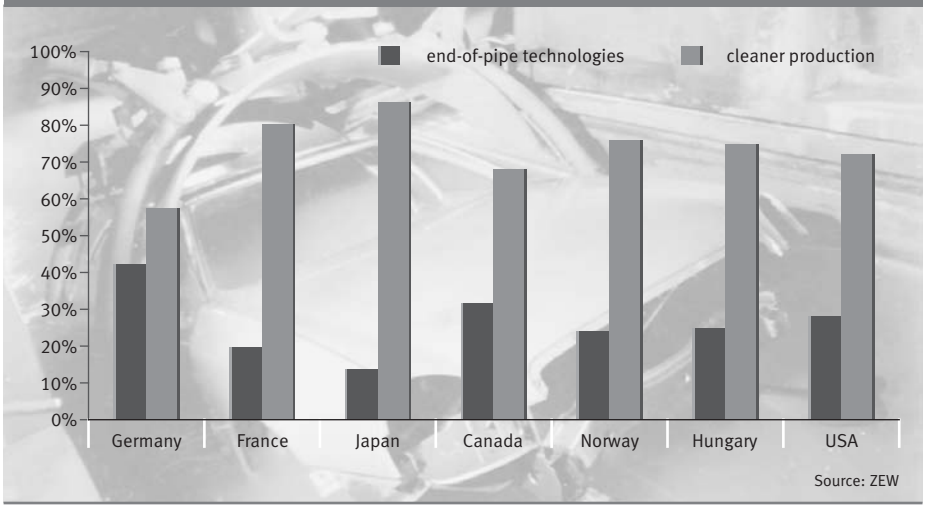
The establishment of cleaner production technologies, however, is often hampered by barriers such as additional co-ordination input and a lack of organisational support within firms. In addition to substantial investment costs in new technologies, obstacles arise due to the type of regulation involved. Command and Control (CaC) regulations, for instance, frequently impose technology standards that can only be met through end-of-pipe abatement measures. The question arises which of several alternative policy approaches is to be preferred: performance standards, voluntary measures, or economic instruments which leave decisions about the appropriate abatement technology up to the firm.

In a study commissioned by the Organisation of Economic Co-operation and Development (OECD), the ZEW analyses factors that may enhance a firm's propensity to implement cleaner products and production technologies rather than end-of-pipe technologies (ZEW Discussion Paper No. 04-82). Surprisingly, 76.8 percent of sample facilities report that they predominantly invest in cleaner production technologies. There are, however, significant differences (see graph): Most notably, Germany displays the lowest percentage of cleaner production technologies among these OECD countries (57.5 percent), while Japan exhibits the highest respective share (86.5 percent).

The explanation is that Germany's CaC policy heavily supported end-of-pipe technologies in the past. Recent empirical results, however, point to a growing importance of cleaner technologies in Germany. The estimation results indicate that cost savings tend to favour clean production and that regulatory measures and the stringency of environmental policy are positively correlated to end-of-pipe technologies.

Furthermore, the study finds evidence that general management systems and specific environmental management tools such as process control systems or environmental audits support the implementation of cleaner production measures. The study thus concludes that improvements towards cleaner products and production may be achieved by developing and disseminating these management tools to a larger extent. Furthermore, the introduction of cleaner technologies and products is supported by R&D investment specifically related to environmental matters.

Choice of abatement measures in environmental protection in seven OECD countries




Source: ZEW

## Substitution of end-of-pipe technologies might be limited

The potential for continuously substituting end-of-pipe technologies with cleaner technologies might be limited, however, since not all regulations favouring end-of-pipe technologies can be cut down. For example, additional filters currently reduce particulate emissions of diesel cars more effectively than the more eco-efficient diesel engines. Thus, a certain amount of end-of-pipe technologies will still be necessary to curb specific emissions which cannot easily be reduced with cleaner production.

