

# PEP—A Yield-Management Scheme for Rail Passenger Fares in Germany

Heike Link

Deutsche Bahn AG (DB AG) introduced a new fare system called PEP for long-distance passenger transport in Germany in 2002. The system was designed as a yield-management scheme like that used for airfares. Similar schemes are in operation elsewhere in Europe, especially in the UK and for TGV trains in France. After serious public debate, massive protests by frustrated passengers, and a considerable drop in economic performance both in terms of passenger numbers and turnover, DB AG amended the scheme in August 2003. This article analyzes the PEP fare system, its impact on DB AG's performance, the problems leading to its amendment in August 2003, and the details of the changes. It has not yet been possible to draw any definite conclusions about possible impacts, such as regaining passenger confidence, because the amended scheme has only been running for a few weeks at the time of writing this article.

## Features of PEP Long-distance Fare Scheme

One aim of the 1994 German railway reforms was to achieve a clear separation between cost-covering or even profitable rail services that DB AG can operate at its own business risk, and those loss-making services that must be operated due to public service obligations (PSOs). These PSO services are supposed to be subsidized by regional authorities who negotiate with service providers—often using competitive tendering. All long-distance rail passenger services were classified as profitable, making them ineligible for explicit subsidies, while all regional services were classified as non-profitable and therefore eligible for subsidies. This classification is disputable. It has led to the situation where DB AG has abolished its long-distance InterRegio trains, which are ineligible for subsidies, and replaced them

with regional trains that could receive subsidies per train-km from regional authorities (see *JRTR* 34, pp. 42–49).

As a consequence of this classification, fare approval is handled differently for long-distance and regional services; since the latter are subsidized, the structure and level of fares must be approved by the local government of the Ländes (state) where the rail operator is registered. If the local authority and operator cannot agree upon the fares, the Federal Ministry of Transport, Construction and Housing has the final binding decision. In contrast, DB AG has full freedom to decide the level and structure of fares on its long-distance passenger services. Consequently, the PEP fare system for long-distance services must be discussed from the viewpoint of whether it is a sensible scheme in terms of customer satisfaction and growth of passenger volumes and turnover.

## PEP system from January to July 2003

The PEP fare system was introduced in December 2002 to maximize profits and make better use of capacity. It had the following main elements:

- Base fares (Normalpreis)  
In contrast to the former kilometer-based fares, the new fares were designed as relation-specific prices, similar to airfares. This means that they do not necessarily depend on the distance travelled but rather on the importance of the relation and the traveller's demand for it. As previously, they were further differentiated by train type and class (first or second). Passengers using these fares had full timetable flexibility (similar to a standard Economy or Business air ticket).
- Early booking discounts (Plan & Spar discount)  
Passengers could get one of three booking discounts depending on the booking date: A 40% discount for

booking 7 days in advance with the added restriction that a weekend was required to pass between the outward and return journeys; a 25% discount for booking 3 days in advance; and a 10% discount for booking 1 day in advance. In general, there was a minimum fare of €15 (€1 = \$1.22) per person and direction, meaning that the maximum 40% discount could not be obtained at relations with less than 150 km distance (due to the fact that a 40% discount would lead to a fare of less than €15). Passengers using any of the three discounts were bound to a definite outward train on a specific date. The 40% and 25% discounts also required advance booking of the return journey. Although tickets were only valid for the booked train, they did not include a seat reservation. Moreover, discounts could only be obtained if at least one part of the journey was on a long-distance train and there were limited numbers of discount tickets per train.

- BahnCard discounts  
Passengers having previously bought a €60 BahnCard could get a 25% discount on any tickets on both long-distance and regional services. This was a reduction compared to the former 50% discount but the previous BahnCard had a higher fixed price (€140). The BahnCard 25% discount did not apply to surcharges for so-called fast ICE Sprint services and to some special tickets on short-distance passenger services. Family members (partners and children up to 17 years) could get a Partner BahnCard for a reduced price of €5, but partners were only allowed to purchase this BahnCard at the reduced price if at least one children's BahnCard was purchased as well.
- Discounts for accompanying persons  
If a passenger was travelling with other persons, forming a small group, a



