

# The Karlsruher Kapitalmarktdatenbank (KKMDB): The IBIS Data

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# **The Karlsruher Kapitalmarktdatenbank (KKMDB): The IBIS Data**

## **Abstract**

The Karlsruhe capital market database contains transaction data from different trading systems in Germany. This paper describes the format of transaction data as reported by the electronic screen trading system IBIS (Integrated Stock Exchange Trading and Information System) which was part of the Frankfurt Stock Exchange from April 1991 until November 1997. The IBIS database contains tick-by-tick data (price and volume) for all stocks, bonds, and warrants traded during the period of July 1st through November 27, 1997. Except the first three months after introduction, a complete history of data is available. Several stock-indices are also included. The data are organized in ASCII-type files by year and type of security and may be distributed via tape, CD or electronic file transfer. All data are distributed for purposes of academic research.



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# 1 Introduction

This paper specifies the format of the IBIS files created at the University of Karlsruhe (TH). The IBIS files are part of the *Karlsruher Kapitalmarktdatenbank (KKMDB)*.<sup>1</sup> All data for the German capital market were provided by the group *Deutsche Börse AG*, Frankfurt. The IBIS data can be obtained for academic research under the conditions as noted in Appendix F and G.

## 2 The IBIS and IBIS-R System

The IBIS<sup>2</sup> system as an integrated stock exchange trading and information system was part of the Frankfurt Stock Exchange (FSE) and introduced on April 5, 1991.<sup>3</sup> On November 27, 1997 the IBIS system was put out of operation and trading has switched to XETRA (eXchange Electronic TRAding) on the next day. Official trading hours were from 8:30 a.m. until 5 p.m. There was an orientation phase 15 minutes before and 30 minutes after the trading period. The usual settlement procedure was applied for trades done before 4 p.m.<sup>4</sup> The settlement of trades accomplished after 3:59 p.m. was started on the next trading day.

IBIS was an order-driven system and pro-active in that trading took place under the control of the trader. Thus, IBIS was a hit-and-take system without an automatic matching of orders. There were no designated market makers on IBIS. However, quotes were binding once they were put into the system and shown on the trading screen. Banks and institutional investors were the main providers of liquidity by submitting limit orders to the market. In addition Kurs- and Freimaklers of the floor exchanges were allowed to trade on IBIS. Hence, IBIS had the features of a continuous double auction.

Changes in the trading environment which may be relevant for empirical research are summarized in Appendix A. Some technical problems during trading hours are reported in Appendix B.

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<sup>1</sup>The KKMDB overlaps to some extent with the *Deutsche Finanzdatenbank (DFDB)*. However the DFDB contains no intradaily data. See Bühler et al. [1]. See also Göppl et al. [8] or <http://finance.wiwi.uni-karlsruhe.de/Forschung/kkmdb.html>.

<sup>2</sup>IBIS = Integriertes Börsenhandels- und Informations-System.

<sup>3</sup>The first version of IBIS was introduced on December 1, 1989 with 14 stocks admitted for trading. Since May 1990, the complete set of 30 DAX stocks could be traded on IBIS. The trading of bonds started on September 3, 1990. See DWZ [7]. However, data for the period before April 5, 1991 are not available.

<sup>4</sup>Before June 14, 1994 the settlement period started at 3:30 p.m.

IBIS-R was introduced on December 5, 1995 to replace bond trading on IBIS. The system has additional features to accommodate the special needs of bond traders and issuers. IBIS-R offers primary and secondary market functions for bonds issued by public and private entities. Hence, the large segments of German government bonds (*Bund, Bahn, Post, Treuhand, etc.*) and mortgage bonds (*Pfandbriefe*) could be traded electronically.

### 3 IBIS data

The IBIS data comprises time-stamped prices and volume for all trades done on the IBIS system during the period of July 1, 1991 through November 27, 1997.<sup>5</sup> The time-stamp is accurate to the 100th second.<sup>6</sup> Quotes as disseminated via the IBIS trading screens were not made available by the Deutsche Börse AG. The same is true for IBIS-R data which are available since the introduction of the system in December 1995.

