



## Documentation of the Danish National Travel Survey

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# Documentation of the Danish National Travel Survey

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August 2012

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By Hjalmar Christiansen

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# 1 Introduction

TU is the Danish National Travel Survey, in Danish: Transportvaneundersøgelsen ("TU" is used as abbreviation in all languages).

The aim of this document is to describe the survey to an extent which is useful for academic and international reference. It is not intended to cover every aspect or every detail. For further details please refer either to the appropriate Danish documentation, or ask the responsible staff.

This presentation focuses on the present version of TU (2006 onwards). Earlier versions are mentioned when appropriate to the context. However, please refer to the previous documentation for full details on the survey before 2003.

## 1.1 Background for the survey

The basic aim of TU is to survey the transport behaviour of Danes residing in Denmark.

The survey is managed by DTU Transport on behalf of a group of Danish authorities and organisations. Thus, we focus on the needs arising from this group:

- A stable, continuous, operational, reliable, easy-to-comprehend survey
- Often very detailed, but generally not very advanced analyses
- Data which cannot be drawn from other sources

We survey behaviour, not attitudes, nor what is considered "normal". The basic content of the questionnaire is a one-day diary combined with various background questions.

## 1.2 Some basic choices in the TU

TU is an **individual** survey, because most applications regard either individual behaviour or general statistics and because the response rate is an issue. Yet, we have conducted household surveys in scientific context in 2005 and 2011. However, the ordinary questionnaire contains background information on the composition of the household, plus questions on co-participants in each trip.

TU contains a **one-day travel diary**, because most applications regard either daily behaviour or general statistics. The priority is to get good and detailed information on that single day. In 2010-11, we conducted a special survey with a 14 day and/or a 3 month diary. Besides this, the questionnaire asks supplementary questions about overnight trips such that TU can be used for analysing these.

TU covers **365 days a year**, because we want a complete picture, and because some of the partners have particular interest in non-working days.

TU regards **Danish residents**, 10-84 years of age. Danish residents are chosen for practical reasons. The age limits are historically motivated. The lower limit of 10 years might be explained by the observation that children under 10 are difficult to interview and have only few trips on their own. The ques-

tionnaire contains questions on co-participants in each trip, which to some extent allows analysis of children below the age of 10.

TU is a combination of **internet and telephone** interviews. Originally this concept was developed in order to save money, but experience has shown that the combination has positive influence on the quality of the data.

TU has **no separate long distance part**. Using our ordinary sampling techniques, we collect data for thousands of long distance trips.

### 1.3 History

The TU history starts with 3 early surveys from 1975, 1981 and 1986. These surveys are relatively small and are not quite comparable with the later ones. They are rarely used, and when in use, it is primarily the 1975 version because it is the oldest and best of the 3. The 1986 version contains a series of problems, which renders it practically useless.

The second generation is the 172,000 interviews conducted by Statistics Denmark from 1992 to 2003. These data are sometimes used for time-series and in cases where the raw number of interviews is an issue. Internally in the 1992 to 2003 data, there are several changes in method, problematic periods, etc. which implies that the data is usually only used here at DTU Transport – with great care.

In 2004 the survey was set on hold, due to withdrawal of financing.

In the spring of 2005, TU was resumed by a special survey in central parts of Copenhagen: 16,500 interviews in the Copenhagen and Frederiksberg municipalities. These data are only rarely used, but the survey formed a frame, where most of the principles of the new TU were developed.

The present generation of TU was launched on May the 12<sup>th</sup> 2006 and has been running on every day since. The questionnaire has been further developed and there have been some improvements in the procedures, but we are very careful to keep the survey as stable as possible. At present, DTU Transport has signed contracts for the continuation through 2013 with options for 2014 and 2015.

One recent addition is worth mentioning: From June 2009 to July 2011, the survey was conducted in double-size. This means 24,000 interviews per year or approximately one interview per 100 Danes in these 2 years. The normal sample size is around 12,000 interviews per year.