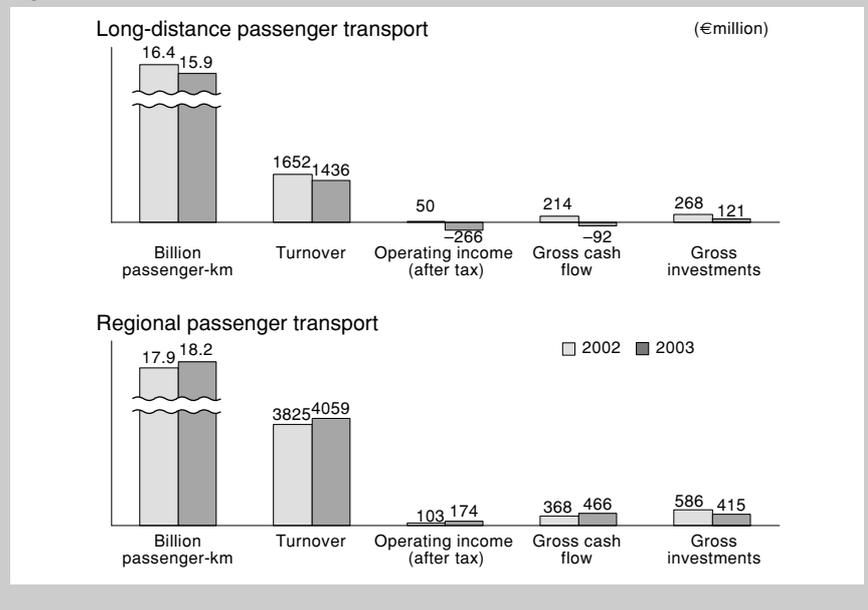
DB Ticket counter

(DB AG)

special discount regime allowed up to four persons to get a 50% discount on the regular fare. While the children's €5 BahnCard allowed a 50% fare for all trips made by children (independent of age), there were further fare advantages for children. Children under 14 accompanied by parents or grandparents travelled for free, while children between 6 and 14 travelling alone paid a children's fare of 50% of the regular fare. Children under 6 generally travelled free, independent of accompanying persons. A minimum fare of €15 was applied as in the early booking discounts.

Rebookings and ticket cancellations of discounted early bookings incurred high penalties. A €15 fee was charged for cancellation before the advance booking period, rising to €30 when cancelling during the advance booking period. Rebooking on another train was possible for a €45 fee and payment of the difference between the base and discount fares. The new journey had to be started on the original day of the former ticket, otherwise a completely new ticket had to be purchased.

Figure 1 DB Results for First Halves of FY2002/3



### PEP fare system from August 2003

The complexities and restrictions of the introduced PEP fare system brought bitter complaints from passengers and customer organizations as well as a precipitous drop in passenger numbers and turnover in the first half of FY2003. In response, DB AG revised the system in August 2003 as follows:

- **BahnCard revision**  
The former BahnCard with a 50% discount for all tickets was reintroduced but the cost rose to €200 (second class) and €400 (first class) with no possible combination with early booking discounts. The price of the €60 BahnCard offering 25% discount was reduced to €50 (for second class) and €100 (for first class). Passengers with the €60 BahnCard can still use it under the original conditions until October 2004. Moreover, a totally new BahnCard with a 100% discount for all tickets on long-distance and regional passenger services with free door-to-door luggage delivery and other extras was introduced at €270 per month or €3000 per year (second class) and €5000 per year (first class).
- **Fewer early booking discounts**

The three early booking discounts have been reduced to two—25% and 50% (the latter increased from 40%). The advance-booking period for both types is now 3 days but passengers must book both the outward and return journeys. The 50% discount still requires a weekend between the outward and return journeys.

- **Reduced cancellation fee**  
The cancellation fee was reduced to €15.

All other PEP conditions remained unchanged.

### Passenger Response and Impact on DB Performance

The extreme complexity of the PEP system makes it hard to evaluate the role of each element individually and in combination regarding the impact on passengers' travel decisions. Similarly, it is hard to draw general conclusions about winners and losers compared to the former fares. The tendency seems to be that passengers travelling long distances and families won, while short-distance commuters lost. Identifying the impacts of the fare scheme on DB AG's economic performance is

only possible for the first half of FY2003. Post-revision figures were not available when this article was written, making it impossible to draw any firm conclusion about whether the revisions in August 2003 have successfully regained passengers.