Transaction data are available for different types of securities and indices as illustrated in Figure 1. A complete history of data can be offered for all securities and indices. As noted before bond trading switched from IBIS to IBIS-R in December 1995.

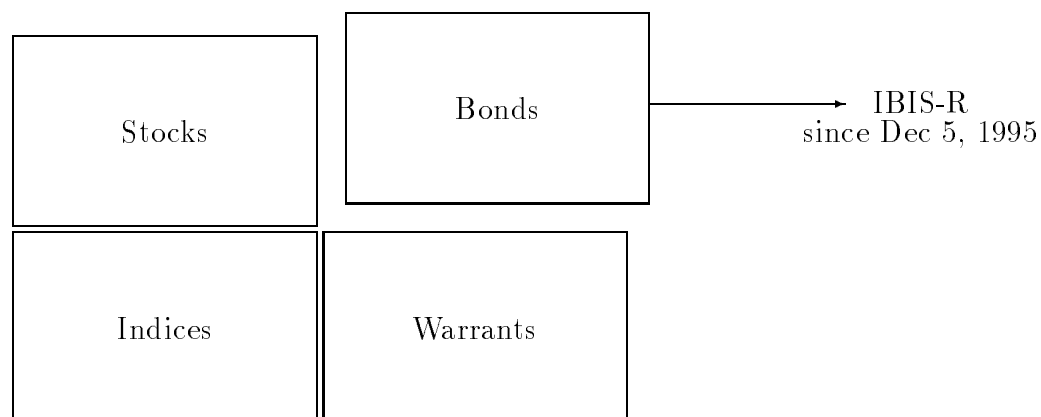


Figure 1: Types of Securities traded on IBIS

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<sup>5</sup>Time-stamped data from the floor on the FSE are distributed via the KISS-Tape. See Lüdecke [11]. However, volume data on a trade-by-trade basis are not available before May 1996.

<sup>6</sup>However, the system technology is such that trading screens are updated every 4 seconds.



### 3.1 Securities

In the year 1997 114 stocks including the DAX 100 stocks and 15 warrants were admitted for trading on IBIS.<sup>7</sup> The component stocks of the DAX 100 index are the most liquid stocks in terms of overall trading volume in Germany. Non-component stocks are those which dropped out of the top 100 over time.

The number of government and mortgage bonds traded on IBIS-R amounts to 709 during the year 1997, compared to 1366 in 1996.

A complete list of securities traded during the lifetime of IBIS version II is provided along with the data files. For every security or index, the list reports the official six-digit code and full name. Stock specific data on dividends, right issues, and splits could be obtained from the KKMDB.<sup>8</sup>

### 3.2 Indices

The IBIS system has calculated several stock indices with the DAX 30 as the most prominent. The underlying concept is the same for all indices.<sup>9</sup> Index codes and data availability are given in Appendix C. The DAX family is shown in Figure 2. The DAX stocks are listed in Appendix D while changes in the DAX list are reported in Appendix E.

The stocks listed on the Frankfurt Stock Exchange (FSE) are ranked by liquidity and firm size to be included in the DAX 30 and DAX 100 index.<sup>10</sup> The composition of the DAX (H-DAX) is checked once (twice) a year. The DAX was the first index available on IBIS and calculated on a minute-by-minute basis since December 16, 1993.<sup>11</sup> The intraday availability of the index is as follows:

- December 15, 1993 – June 14, 1995: 8:30 a.m. – 10:30 a.m. and  
1:45 p.m. – 5:00 p.m.
- June 15, 1995 – November 27, 1997: 8:30 a.m. – 5:00 p.m.

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<sup>7</sup>DAX is a trademark of *Deutsche Börse AG*, Frankfurt. Aggregated volume data are tabulated in Deutsche Börse AG [6].

<sup>8</sup>See Göppl/Lüdecke/Sauer [9].