## 2 Organisation

### 2.1 The partner group

The TU is financed by a group of 27 Danish authorities and other organisations.

Currently (August 2012), the group consists of:

- Danish Ministry of Transport
- Danish Road Directorate
- Danish Transport Authority
- DSB (Danish State Railways)
- DTU Transport
- Movia (Public Transport on Zealand, incl. Copenhagen)
- Danish Road Safety Council
- 20 municipalities (Albertslund, Billund, Copenhagen, Fredericia, Frederiksberg, Gladsaxe, Herning, Hjørring, Kolding, Middelfart, Næstved, Odense, Randers, Roskilde, Silkeborg, Vejen, Vejle, Viborg, Aalborg and Aarhus)

### 2.2 Technical organisation

DTU Transport has the overall responsibility for the survey. Employees at DTU take care of the management, quality control, post processing, external requests – and, of course, a great deal of research on the data.

The technical operation of the survey is carried out by a subcontractor. In November 2011, Epinion was awarded the contract for the period 2012 to 2013/15.

Synovate Denmark (now: Ipsos) operated the survey from 2006 to 2011, with Norstat Denmark as subcontractor from 2010-11. Before 2006, the survey was conducted by Statistics Denmark.



## 3 Technical description of the survey

### 3.1 Sampling

Since 2006, the target population of TU has been Danish residents between 10 and 84 years of age. (Greenland and the Faroe Islands excluded). Before 2006, the survey was based on various other age spans.

Technically, the respondents are sampled from the Danish Civil Registry (CPR), with special permission from the Danish Ministry of Health that administers the registry. CPR contains exact information on year of birth, gender and permanent address<sup>1</sup> for every Danish resident, and is generally regarded as very reliable.

Until December 2011, the sampling was a stratified sampling based on 48 strata (2 genders x 6 age groups x 4 geographical groups). From 2012 onwards, the sampling is a stratified, disproportional sampling with coefficients to ensure a proportionally correct survey. The 2012 strata system contains 208 strata (2 genders x 8 age groups x 13 geographical groups).

In the sampling process, we comply with the requirements of the special Danish "Forskerbeskyttelse" which implies that we are not allowed to contact persons who have claimed this special marking against participation in scientific and statistical studies. In total, 13% of the population has requested this "Forskerbeskyttelse", but unfortunately they are very unevenly spread. In order to eliminate this problem, we apply a 2 stage sampling: At the first stage, we sample respondents regardless of the "Forskerbeskyttelse". Secondly we replace any protected persons with other persons from the same geographical area, age and gender.

In a "normal year", the sample contains 20,000 persons (estimated as 1000 successful interviews pr month at 60% answer rate). More specifically, the 20,000 is the general target, but almost every year has a modification to this. The most important deviation is that in the period June 2009 to July 2011, the survey size was doubled, paid by the Danish National Transport Model project.

The sampled persons are assigned a random day for the interview (day0) such that every day has equal counts. Finally, the data is enriched with phone numbers from telephone register sources (approx. 90% success). Every respondent is assigned with all possible telephone numbers, including mobile phones, up to 20 numbers per respondent.

### 3.2 Interview process

TU is based on a combination of web and telephone interviews. Every respondent receives an introductory letter, instructing him or her to answer the survey via a personal URL at a specified date.

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<sup>1</sup> Plus marital status and various other data.

Respondents, who do not complete the web interview within 2 days from the specified date, but has at least one known telephone number, are then selected for telephone interviews.

The details of the interview plan can be seen from the tables below. Note that although the plan is different before and after 2012, the aim is still to ensure that the respondent cannot select the interview date by him/herself. The change in the interview plan is triggered by the observation that the old plan had a pattern, where the variation in response rate by weekday gave variation in the sample size for the other weekdays, which again contained a 2<sup>nd</sup> order effect, because the response rate varies by both weekday and various other factors.