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ZEW FINANCIAL MARKET SURVEY

# Results of the Survey in May 2005

The Financial Market Test conducted by the ZEW is a monthly business survey of German financial market experts which started in December 1991. The survey asks for the predominant expectations about the development in six international financial markets.

As a whole around 350 experts take part in the survey. 280 of them work in banks, 50 in insurance companies and investment companies and 20 in other industries. Participants in the survey are financial experts of the finance departments, the research departments and the economic departments as well as the investment and securities departments of the firms. The experts are questioned on their medium term expectations about the development of important international financial markets with respect to the business cycle, the inflation rate, short term and long term interest rates, the exchange rate and share prices.

Information to the applied procedure is available as an abridged version published by the ZEW. The present survey was conducted between May 02, 2005 and May 23, 2005. All calculations are termed to May 25, 2005.

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## Japan: No further positive surprises expected

Japan achieved a success in this year's first quarter: Its gross domestic product has for the first time after three weak quarters rebounded to positive, real growth. It should be noted in this context that this positive result is entirely borne by private domestic consumption. In addition, investments of Japanese companies are currently at a high level and firms are reorganising without dismissals. The analysts rewarded this performance with a raised assessment of the current economic situation at -22.2 points (previous month: -23.4). This is a precautious betterment taking into account the fact that Japan frequently publishes figures requiring revisal. The experts furthermore assume that this growth spurt can not be sustained over the medium term. An indication that this apprehension may hold true is already contained in the current data. It is the substantial increase of inventory investment that leads to presume that possible reduction in the following months may hamper growth. Accordingly, the financial market experts lower their economic expectations by 6.5 to 13 points. *Sandra Schmidt, s.schmidt@zew.de*

**Business situation/expectations in Japan**


Balance of positive and negative expectations concerning the currrent business situation and the expectatios in Japan in six months' time.

Source: ZEW

## Great Britain: Heightened concerns

Even though economic growth in the first quarter has been slightly weaker, the analysts make a positive overall assessment of the British economy: The current economic situation remains relatively unchanged at 24.1 points. Good news during the last month have been a relatively strong growth of income as well as a stable labour market. Even Great Britain is, however, not unaffected by the worsened global growth outlook. The British economy is indeed mainly supported by domestic demand, but according to the experts this is seemingly not a warranted foothold for the following months. Consumers that have in the past relied on affordable credit to maintain their consumption behaviour may become more cautious. The experts are therefore more pessimistic as regards the future; the balance of the expectations component draws back by 4.1 to -13.6 points. The cyclical worries are decisive for the appraisal of the Bank of England's future monetary policy as well. The balance of the expectations of short-term interest rates declines clearly by 13.3 to 11.7 points. *Sandra Schmidt, s.schmidt@zew.de*

**Business situation/expectations in Great Britain**


Balance of positive and negative expectations concerning the currrent business situation and the expectatios in Japan in six months' time.

Source: ZEW

## PUBLICATIONS

### ZEW Economic Studies

Charlotte Lauer

**Education and Labour Market Outcomes – A French-German Comparison**

This book offers a comprehensive empirical analysis of educational inequalities and their consequences on individual labour market outcomes for men and women in France and Germany, two countries with different education systems. Based on micro-data of either country, mainly econometric methods are employed. After a detailed comparison of the French and the German education systems, the social determinants of school and post-school attainment are analysed. Then, the extent to which education reduces the unemployment risk is examined, distinguishing between risk of entering unemployment, unemployment duration as well as recurrence of unemployment episodes. Finally, evidence is given on the way education affects the individual earnings prospects.

*Vol. 30, Physica Verlag, Heidelberg/New York, 2005, ISBN 3-7908-1569-1*

### ZEW Discussion Papers

No. 05-08, Johannes Rincke: Policy Innovation in Local Jurisdictions: Testing the Neighborhood Influence Against the Free-Riding Hypothesis.

No. 05-10, Bernd Fitzenberger, Aderonke Osikominu, Robert Völter: Imputation Rules to Improve the Education Variable in the IAB Employment Subsample.

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