<sup>9</sup>For a description of the index formula see Deutsche Börse AG [2].

<sup>10</sup>See Göppl et al. [10] for some stylized facts on liquidity of the German stock market.

<sup>11</sup>The IBIS DAX was first displayed on the IBIS trading screen on January 27, 1994.

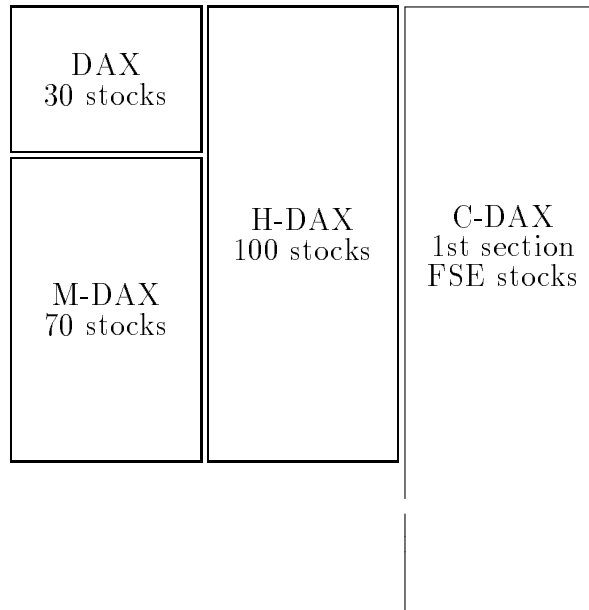


Figure 2: The DAX Family

The three hours and fifteen minutes of missing DAX data in the first period are covered by the intraday DAX based on the official prices from FSE floor.<sup>12</sup> Hence, since June 15, 1995, both the floor DAX and the IBIS DAX are available during the FSE official trading hours.<sup>13</sup> Since July 11, 1997 the DAX index is calculated every fifteen seconds.

## 4 Data File Structure

The IBIS and IBIS-R data are stored in ASCII files with one transaction per line. All records are of fixed length. The fields of each record are separated by a single blank. Hence, a data file looks like a simple spread sheet.

The data were separated by type of security and year. The corresponding files contain all transaction data for the securities of the particular type in a given year.<sup>14</sup> The names of

<sup>12</sup>The intraday DAX from the floor is available on the KISS-Tape. See Lüdecke [11].

<sup>13</sup>Though one would expect 510 index prices during the day, the actual number of observations is less than 510, because the calculation of the IBIS DAX does not start at 8:30 a.m. sharp. To calculate the IBIS opening DAX the opening prices of at least 15 component stocks must be available and these stocks must represent 70% of the total market capitalization of DAX stocks. Normally the first IBIS DAX is available between 8:45 a.m. and 9:00 a.m. On average we have 488 (299) index observations per day in the second (first) period given the index is calculated every minute.

<sup>14</sup>Note that the number of FSE trading days differ compared to the number of IBIS trading days in a

the ASCII files will be:

|                |               |
|----------------|---------------|
| Ystocks.yy.DAT | Ybonds.yy.DAT |
| Ywar.yy.DAT    | Yindex.yy.DAT |

where

yy: year number 9192, 93 – 97.

IBIS-R data are stored in separate files named

Rbonds.yy.DAT

where

yy: year number 95 – 97.

All files are of the same structure which is shown in table 1. Of course, files with data for indices do not contain variable VOL and MOB.

Table 1:  
IBIS file structure

| Column | Variable name | Description        | Format       |
|--------|---------------|--------------------|--------------|
| 1      | WPNR          | Security code      | Numeric 6.0  |
| 2      | DATUM         | Date               | YYMMDD       |
| 3      | ZEIT          | German time        | HH:MM:SS.XX  |
| 4      | KURS          | Transaction price  | Numeric 11.4 |
| 5      | VOL           | Transaction volume | Numeric 9.0  |
| 6      | MOB           | Transaction flag   | Character 1  |

The meaning of these fields is given below:

**WPNR:** The official 6-digit security code assigned to every security by *Wertpapier-Mitteilungen (WM)*, Frankfurt.

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given year due to regional holidays.