In all cases, the plan favours the earliest possible day, such that the 2<sup>nd</sup> telephone day in principle is only open for respondents with proven no-contact at the 1<sup>st</sup> day, etc.

|                       |   |
|-----------------------|---|
| 1-3 months in advance | Respondents are drawn from CPR and assigned day0  |
| Approx. day "-1"      | The respondent receives introductory letter by mail   |
| Day 0                 | Assigned (diary) day for internet interview   |
| Days 1-2              | Questionnaire is open for internet interview.<br>Approx. 12% response or 20% of the final base                                    |
| Days 3/4/5            | Assigned (diary) day for 1st telephone attempt (one 3 <sup>rd</sup> at each of the 3 days)  |
| Days 4/5/6            | 1 <sup>st</sup> telephone day, interview regarding day before<br>Approx. 29% response or 48% of the final base                    |
| Days 6... 22          | 2 <sup>nd</sup> to 4 <sup>th</sup> telephone day, interview regarding day before<br>Approx. 19% response or 32% of the final base |
| Total result          | Interview with 60% of the total sample.   |

Table 1: Interview plan (2006-11)

|                       |   |
|-----------------------|---|
| 1-3 months in advance | Respondents are drawn from CPR and assigned day0  |
| Approx. day "-2"      | The respondent receives introductory letter by mail   |
| Day 0                 | Assigned (diary) day for internet interview   |
| Days 1-2              | Questionnaire is open for internet interview.<br>Approx. 14% response or 22% of the final base  |
| Day 2                 | Respondents with an almost completed internet interview are contacted via telephone in order to complete this as a combined interview. (<1% of interview) |
| Day 7                 | Assigned (diary) day for 1 <sup>st</sup> telephone attempt. Note: always same weekday as day 0.   |
| Day 8                 | 1 <sup>st</sup> telephone day, interview regarding day 7<br>Approx. 28% response or 44% of the final base   |
| Day 14                | Assigned (diary) day for 2 <sup>nd</sup> telephone attempt. Note: always same weekday as day 0.   |
| Day 15                | 2 <sup>nd</sup> telephone day, interview regarding day 14<br>Approx. 11% response or 17% of the final base  |
| Days 16 to 22         | 3 <sup>rd</sup> to 9 <sup>th</sup> telephone day, interview regarding the day before<br>Approx. 11% response or another 17% of the final base             |
| Total result          | Interview with 63% of the total sample, >80% with assigned weekday.   |

Table 2: Interview plan (2012 onwards)

### 3.3 Response rates

Broadly speaking, the average response rate in TU is 60%, with 20% (12%) web and 80% (48%) telephone interviews. These figures cover that the response rate per month varies from 54% to 67%, with the lowest values connected to problems at the technical operator in the spring and summer of 2010.

| Year | Respondents | Interview | Response rate |
|------|-------------|-----------|---------------|
| 2007 | 5796        | 3780      | 65.2%         |
| 2008 | 5529        | 3573      | 64.6%         |
| 2009 | 5160        | 3122      | 60.5%         |
| 2010 | 10260       | 5746      | 56.0%         |
| 2011 | 10260       | 6463      | 63.0%         |
| 2012 | 4006        | 2517      | 62.8%         |

Table 3: TU respondents and approved interviews, first 3 months of years 2007-12

The new contract from 2012 contains various measures, which increase the average response rate to 63%, even when the disproportional sampling costs approx. 2%.