Compared to DB AG's reasons for introducing PEP, the performance for long-distance passenger transport was a disaster. Originally, DB AG expected a 3% increase in turnover in 2003. Figure 1 shows the growth for the first half of FY2003 for regional passenger transport operated by DB Regio and for long-distance passenger transport operated by DB Fernverkehr. Passenger-km on long-distance trains fell by 7% (15.2 billion passenger-km) compared to the same period in 2002. For a proper interpretation, it must be remembered that passenger transport demand was affected by a complex set of factors in 2003. Apart from the response of frustrated passengers to the confusing fares and inadequate services (including serious punctuality problems), DB AG was also affected by Germany's economic slowdown and rising unemployment. Furthermore, there was also intensified competition from budget airlines. Finally, DB AG shifted many loss-making long-distance InterRegio services to regional services subsidized by regional authorities and this affected the statistics. After this shift, the passenger-km for these long-distance services appeared in the figures for the DB Regio regional services instead of DB Fernverkehr.

The decline in passenger transport performance is reflected in a 13% decrease in turnover. The post-tax net operating income fell by €266 million and the gross cash flow fell by €92 million. Due to DB AG's investment schedule, DB Fernverkehr invested about 55% less (€147 million) in the first half of FY2003 than in the same period for FY2002. As a result, the decline in operating income has not been as sharp as it might have been with normal investment levels.

In contrast to the decline in long-distance transport, the regional transport performance increased by 4% and amounted to 18.6 billion passenger-km. Turnover increased by 6%, operating income by 69% and cash flow by 27%. Like DB Fernverkehr, lower investment levels reduced costs and positively influenced operating income.

---

### PEP—What was Wrong?

---

The PEP introduction was based on the yield-management concept commonly used by airlines. The aim was to generate higher ticket revenues and to promote better use of train capacity (avoiding underuse and overuse). Furthermore, DB AG intended to replace the many different fares and discounts of the former scheme by a more transparent and customer-friendly system. As described, the PEP system obviously failed to achieve these goals. Analysis of this failure requires answering the following five questions:

- Is a yield-management type of fare scheme sensible and feasible for rail at all?
- Was the underlying market and customer segmentation appropriate?
- Given the scheme's complexity, was an adequate database with survey results and data on price elasticity, etc., available?
- Was the scheme manageable and customer friendly?
- How did PEP change rail's competitiveness relative to air and private car transport?

We cannot answer these questions quantitatively and in detail because DB AG does not publish data on the structure of passenger demand by type of ticket, on passengers' purchasing and (early) booking behaviour, and on price elasticity in conjunction with ticket restrictions.

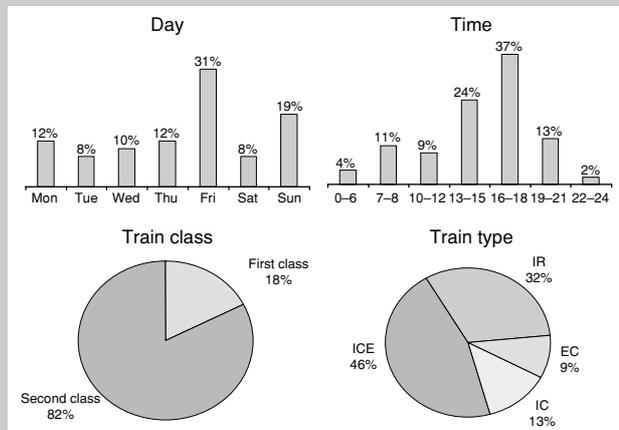
### Yield-management feasibility

The general aim of a yield-management scheme is to maximize ticket revenues by price differentiation based on the different willingness-to-pay of different customers for different products. This price differentiation is connected to defined quotas of available seats per price category in order to optimize capacity provision and use.

PEP was designed to differentiate according to booking time, class (a common rail practice) and distance travelled (via the BahnCard as a two-part fare with fixed and variable components). While the first two factors correspond with the different willingness-to-pay of different passengers for different products, differentiation according to distance travelled creates incentives for increased use because of the cost taper inherent in the two-part structure.