**DATUM:** Date of transaction, where

YY Year,

MM Month,

DD Day.

Date may be a holiday in the state of Hesse. On these days volume is very low due to trading of regional members only.

**ZEIT:** German time of transaction, where

HH Hour,

MM Minute,

SS Second,

XX Hundredth of second.

**KURS:** Transaction price in DM. Due to the trading mechanism of IBIS, a transaction in principle occurs at the best bid or best ask.<sup>15</sup> In case of a stock going ex dividend or ex right issue, the stock trades ex after 4pm.<sup>16</sup>

**VOL:** Transaction volume. In case of bonds VOL contains the par value traded. In case of stocks or warrants VOL indicates the number of issues traded.

The lot size of stocks depends on firm size and is 100 and 500, respectively.<sup>17</sup> Bonds trade at a minimum par value of DM 1 million.

**MOB:** This flag indicates if a transaction was initiated by a **Makler** or **bank**, where

blank IBIS member bank,

A official Makler (*Amtlicher Kursmakler*),

F free Makler (*Freimakler*).

In case of a Makler initiated transaction the Makler charges a transaction fee called *Courtage*.<sup>18</sup> For DAX stocks the courtage is currently 0.04 percent, for non-DAX stocks and warrants 0.08 percent of market value.<sup>19</sup> With the introduction of the

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<sup>15</sup>For exceptions see Deutsche Börse AG [3].

<sup>16</sup>After 3:30 p.m. before June 14, 1994. See Göppl/Lüdecke/Sauer [9] for a description of the data on dividends and right issues.

<sup>17</sup>There were different lot sizes in effect since the introduction of IBIS.

<sup>18</sup>See Deutsche Börse AG [4].

<sup>19</sup>The reduced courtage for stocks is in effect since July 1, 1994. For bonds, a different courtage schedule is valid. See Deutsche Börse AG [5].

2nd Financial Market Promotion Act (*Finanzmarktförderungsgesetz*) in August 1994 the variable MOB has become meaningless because the former distinction between official and non-official prices no longer exists (amtlicher Kurs vs. Preis). With the new law the term *exchange price* (Börsenpreis) was introduced.

### Data example:

Below an extract of the 1994 IBIS stocks file is shown. The rows contain the transaction prices and volume of the *Daimler Benz AG* (security code 550000) on the 1st of July, 1994. The flag A in the right most column of row five and six indicates a Kursmakler initiated transaction.

```

550000 940701 11:42:20.15 000723.500      1000
550000 940701 11:42:45.80 000723.500      2000
550000 940701 11:45:30.80 000723.100      1000
550000 940701 11:45:34.94 000723.500      1000 A
550000 940701 11:45:36.54 000723.500      2000 A
550000 940701 11:45:39.50 000723.000      2000
550000 940701 11:46:15.08 000723.000      1000

```

## 4.1 Distribution of data

The IBIS data are distributed in a packed version of the ASCII files Y\*.yy.DAT. The data were packed using ZIP under LINUX<sup>20</sup> version 4.41. ZIP is compatible with the MS-DOS<sup>21</sup> version of PKZIP, thus the data can be transported into a DOS environment without problems. There is one packed data file for every calendar year and type of security. The file names will be:

|                |               |
|----------------|---------------|
| Ystocks.yy.ZIP | Ybonds.yy.ZIP |
| Ywar.yy.ZIP    | Yindex.yy.ZIP |

where

yy: year number 9192, 93 – 97.

Smaller files for bonds and warrants are available on 3 1/2 disks. Larger files for stocks and indices will be provided on tape (8mm/DL 112 m/367 ft) or compact disc (CD).

The IBIS files are copied to tape using the TAR command. To restore the data proceed as follows:

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<sup>20</sup>LINUX is not a trademark, and has no connection to UNIX or to Unix System Laboratories. For the TAR command see Welsh/Kaufman [12].