|  |            |             |              |
|--|------------|-------------|--------------|
| Completed web  | 722        | 13.6%       |              |
| Completed telephone                                  | 2636       | 49.5%       |              |
| <b>Completed total</b>                               |            |             | <b>63.0%</b> |
| Respondent deceased                                  | 2          | 0.0%        |              |
| Respondent has moved abroad                          | 15         | 0.3%        |              |
| <b>Screening reasons total</b>                       |            |             | <b>0.3%</b>  |
| Agreement on later interview, but no contact later   | 57         | 1.1%        |              |
| Language problems                                    | 28         | 0.5%        |              |
| Respondent not available for interview in period     | 35         | 0.7%        |              |
| Illness or disability prevents interview             | 42         | 0.8%        |              |
| <b>Contact, but no interview total</b>               |            |             | <b>3.0%</b>  |
| Line always engaged                                  | 3          | 0.1%        |              |
| Error in telephone number (fax, removed number, ...) | 238        | 4.5%        |              |
| No contact on number                                 | 584        | 11.0%       |              |
| No known telephone number                            | 458        | 8.6%        |              |
| <b>Telephone no contact reasons total</b>            |            |             | <b>24.1%</b> |
| <b>Refusals</b>                                      | <b>506</b> | <b>9.5%</b> | <b>9.5%</b>  |
| SUM  | 5326       | 100%        |              |

Table 4: Respondent outcome and non-response reasons, first 4 months 2012

### 3.4 Questionnaire

The TU questionnaire is programmed and owned by DTU Transport.

The basic idea is to provide a self-explaining questionnaire, which contains as much error-checking as possible. Our philosophy is that the person, who knows best, is the respondent him/herself, and that as many issues as possible should be handled during interview-time. This means that the questionnaire 'negotiates' the answers until they make sense. The result is of course a huge decrease in nonsense answers (which is good), but also a risk that some respondents give a wrong or misleading answer, just to satisfy the questionnaire. – This has quite a few implications in the post processing, because we need to look not just for ordinary errors, but also for cases where the questionnaire has misled the respondent.

One major feature is that the geo-coding of addresses is done in the questionnaire. Every destination is searched in our database with all 2.3 million Danish addresses plus almost 100,000 other locations. The search is successful in 91% of the cases in web interviews and 96% in telephone interviews. The rest is handled as free text and post processed (see below).

Thus, more than 90% of all destinations have known coordinates, interview-time. This gives rise to a whole bundle of advanced error checks in the questionnaire. The simplest of these is that it is not possible to state a trip distance which is shorter than the corresponding Euclidean distance.

The average duration of an interview is 10-12 minutes by telephone and 20 minutes by web, both values with a slightly decreasing tendency over time.

In February 2009, the questionnaire was improved with questions on public route choice, including bus line numbers and first/change/last stations for railway trips. Plus some other improvements, including checks for ferry links, when required. This gives rise to some minor differences before/after 2009, especially regarding public transport and ferry trips.

### 3.5 Overview of questions in questionnaire

(Not in order of appearance in questionnaire)

**General on transport possibilities:** Ownership of bicycle, public transport season ticket, driving license, year for obtaining license, car sharing, handicap. The cars available to the household: model year, fuel type, ownership.

**Socio-economics:** Permanent address, year of birth, gender, primary occupation, education level, income, type of dwelling.

**Other persons in the household:** relation, year of birth, gender, driving licence.

**Workplace** (or other primary occupation): Address of occupation, public/private, working hours, work-at-home possibility.

**General on transport to primary occupation:** Usual daily base, num. commuter days per week, parking possibilities at primary occupation.

**Trip diary, for every trip during the day:** departure time (HH:MM, 5 min intervals), destination, purpose, num. co-participants, every mode with length and time, driver/passenger and car usage in multiple-car households.

**Special for Public Transport trips:** waiting time, (bus) line, from/to (train) station, ticket type, and price.

For **commercial transport tours**, TU applies a simplified questionnaire. When a diary contains 2 sequential stops with commercial transport, the questionnaire continues with a special page asking about the last commercial transport stop on the tour, mode(s) and total length.

For **international journeys**, TU asks for transport within Denmark only, but with supplementary questions on the border crossings and the purpose abroad.

### 3.6 Data processing

DTU Transport invests a vast amount of resources in securing a proper quality of the TU data.

Our work is guided by various criteria: The questionnaire system supplies lists of warnings, which are prioritised and handled appropriately. Questions and enquiries from respondents, interviewers and supervisors are collected and checked. And even the end users sometimes stumble on issues which need attention.