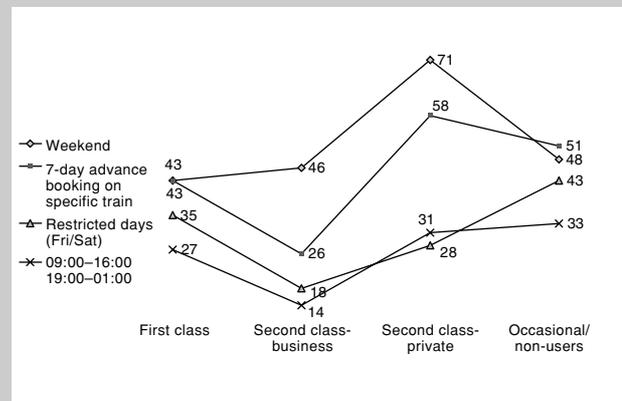
PEP did not include any time differentiation, such as peak-load pricing for travel during congested times. Instead, DB AG hoped to solve the problem of capacity overuse and underuse by price differentiation based on booking time. Unfortunately, there is no quantitative data on whether overuse of trains was limited by this mechanism. In principle, it is possible to ease the problem of overused trains by fixing discount tickets to specific trains and restricting the number of such tickets per train. However, some (unknown) part of the limiting mechanism was lost because the number of tickets at base fares was unrestricted with no restrictions on discount tickets for accompanying persons. So why didn't DB AG chose a peak-load pricing scheme, such as price mark-ups for peak trains? DB AG argues that the distribution pattern of overused trains is complex (Fig. 2) and would have required various peak periods depending on the day, train and route. The company also argues that its surveys show a low passenger willingness to accept train use restrictions (Fig. 3).

**Figure 2 Distribution of Overused Trains**



Source: A. Krämer and H. J. Luhm, Peak-Pricing oder Yield-Management? (Peak pricing or yield management), *Internationales Verkehrswesen*, 54, 1+2, 2002.

**Figure 3 Rail Passengers Acceptance of Restrictions on Discount Tickets**



Source: A. Krämer and H. J. Luhm, Peak-Pricing oder Yield-Management? (Peak pricing or yield management), *Internationales Verkehrswesen*, 54, 1+2, 2002.

Although both arguments are true, they do not provide any good reason for preferring advance-booking discounts over peak-load pricing. First, higher prices for passengers without advance bookings do not shift these passengers from overused trains to underused trains if the ticket is not tied to a seat reservation. Second, it would be more sensible in economic terms to charge lower fares for underused trains. Another problem is that the early booking discounts did not include a seat reservation, possibly reinforcing the problem of congested trains. Third, unlike airfares, PEP did not include the opportunity to buy cut-price 'last-minute' fares in order to increase use of underused trains. Fourth, the low willingness of passengers to accept train use restrictions is also true for the early booking discounts.

Generally, we can conclude that apart from the traditional second and first class distinction, DB AG has tried to use economic price differentiation via advance bookings and specified trains. In addition to these problems, other unique features of rail transport complicate use of yield-management schemes. A major advantage of rail transport is flexible choice of trains and departure times, especially in networks using a synchronized and regular timetable. This advantage is lost when fares are tied to specific trains with specific

departure times. Furthermore, the PEP complexity of offering different opportunities to combine different types of discounts to purchase a ticket at the best price creates high passenger transaction costs offsetting rail's flexibility and ease-of-use advantages (compared to air).

### Market and customer segmentation

To make practical use of the underlying price differentiation concept of yield-management schemes, rail passengers must be segmented by their willingness to pay for different travel products, and by their required travel flexibility. Based on a recent study, about 65% of rail passengers have no flexibility restrictions, 31% of the same group are price sensitive; 17% are sensitive about journey time and another 17% are sensitive about travel comfort. This means that about 35% of rail passengers will not accept restrictions on travel flexibility. Of these, 23% are sensitive about journey time and 12% about travel comfort. While this differentiation is certainly valuable for designing a yield-management fare scheme like PEP, it overlooks the important issue that many passengers tend to simplify their choice of transport mode and make a general long-term decision rather than a trip-specific decision (usually reinforced by the decision about whether

or not to purchase a car). Passengers who have generally decided in favour of rail (regular customers) are important in quantitative terms. DB studies of the pre-PEP fare system showed that 39% of all rail journeys were made by just 1.6% of all rail customers. Obviously the PEP fare system neglects this segment. The BahnCard discount has been the main instrument for regular customers but the reduction in this discount coupled with the reduced purchase price increased the variable fare costs per km and actually increased prices for regular passengers. Combining the 25% BahnCard discount with other discounts was especially unattractive for this group because it requires searching for the best fare for each specific trip, which is inconvenient and time consuming. The positive response by passengers to the re-introduction of the 50% discount BahnCard (but no combination with other discounts) confirms the importance of this issue.

### PEP Complexity and data adequacy

Germany has extensive rail services and passengers can choose many different routes from origin A to destination B on different types of trains, etc. As a result, the many possible service combinations must be considered when designing a fare system. DB AG assumes there are

22 million possible combinations, causing immense complexity in calculating the different optimal requirements for restricting discount tickets over each section of a route. Furthermore, this complexity creates high requirements on both designing and adapting the fare system.