<sup>21</sup>MS-DOS is a trademark of Microsoft Corporation.

1. Copy the ZIP-files to your hard disk using the TAR command with the appropriate options.
2. Unpack the data using UNZIP.

Thereafter you should find the Y\*.yy.DAT files on your hard disk, otherwise start again. IBIS-R data are provided as ASCII files and will be delivered on 3 1/2 disks. Files could also be transferred electronically by using the file transfer protocol.

## **4.2 Size of the IBIS files**

Table 2 and 3 indicates the amount of data by year and type of security measured in megabytes and the number of records.

Table 2:  
Size of the IBIS files

| A. Stocks             |                |                    |          |
|-----------------------|----------------|--------------------|----------|
| Year                  | No. of records | ASCII <sup>a</sup> | ZIP      |
| 1991 <sup>b</sup> +92 | 480438         | 24.02 MB           | 3.83 MB  |
| 1993                  | 648259         | 32.41 MB           | 5.11 MB  |
| 1994                  | 721197         | 36.06 MB           | 5.65 MB  |
| 1995                  | 850363         | 42.52 MB           | 6.58 MB  |
| 1996                  | 1334215        | 66.56 MB           | 10.68 MB |
| 1997                  | 1972365        | 94.67 MB           | 15.52 MB |
| Total                 | 6009557        | 296.24 MB          | 47.37 MB |
| B. Warrants           |                |                    |          |
| Year                  | No. of records | ASCII              | ZIP      |
| 1991 <sup>b</sup> +92 | 2830           | 0.14 MB            | 0.03 MB  |
| 1993                  | 28891          | 1.44 MB            | 0.26 MB  |
| 1994                  | 28114          | 1.41 MB            | 0.25 MB  |
| 1995                  | 18014          | 0.89 MB            | 0.16 MB  |
| 1996                  | 18228          | 0.91 MB            | 0.16 MB  |
| 1997                  | 30135          | 1.45 MB            | 0.26 MB  |
| Total                 | 126212         | 6.24 MB            | 1.32 MB  |
| C. Bonds              |                |                    |          |
| Year                  | No. of records | ASCII              | ZIP      |
| 1991 <sup>b</sup> +92 | 20690          | 1.03 MB            | 0.19 MB  |
| 1993                  | 30028          | 1.50 MB            | 0.28 MB  |
| 1994                  | 14345          | 0.72 MB            | 0.13 MB  |
| 1995                  | 14695          | 0.73 MB            | 0.13 MB  |
| 1996                  | 8295           | 0.41 MB            | 0.08 MB  |
| Total                 | 88053          | 4.39 MB            | 0.81 MB  |
| D. Indices            |                |                    |          |
| Year                  | No. of records | ASCII              | ZIP      |
| 1993                  | 2854           | 0.11 MB            | 0.01 MB  |
| 1994                  | 72857          | 2.77 MB            | 0.37 MB  |
| 1995                  | 242818         | 9.22 MB            | 1.28 MB  |
| 1996                  | 2493793        | 94.76 MB           | 10.79 MB |
| 1997                  | 4778169        | 181.57 MB          | 22.69 MB |
| Total                 | 7271962        | 288.49 MB          | 35.14 MB |

<sup>a</sup>ASCII refers to the unpacked version of the IBIS files, whereas ZIP refers to the packed version of the files.

<sup>b</sup>Since July 1, 1991.

Table 3:  
Size of the IBIS-R files

| Year              | No. of records | ASCII <sup>a</sup> | ZIP |
|-------------------|----------------|--------------------|-----|
| 1995 <sup>b</sup> | 451            | 0.02 MB            | N/A |
| 1996              | 3810           | 0.19 MB            | N/A |
| 1997              | 8322           | 0.42 MB            | N/A |
| Total             | 12683          | 0.63 MB            | N/A |

<sup>a</sup>ASCII refers to the unpacked version of the IBIS files, whereas ZIP refers to the packed version of the files.