Besides the manual handling, we perform a batch of automatic checks: Whether gender and age corresponds to the sampled person, that the diary conforms to our definitions, that distances are reasonable, etc.

Generally, we seek to repair problems, if possible. During the period 2006-2011 an average of 1.75% of interviews are rejected for various reasons, the largest single reason being "uncompleted diary". This figure covers a large difference between web and phone interviews. On the phone, the rejection rate is 0.63% with "wrong person in interview" as the major reason. For web interviews, the rejection rate is 2.73% with the "uncompleted diary" as dominant reason.

Regarding the data in an individual interview, we use the original (questionnaire) value, unless it is proven incorrect (beyond reasonable doubt). New values are assigned as the most likely value (>50%). This leaves some deleted values, when the original has been proven wrong and there exists no sufficiently plausible value.

One major issue are the destinations which were not found in the interview. We manually post-process these, such that more than 97% of the final base has coordinates within 100 meters and more than 99.5% are known at a zonal level.

Technically the post processing is done by building a database with corrections to the original data. In this way, we have a complete record of what is interview data and what is changed in the post processing. The production of a new dataset is then pretty straightforward: Merge the original data with the corrections. Then calculate the derived variables on this base.

Please refer to the data documentation for the individual variables. Note that we compute several variables, which in other surveys are asked as questions. E.g. the variables with the closest railway station and the distance to this are based on coordinate data in TU.

### 3.7 Weighting

TU is weighted in such a way that a one year sum is the number of Danish inhabitants 10-84 years. Thus, simple calculations on the one-day interviews will produce results scaled as AADT (for any given year).

The weighting procedure is a classic 'raking' by calendar date and various socio-geographic data, obtained from Statistics Denmark. These data are based on extracts from the CPR registry which implies that TU has coincidence between the sampling frame and the foundation for the target weights<sup>2</sup>.

Initial weights are calculated to correct for response rate by sample and sample strata. These initial weights are then modified to account for differences in response rate by date (day0). The weights are scaled to population.

Secondly, we apply a classic iterative proportional fitting (or 'raking') after: Diary Date, Home Municipality, Age x gender and the TU "208" strata system. The "208" strata system is based on a matrix of 13 geo groups x 2 genders x 8 age groups.

The calendar dimension is the single most important parameter, with 10 fold variation in coefficients. The interview success rate is tightly associated with the date, due to seasonal, weekday and weather variations. Besides this, the sample size varies with time.

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<sup>2</sup> The statistics used for weighting are based on the address on the 1<sup>st</sup> of January. The sampling is based on the address at the sampling date which is 1-4 months before the interview. The practical implications of this are very limited, even more so because the effect is overshadowed by the (small) seasonal variation of the population.

## 4 Basic definitions

TU operates with these 4 basic definitions:

- One **interview session** represents one person for **one diary day**
  - Every session contains 0, 1 or more journeys
- One **journey** (Danish: 'turkæde' or 'rejse') represents **the entire** journey from 'home' and return to 'home'
  - Every journey is divided in 2 or more trips (at least outward and homeward)
- One **trip** (Danish: 'tur') represents the travel **from one stay/activity to the next**
  - Every trip is divided into 1 or more stages
- One **stage** (Danish: 'deltur') represents one usage of a **mode of transport** on the trip

A diary day is defined as the 24 hours from 03 to 03, regarded as departure time of the trip.

Please note that the TU has no predefined tours<sup>3</sup>. It is possible to divide the journeys into tours, given an unambiguous definition, but this has not been done in the dataset.

### 4.1 Table structure

These basic definitions give rise to the following 6 tables of a TU dataset:

**(Interview) Session** contains interview data at the one-day level. This includes various background variables, aggregates of the trips, plus the general questions at day-level and the weighting of the survey.

**Journey** contains information for each journey. As the questionnaire has no 'journey' concept, this table consists entirely of aggregates from the trip level.