Due to DB AG's restrictive policy on publishing company data, we do not know whether it had sufficient good-quality data on passengers' booking behaviour, trade-offs between willingness to pay and acceptance of usage restrictions, etc.

**Manageability, transparency and passenger friendliness**

The complexity of the PEP scheme immediately leads to related questions about whether DB AG could manage the scheme, and whether the scheme was transparent and passenger friendly.

From the 2003 first-half results, DB AG was clearly overstretched by the complexity, especially the variety of basic charges and the various possible combinations of different discounts (early booking, BahnCard, groups, accompanying persons). Table 1 shows an example for this latter problem where six different base fares were charged for a journey from Düsseldorf to Frankfurt. There were even as many as 10 different base fares for a trip from Hamburg to Chemnitz. Moreover, DB AG's old-

fashioned and insufficiently updated fare information and enquiry system caused the following two major problems:

- Information to passengers about ticket prices varied considerably depending on the medium (internet fare search, CD ROM fare and timetable, telephone, automatic ticket machines at stations, ticket counters). In an example for a journey between Detmold and Hamburg, the internet search showed one possible journey at €44, the CD ROM gave three possible journeys with a lowest fare of €30.80, a station ticket machine displayed two possible journeys with a lowest fare of €30.80, and a telephone enquiry could not provide any fare information.
- In a study by Quotas during February and March 2003, ticket counter staff could often not find the best ticket. In 256 tests conducted by undercover professionals at 143 ticket counters, one third were not given the best advice about ticket price, journey time and number of changes (Fig. 4). The counter staff recommended tickets that were too expensive in 13% of all cases, had excess journey times in 13% and unnecessary changes in 4%. On average, recommended tickets were €16.80 more expensive than the best ticket, journey times were 49 minutes longer than necessary and included 1.8 more changes than

necessary. The percentage of correct recommendations decreased as the complexity of the enquiry increased (Fig. 4).

A very serious problem for passengers with early booking discount tickets was (and still is) the risk of using the wrong train instead of the pre-booked train. Since discount tickets are only valid for a specific train at a specific departure, passengers mistakenly taking the wrong train are treated as joy riders without a valid ticket and have to pay for both a new ticket and a penalty. Practical experience shows that these mistakes happen easily when changing between connecting trains that may be delayed, etc. The system was also very unfriendly to passengers with disabilities who were forced to pay the mark-up on ticket price charged when purchasing a ticket on the train instead of at a station ticket machine.

**Competition with air transport and private cars**

The major advantage of rail transport compared to air is the travel flexibility and spontaneity, the possibility of breaking a journey, and—until the appearance of budget air carriers—the price. PEP restrictions on discount tickets are an obvious loss of rail's advantage over air. Early booking discounts neither compensate for the disadvantage of longer journey times nor achieve the far higher discounts of budget air carriers. Compared to private cars, rail's advantages are reduced by the price advantage because most car users base their travel decisions on perceived variable costs that do not reflect the full costs of private car travel (depreciation, repairs, etc.).

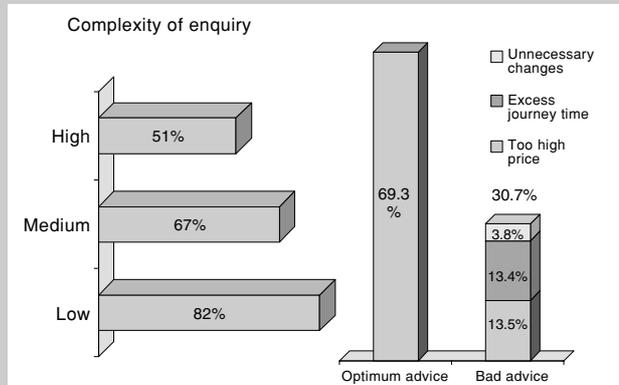
We should also remember that passengers tend to show general habits and price attitudes about their choice of transport mode. In other words, they do not choose a mode based on the price of one journey