<sup>b</sup>Since December 5, 1995.



## References

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## A Changes in the IBIS Trading Environment

Table 4:  
Changes in the IBIS Trading Environment

| Date        | Event   |
|-------------|---|
| 5-Apr-1991  | Introduction of IBIS version II   |
| 30-Apr-1992 | Kursmaklers of the regional stock exchanges were linked to IBIS.<br>Reduction of lot size from 500 to 100 for 15 less liquid stocks.<br>Introduction of the catch-all function ( <i>Abräumfunktion</i> ). |
| 4-Nov-1992  | Admission of the construction firms Hochtief and Phillip Holzmann, KHD, Mercedes Holding, RWE preferred stocks and Volkswagen preferred stocks.   |
| 4-Jan-1993  | Bilfinger & Berger construction was introduced.   |
| 1-Sep-1993  | Foreign DM bonds were admitted to IBIS trading.   |
| 26-Oct-1993 | Introduction of the multiple quote function for stocks, i.e. IBIS members are allowed to have up to 3 quotes for a given stock in the system at the same time   |
| 27-Jan-1994 | IBIS DAX was displayed for the first time.  |
| 14-Jun-1994 | Start of the settlement process was shifted from 3:30 p.m. to 4 p.m.  |
| 25-Jul-1994 | Admission of the reinsurance company Münchner Rückversicherung.   |
| 13-Sep-1994 | SAP common and preferred stocks were introduced.  |
| 5-Dec-1995  | Bond trading switched to IBIS-R.  |
| 19-Jan-1996 | Introduction of M-DAX stocks to IBIS trading.<br>Introduction of the M-DAX and H-DAX index.   |
| 18-Nov-1996 | Deutsche Telekom was introduced.  |
| 27-Nov-1997 | Last trading day on IBIS.   |

## B Technical Problems on IBIS

Some technical problems as far as they became public are listed below. No warranty is given on completeness.

Table 5:  
Technical Problems on IBIS

| Date      | Time          | Event  |
|-----------|---------------|--|
| 6-Nov-95  | 12:31 - 14:50 | IBIS system was not available for trading due to a host breakdown triggered by a software bug in the order routing system BOSS.  |
| 22-Jul-96 | 8:43 - 11:13  | Incorrect computation of the DAX due to a missing adjustment of the replacement of Kaufhof by Metro (Kaufhof DM 50 stocks were merged with Asko and SB Kauf to Metro DM 5 stocks). |
| 23-Jul-96 | 8:30 - 9:10   | IBIS system was not available for trading.   |
| 13-Dec-96 | 9:12 - 10:25  | IBIS system was not available for trading.   |