**Tur** contains information on the trip from one stay/activity to the next. This is the basic structure in the questionnaire. The table contains various questions about the trip, plus aggregate variables from the stage level and a few derived variables from the journey and the neighbour trips.

**Deltur** contains information on every usage of transport on each trip.

**Household** contains details about any other persons in the household. From October 2006 to January 2009 (incl.) the table contains only family members. The size of the household can still be found in session.HousehNumPers.

**Bil** contains details about the individual cars available to the household.

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<sup>3</sup> A journey is a series of trips starting and ending at home or another permanent residence. A tour is a series of trips starting and ending at the same place, which might be another place than home, e.g. the working place. One journey may consist of several tours.

Most of the variables and some tables have English names, but for technical and historical reasons, a few names are still in Danish. Our policy is that all new names are English, and the remaining Danish names are renamed into English, if/when this can be done with little difficulty.

## 4.2 Aggregation of transport modes

The individual stages are distributed in the Stage (deltur) table. For various analytical purposes, we aggregate the stages into a single Mode for every Trip, Journey and Diary. In TU, this is done by means of 2 methods:

The **Primary Mode** is defined as the mode which has the largest length sum during the trip, journey or day. When two modes have the same sum, the one with the largest id is chosen<sup>4</sup>.

The **Mode Chain Type** is defined qualitatively such that if a trip/journey/day contains a public transport stage, the chain type is defined as a public combination. Walking is disregarded, when in combination with other modes.

Please read the data documentation on these variables for further details.

## 4.3 Primary targets and trip purposes

For every Journey, we define the **Primary Target** as the stay (outside home) with the longest dwell time. When two stays has the same dwell time, the stay with the longest distance from home is chosen. When also the distance is identical, the median (in order) is used. Special criteria apply for international trips and for the “simplified business tours”.

Every trip is created with 2 purposes: At origin and destination, because the purpose is in principle connected to the stay, not the trip. These two purposes are combined into one, using the concepts of journey and primary target: The **TripPurp** is defined as the Destination Purpose, when the trip is before the primary target on the journey; and TripPurp is defined as the Origin Purpose, when the trip is after the primary target. Thus, the TripPurp indicates the purpose at the ‘away from home’ end of the trip.

## 4.4 Datasets and publication frequency

Datasets are released twice a year, in February and June.

The dataset (v1) in February contains data until and including the 31<sup>st</sup> of December, the year before. These datasets form the release of the latest complete calendar year.

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<sup>4</sup> This is a very rare case: 211 out of 297573 trips or 0.07%.



The dataset (v2) in June contains data until and including the 30<sup>th</sup> of April. These datasets form a re-release of a whole survey-year, because the present survey started at the 12<sup>th</sup> of May 2006 and is weighted to cover the period from the 1<sup>st</sup> of May.

Please note that we “never stop” the post processing. Thus, every new dataset also contains an update of what has been corrected since the previous dataset.

| Year                     | Interview sessions | Journeys | Trips   | Stages  |
|--------------------------|--------------------|----------|---------|---------|
| 2006<br>(from 12 May)    | 8,142              | 11,142   | 27,055  | 30,169  |
| 2007                     | 14,387             | 18,142   | 43,285  | 48,718  |
| 2008                     | 13,324             | 16,639   | 39,262  | 43,845  |
| 2009                     | 19,186             | 24,629   | 58,688  | 66,301  |
| 2010                     | 23,740             | 29,122   | 68,435  | 78,939  |
| 2011                     | 18,019             | 22,191   | 52,168  | 60,862  |
| 2012<br>(first 4 months) | 3,407              | 4,352    | 10,297  | 11,917  |
| SUM                      | 100,205            | 126,217  | 299,190 | 340,751 |

Table 5: Overview of the number of observations in the latest dataset, TU0611v2

#### Technical notes on the datasets:

Naming convention:

1. “TU“
2. Last two digits from starting year (usually “06”, but versions with “92” exist)
3. Last two digits from last completed year (presently “11”)
4. “v1” or “v2”, depending on whether it is a calendar-year or whole-year dataset

Thus, at present “TU0611v2” is the latest dataset.