**Table 1 Possible Base Fares for Frankfurt–Düsseldorf Routes**

Route	Journey time	Number of changes	Train type(s)	Fare (€)
Frankfurt–Mainz–Düsseldorf	2 h 44 min	1	IC	38.20
Frankfurt–Köln–Düsseldorf	2 h 47 min	1	IC/ICE	39.40
Frankfurt–Düsseldorf via Frankfurt International Airport	1 h 40 min	1	IC/ICE	57.80
ICE to Köln, IC to Düsseldorf	2 h	1	ICE/IC	54.40
Frankfurt–Frankfurt International Airport–Köln–Düsseldorf	1 h 46 min	2	IC/ICE/IC	53.80
Direct connection	1 h 40 min	0	ICE	58.80

Source: ProBahn 2003

**Figure 4 Quality Tests of Fare Information from DB Ticket Counter Staff**



Source: VCD, VCD Bahnpreis-Check (VCD Fare check), study by Quotas for VCD and Stern, 2003.



Increased congestion on DB trains

(DB AG)

only, but instead base their decision on an evaluation of general prices or an attitude about the mode.

## Conclusions

The experience of DB AG's PEP fare scheme for long-distance rail passengers in Germany shows that passengers saw the scheme as opaque, unfriendly and a hidden price increase (especially for shorter journeys). The increase in turnover expected by DB AG was not achieved by the end of the first half of FY2003. Lack of detailed quantitative data on tickets sold within the PEP scheme precludes evaluation of whether the decline in passenger numbers and turnover occurred because too many discount tickets and cheap tickets for accompanying persons were sold or because passengers made fewer rail journeys as a consequence of their negative perceptions about the PEP fare scheme.

Obviously DB AG must analyze the reasons for failure. The central question is how a rail yield-management scheme must be designed. Direct transplant of air yield-management schemes may be foolhardy due to the different advantages and disadvantages of rail over other modes, and the different habits of rail passengers when making travel decisions. The passenger protests over the reduced

BahnCard discount clearly show that the important segment of regular rail customers was neglected. Reduced conditions imposed on early booking discounts and reduction of high cancellation fees have been an appropriate response to critics.

Train congestion and making best usage of capacity is a remaining problem. Empirical studies are needed to determine whether yield management or peak-load pricing is best for optimizing usage of capacity. In either scheme, tickets are only valid for a single pre-booked train—something that has been unusual in rail transport so far—and customer responses to such a change will require analysis.

Finally, DB AG's old-fashioned fare enquiry systems must be modernized and ticket counter staff provided with good training. DB AG has already started this process. The future will show whether DB can regain the trust of its passengers and increase patronage and turnover. ■

## Further Reading

- A. Berndt, Die Tarife im Personenfernverkehr der DB: Trial and Error mit Happy End? (DB's fares for long-distance passenger transport—Trial and error with happy end?), *ifo-Schnelldienst*, 16, München, 2003.
- A. Brenck, Neues Tarifsysteem der Deutschen Bahn AG: Sinnvolle Preisgestaltung im öffentlichen Verkehr? (DB's new fare system: A sensible price design for public transport?), *ifo-Schnelldienst*, 16, München, 2003.
- M. R. Erhardt, Das neue Preissystem im Personenverkehr der DB AG, (The new fare scheme for passenger transport of DB), *Internationales Verkehrswesen*, 54, 1+2, 2002.
- M. Hunkel, Segmentorientierte Preisdifferenzierung für Verkehrsdienstleistungen—Ansätze für ein optimales Fencing. (Segment-oriented differentiation for transport services—Ideas for an optional fencing), Wiesbaden (PhD Thesis, University of Darmstadt), 2001.
- A. Krämer, H. J. Luhm, Peak-Pricing oder Yield-Management? (Peak pricing or yield management), *Internationales Verkehrswesen*, 54, 1+2, 2002.
- H. Link, Rail Restructuring in Germany—8 Years Later, *JRTR*, 34, March 2003.
- H. Link, Rail infrastructure charging and on-track competition in Germany—Nine years later, *Proceedings of the 31st European Transport Conference*, Strasbourg, PTRC, 2003.
- Pro Bahn, Tarif-Chaos und Beratungs-Chaos, Analyse und Dokumentation, (Fare chaos and advice chaos—Analysis and documentation), <http://www.der-fahrgast.de/Dokumentation/index.html>, 2003.
- VCD, VCD Bahnpreis-Check (VCD Fare check), study by Quotas for VCD and Stern, 2003.



## Heike Link

Dr Link is a senior researcher at the German Institute for Economic Research in Berlin and a member of the Board of Directors of the Association for European Transport. She has published extensively on German railways and visited Japan in 1993 on a fellowship to study Japanese railway restructuring.