## C IBIS Stock Indices

| Code   | Symbol | Full name                         | Introduced  |
|--------|--------|-----------------------------------|-------------|
| 846741 | MDAX   | MIDCAP DAX                        | 19-Jan-1996 |
| 846742 | ADAX   | DAX BEST ASK                      | 16-Jun-1995 |
| 846743 | BDAX   | DAX BEST BID                      | 16-Jun-1995 |
| 846754 |        | MIDCAP DAX BEST BID               | 17-Jul-1996 |
| 846755 |        | MIDCAP DAX DEST ASK               | 17-Jul-1996 |
| 846756 |        | DAX 100 BEST BID                  | 17-Jul-1996 |
| 846757 |        | DAX 100 BEST ASK                  | 17-Jul-1996 |
| 846758 |        | DAX 100 AUTO/VERK. BEST BID       | 17-Jul-1996 |
| 846759 |        | DAX 100 AUTO/VERK. BEST ASK       | 17-Jul-1996 |
| 846844 |        | DAX 100-AUTOMOBIL UND VERKEHR     | 15-May-1996 |
| 846845 |        | DAX 100-BAU                       | 15-May-1996 |
| 846846 |        | DAX 100-CHEMIE UND PHARMA         | 15-May-1996 |
| 846847 |        | DAX 100-ELEKTRO                   | 15-May-1996 |
| 846848 |        | DAX 100-BANKEN                    | 15-May-1996 |
| 846849 |        | DAX 100-MASCHINENBAU              | 15-May-1996 |
| 846850 |        | DAX 100-VERSORGER                 | 15-May-1996 |
| 846851 |        | DAX 100-EISEN UND STAHL           | 15-May-1996 |
| 846852 |        | DAX 100-VERSICHERUNGEN            | 15-May-1996 |
| 846853 |        | DAX 100-HANDEL U. KONSUM          | 15-May-1996 |
| 846900 | DAX    | DEUTSCHER AKTIENINDEX (DAX)       | 15-Dec-1993 |
| 846901 | HDAX   | DAX 100                           | 19-Jan-1996 |
| 965000 |        | DAX 100-BAU BEST BID              | 17-Jul-1996 |
| 965001 |        | DAX 100-BAU BEST ASK              | 17-Jul-1996 |
| 965002 |        | DAX 100-CHEMIE U. PHARMA BEST BID | 17-Jul-1996 |
| 965003 |        | DAX 100-CHEMIE U. PHARMA BEST ASK | 17-Jul-1996 |
| 965004 |        | DAX 100-ELEKTRO BEST BID          | 17-Jul-1996 |
| 965005 |        | DAX 100-ELEKTRO BEST ASK          | 17-Jul-1996 |
| 965006 |        | DAX 100-BANKEN BEST BID           | 17-Jul-1996 |
| 965007 |        | DAX 100-BANKEN BEST ASK           | 17-Jul-1996 |
| 965008 |        | DAX 100-MASCHINENBAU BEST BID     | 17-Jul-1996 |
| 965009 |        | DAX 100-MASCHINENBAU BEST ASK     | 17-Jul-1996 |
| 965010 |        | DAX 100-VERSORGER BEST BID        | 17-Jul-1996 |
| 965011 |        | DAX 100-VERSORGER BEST ASK        | 17-Jul-1996 |
| 965012 |        | DAX 100-EISEN UND STAHL BEST BID  | 17-Jul-1996 |
| 965013 |        | DAX 100-EISEN UND STAHL BEST ASK  | 17-Jul-1996 |
| 965014 |        | DAX 100-VERSICHERUNG BEST BID     | 17-Jul-1996 |
| 965015 |        | DAX 100-VERSICHERUNG BEST ASK     | 17-Jul-1996 |
| 965016 |        | DAX 100-HANDEL U. KONSUM BEST BID | 17-Jul-1996 |
| 965017 |        | DAX 100-HANDEL U. KONSUM BEST ASK | 17-Jul-1996 |

<sup>1</sup>For a description of the DAX see Deutsche Börse AG [2]