We deliver datasets in the following formats: MS Access (\*.mdb), SAS and SPSS, with all 3 formats technically a copy of the SQL server original.

## 5 A brief overview of results

This chapter contains selected results from the TU survey, with comments and benchmarks against other reliable sources.

### 5.1 Key figures

The table below shows three classic key figures from transport surveys: average num. trips, distance and travel time. The figures are all-year averages incl. weekends and holidays. Results from 2006 have a greater uncertainty than the following years, due to some structural problems in the first samples. The remaining variations between years are partly due to calendar variations

| PseudoYear | Avg Num<br>Trips per day | Avg travel distance<br>km per day | Avg total travel time<br>min per day |
|------------|--------------------------|-----------------------------------|--------------------------------------|
| 2006/7     | 3.19                     | 39.30                             | 60.40                                |
| 2007/8     | 2.97                     | 38.98                             | 56.22                                |
| 2008/9     | 2.93                     | 37.59                             | 56.23                                |
| 2009/10    | 3.07                     | 38.07                             | 57.03                                |
| 2010/11    | 2.90                     | 37.49                             | 55.05                                |
| 2011/12    | 3.01                     | 37.99                             | 56.57                                |

Table 6: 3 key figures from TU (excl. commercial transport)

The average number of trips and the total travel time are fairly constant at approx. three trips per day and slightly under one hour, respectively. Most other travel surveys show these approximate figures, whereas the travel distance varies between countries and over time.

### 5.2 Vehicles passing the Great Belt Bridge

The Great Belt Bridge is a toll bridge, which provides very precise figures on the number of cars. Seen from TU, the same figure can be calculated very precisely, because the bridge is the only fixed link between the eastern and western parts of Denmark.

A comparison of these two sources can be seen in the table below. From 2009 onwards, the TU results are within expected deviations, given only approx. 100 observations per year. Before 2009, the values are influenced by missing ferry stages, because the former questionnaire had no checking for ferry stages (e.g. to/from the various islands).

| Year | TU calculation<br>M veh/year | TU<br>Num obs.<br>(N) | Official statistic<br>from Great Belt<br>Bridge<br>M veh/year | TU compared to<br>official statistic |
|------|------------------------------|-----------------------|---|--------------------------------------|
| 2007 | 12.9                         | 96                    | 9.4   | 138%                                 |
| 2008 | 11.7                         | 93                    | 9.7   | 121%                                 |
| 2009 | 9.2                          | 114                   | 9.6   | 96%                                  |
| 2010 | 9.3                          | 128                   | 9.3   | 100%                                 |
| 2011 | 9.6                          | 96                    | 9.5   | 101%                                 |

Table 7: Million passenger cars (under 3.5 tons) passing the Great Belt Bridge. Calculation on TU compared to official data from <http://www.storebaelt.dk/omstorebaelt/trafiktal>.

The conclusion is that there is no evidence that TU underrepresents long distance trips. Instead, there might be a slight overrepresentation, because some of the passages of the bridge are performed by foreigners, and then we expect a TU value slightly under the official statistic.

### 5.3 Danish Car ownership

In TU, the car 'ownership' questions are phrased as car availability at household level, and then a supplementary question on the ownership for each car. The car ownership can thus be estimated as the household-owned cars, counted at household level. This can be compared to the figure for household-owned cars from Statistics Denmark. To make the comparison, it has been necessary to add the figures for cars and vans, because TU and Statistics Denmark apply two different definitions on cars vs. vans.