## D DAX 30 List

Table 6:  
The 30 DAX Stocks as of Year-End 1997<sup>a</sup>

| Code <sup>b</sup> | Symbol | Full name                 | Stock type                     |
|-------------------|--------|---------------------------|--------------------------------|
| 515100            | BAS    | BASF                      | Common stock DM 5 <sup>c</sup> |
| <b>519000</b>     | BMW    | BAYERISCHE MOTOREN WERKE  | Common stock                   |
| 550000            | DAI    | DAIMLER-BENZ              | Common stock DM 5              |
| 551200            | DGS    | DEGUSSA                   | Common stock                   |
| 555700            | DTE    | DEUTSCHE TELEKOM          | Common stock DM 5              |
| 575200            | BAY    | BAYER                     | Common stock DM 5              |
| <b>575800</b>     | HFA    | HOECHST                   | Common stock DM 5              |
| 593700            | MAN    | MAN                       | Common stock                   |
| 604843            | HEN3   | HENKEL KGAA               | Preferred stock DM 5 no vote   |
| 627500            | KAR    | KARSTADT                  | Common stock                   |
| 648300            | LIN    | LINDE                     | Common stock                   |
| 656000            | MMW    | MANNESMANN                | Common stock                   |
| 695200            | PRS    | PREUSSAG                  | Common stock                   |
| 703700            | RWE    | RWE                       | Common stock DM 5              |
| 716463            | SAG3   | SAP SYSTEME               | Preferred stock DM 5 no vote   |
| 717200            | SCH    | SCHERING                  | Common stock DM 5              |
| 723600            | SIE    | SIEMENS                   | Common stock DM 5              |
| 725750            | MEO    | METRO                     | Common stock DM 5              |
| 748500            | THY    | THYSSEN                   | Common stock                   |
| 761440            | VEB    | VEBA                      | Common stock DM 5              |
| <b>762620</b>     | VIA    | VIAG                      | Common stock                   |
| <b>766400</b>     | VOW    | VOLKSWAGEN                | Common stock                   |
| 802000            | BHW    | BHW-BANK                  | Common stock DM 5              |
| 802200            | BVM    | BAYERISCHE VEREINSBANK    | Common stock DM 5              |
| 803200            | CBK    | COMMERZBANK               | Common stock DM 5              |
| 804010            | DBK    | DEUTSCHE BANK             | Common stock DM 5              |
| 804610            | DRB    | DRESDNER BANK             | Common stock DM 5              |
| 823210            | LHA    | DEUTSCHE LUFTHANSA        | Common stock DM 5              |
| 840400            | ALV    | ALLIANZ HOLDING           | Registered stock DM 5          |
| 843002            | MUV    | MÜNCHNER RÜCKVERSICHERUNG | Registered stock               |

<sup>a</sup>Since September 26, 1996 all DAX stocks are admitted for option trading on the *Deutsche Terminbörse (DTB)*.

<sup>b</sup>Security codes in bold face refer to stocks which has not accepted the take over code.

<sup>c</sup>Several firms have changed the par value of their stocks to DM 5 after August 1st, 1994.

## E Changes in the DAX 30 List

Since its introduction on July 1, 1988 the DAX 30 list has changed several times as shown below.

Table 7:  
Changes in the DAX 30 List

| Date        | Out   | In   |
|-------------|---|--|
| 3-Sep-1990  | Feldmühle Nobel 577230<br>Nixdorf Computer 775613 | Metallgesellschaft 660200<br>Preussag 695200 |
| 15-Sep-1995 | Deutsche Babcock 550700                           | SAP preferred stocks 716463                  |
| 22-Jul-1996 | Kaufhof 781900                                    | Metro 725750                                 |
| 23-Sep-1996 | Continental 543900                                | Münchner Rückversicherung 843002             |
| 19-Nov-1996 | Metallgesellschaft 660200                         | Deutsche Telekom 555700                      |

## F KKMDB: Rules & Regulations

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## G Fees

A fee is charged for every file as shown in Table 8.

Table 8:  
Fee per IBIS file (in DM)

| Year    | Securities |          |       |                      | Indices | Total  |
|---------|------------|----------|-------|----------------------|---------|--------|
|         | Stocks     | Warrants | Bonds | Bonds-R <sup>a</sup> |         |        |
| 1991+92 | 50,-       | 10,-     | 10,-  | N/A                  | N/A     | 70,-   |
| 1993    | 50,-       | 10,-     | 10,-  | N/A                  | 10,-    | 80,-   |
| 1994    | 50,-       | 10,-     | 10,-  | N/A                  | 20,-    | 90,-   |
| 1995    | 75,-       | 10,-     | 10,-  | 10,-                 | 50,-    | 155,-  |
| 1996    | 125,-      | 10,-     | 10,-  | 10,-                 | 150,-   | 305,-  |
| 1997    | 175,-      | 20,-     | n.a.  | 10,-                 | 200,-   | 405,-  |
| Total   | 525,-      | 70,-     | 50,-  | 30,-                 | 430,-   | 1105,- |

<sup>a</sup>Bonds traded on IBIS-R.

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