The February 2009 questionnaire contained a minor improvement to the car availability question. Before Feb' 09, the question was phrased "please list the cars available to your household". After the change, the questionnaire now reads "how many cars are available to your household" and then "please specify". This difference gives rise to a 10% increase in the "total cars" figure.<sup>5</sup> There is no evidence of underrepresentation of cars in the newest TU data.

| Year | TU calculation<br>M cars | Official Statistic<br>M cars | TU compared to official<br>statistic |
|------|--------------------------|------------------------------|--------------------------------------|
| 2007 | 1.95                     | 2.16                         | 90%                                  |
| 2008 | 1.99                     | 2.22                         | 90%                                  |
| 2009 | 2.06                     | 2.25                         | 92%                                  |
| 2010 | 2.22                     | 2.27                         | 98%                                  |
| 2011 | 2.32                     | 2.30                         | 101%                                 |

Table 8: Car ownership (million cars and vans under 3.5 tons owned by households). Calculation on TU with staggered year July-June compared to official statistic from Statistics Denmark by 1st of January. Source: <http://statistikbanken.dk>

<sup>5</sup> The table is prepared as 'staggered' years such that the '2009' figure is really an average of the period July 2008 to June 2009. Thus, the 2009 value is mainly based on observations before the change.

## 5.4 Total car mileage

Using TU, we can estimate the total mileage of Danish cars in Denmark. The sum can be compared to the official figure from Statistics Denmark (based on Odometer readings). This has been done in the table below.

To make the comparison, it is necessary to add the figures for cars and vans, because TU and Statistics Denmark apply two different definitions on cars vs. vans.

TU underestimates the car/van mileage by 3-7%. There are three known reasons for this difference:

1. Underreported trip lengths (proven to account for at least 1%)
2. Non-reported trips
3. Mileage driven by non-Danes and persons over 84 years of age

|      | TU calculation<br>M veh. kms per year | Official statistic<br>M veh. kms per year | TU compared to<br>official statistic |
|------|---------------------------------------|---|--------------------------------------|
| 2007 | 41,206                                | 42,547                                    | 97%                                  |
| 2008 | 39,427                                | 42,765                                    | 92%                                  |
| 2009 | 40,185                                | 42,406                                    | 95%                                  |
| 2010 | 38,998                                | 41,781                                    | 93%                                  |

Table 9: Total car mileage (cars+vans) for Danish cars in Denmark, million vehicle kms per year. TU calculation compared to official statistics based on Odometer readings. Source: <http://statistikbanken.dk>

## 6 Documentation and further reading

Every dataset is connected to a documentation of the variables and data. Since 2009, this document has been released in both Danish and English.

The questionnaire is documented periodically, in Danish only. Versions exist from 2005, 2007 and 2011.

Please find the documents at our website, [www.tudata.dk](http://www.tudata.dk) or enquire at [trequests@transport.dtu.dk](mailto:trequests@transport.dtu.dk)

## 7 Access to data and results

There is no official publication of the results. Results from TU are disseminated via various publications from our partners and by DTU Transport. The data is used for more than 200 applications a year.

Please contact DTU Transport at [trequests@transport.dtu.dk](mailto:trequests@transport.dtu.dk) if you need access to the data.

TU is financed by the users. As a general principle, all users pay for access to the data, either as a subscription fee or per use. The peruse fee for access to the micro-data is larger than the fee for simple cross-tables.

DTU Transport furnishes students and researchers at other universities, NGO's and the news media with few, simple tables free of charge. This service is conditional on DTU Transport and the Danish National Travel Survey being stated as source. Please contact [trequests@transport.dtu.dk](mailto:trequests@transport.dtu.dk). DTU reserves the right to reject any requests or to require payment, if appropriate.

The micro-data is divided into a public part and a confidential part. The confidential part (with coordinates and other sensitive information) is accessible by special arrangement, at DTU Transport only. The public part is in principle open to anyone who has paid the appropriate fee.

DTU Transport performs research and provides education on traffic and transport planning. It advises the Danish Ministry of Transport on infrastructure, economic appraisals, transport policy and road safety and collects data on the transport habits of the population. DTU Transport collaborates with companies on such topics as logistics, public transport and intelligent transport systems.

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