Package 'rFreight'

March 21, 2016

Title Support for dissagregate simulation of freight movement

Version 0.1

Description The functions can be used to create a complete model system that simulates firms, trading relationships, freight demand, shipment frequency and routing, and movements of freight by truck, rail, ship, and airplane.

Depends R (>= 3.1.1)

License GPL-3

LazyData true

Author ``Colin Smith" [aut, cre]

Maintainer ``Colin Smith" <colin.smith@rsginc.com>

R topics documented:

`corresp_naics6_n6io_sctg`

Correspondence between NAICS 6, NAICS IO, and SCTG Codes

Description

This file is a correspondence between three classifications and shows the commodities produced by each industry. Industries and commodities are defined at the 6-digit NAICS level using both the systems used by the U.S. Census Bureau and the slightly more aggregated system used by the U.S. Bureau of Economic Analysis. In addition, the table indicates the correspondence between these detailed NAICS 6-digit industry codings and the much more aggregate 2-digit SCTG commodity classification. The table shows the commodities that are produced by each industry. In some cases, industries produce more than one commodity; the final column is a proportion that is used to account for this. In many cases, a single industry is credited with making the entire domestic supply of a commodity (proportion = 1.0), which is expected given the 6-digit level of detail. Where the proportion is less than 1.0, there should be multiple industry entries for the same commodity, such that their proportions sum to 1.0.

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Usage

```
corresp_naics6_n6io_sctg

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corresp_naics6_n6io_sctg
```

Format

A dataframe with 7 variables

Industry_NAICS6_Make Six-digit NAICS code of the industry

Industry_NAICS6_Make_desc SCTG two-digit code of the commodity

Industry_NAICS6_CBP Six-digit NAICS (Census) industry code

Industry_NAICS6_CBP_desc Description of the NAICS (Census) industry code

Commodity_SCTG SCTG two-digit code of the commodity

Commodity_SCTG_desc SCTG code description

Proportion Proportion of the SCTG commodity made by the NAICS6_Make industry

Details

This correspondence file is an input to the firm synthesis step to identify what a firm in that industry produces and to convert between the two different systems of NAICS coding (used in employment data and input-output data respectively).

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Source

The correspondence between commodity NAICS and commodity SCTG codes is based on commodity descriptions. Information about what is produced by particular industries in based on U.S. Bureau of Economic Analysis (2007), BEA Input-Output Make and Use tables (http://www.bea.gov/industry/io_annual.htm) and is derived from the detailed version of the Make Tables/After Redefinitions in the Industry Input-Output Accounts Data.

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corresp_sctg_category *Correspondence between SCTG Codes and other Commodity Aggregations*

Description

This file shows the commodity group categories used for parameter assumptions. Commodities in Category are categorized (animals, bulk natural resources, intermediate processed goods, finished goods and others) based on the commoditys physical characteristics. Commodities in Category2 are categorized (functional, semi-functional, semi-innovative, and innovative) based on the commodity and supply chain characteristics (e.g. demand pattern, time-sensitivity, cost level, etc.).

Usage

```
corresp_sctg_category
```

Format

A dataframe with 43 rows and 5 variables

Commodity_SCTG Two digits SCTG commodity code

Commodity_SCTG_desc_short Short name of the SCTG commodity

Commodity_SCTG_desc_long SCTG commodity description

Category Commodity category group 1, used in mode and path choice model

Category2 Commodity category group 2, used in the assignment of cost and time weights for use in the PMGs

Details

This table is used to provide a correspondence between the SCTG codes and more aggregate commodity groups used in various model steps. The categories are defined based on physical characteristics or commodity and supply chain characteristics, and specific model parameters are associated with each of these aggregate commodity groups in, for example, the total cost equation used in the mode choice model.

Source

The sources of this table include the article by Marshall L. Fisher (1997), What is the right supply chain for your product? (Harvard business review 75 (1997): 105-117) which helped with the idea of categorizing product types based on different product characteristics.

data_2010io *Data: detailed 2010 use table after redefinitions*

Description

This file contains detailed 2010 Use table after redefinitions data developed using the 2007 benchmark Input-Output (I-O) accounts. The Input-Output accounts show how industries interact. This table shows the inputs to industry production and the commodities that are consumed by final users. For each production industry, the table reports the value of goods consumed by each buyer industry. The table includes 386 different producing industries showing about 5.7 trillion dollar value of inputs.

Usage

```
data_2010io
```

Format

A dataframe with 302 rows and 387 variables

Industry_NAICS6_MakeUse NAICS (BEA) commodity code of the making industry

X1111A0 (and all subsequent fields) Annual values of commodities exchanged between industries, where columns are the using industry (units of millions of dollars per year)

Details

The model uses this information to identify for each buyer industry the most important commodities that are consumed and their associated supplier industries.

Source

The sources of this table include the U.S. Bureau of Economic Analysis (2007), BEA Input-Output Make and Use tables (http://www.bea.gov/industry/io_annual.htm). It is derived from Make Tables/After Redefinitions in the detailed version from the Industry Input-Output Accounts Data. The 2010 detailed use table (6 digits NAICS codes) was developed by factoring up the 2007 detailed table by growth factors calculated from the 207 and 2010 summary level (3 digits NAICS codes) tables and it was assumed all 6 digits NAICS industries under a 3 digits NAICS industry grow with the same growth factor from 2007 to 2010.

data_emp_cbp *Correspondence between NAICS 6, NAICS IO, and SCTG Codes*

Description

This file shows the number of employees and establishments by six digits NAICS industry, FAF zone, and county, , although the employment data in this file are derived from the County Business Patterns data are subject to censoring. This file also has the number of establishments by eight different employment size groups.

Usage

```
data_emp_cbp
```

Format

A dataframe with 113409 rows and 13 variables

Industry_NAICS6_CBP Six digits NAICS (Census) code

FAFZONE FAF zone

CBPZONE County Business Pattern (CBP) zone

employment Total number of employees (subject to censoring)

establishment Total number of establishments

e1 Total number of establishments with 1-19 employees

e2 Total number of establishments with 20-99 employees

e3 Total number of establishments with 100-249 employees

e4 Total number of establishments with 250-499 employees

e5 Total number of establishments with 500-999 employees

e6 Total number of establishments with 1000-2499 employees

e7 Total number of establishments with 2500-4999 employees

e8 Total number of establishments with more than 5000 employees

Details

This employment data is used in the firm synthesis step and in conjunction with information from the Make and Use tables to develop a set of synthetic firms characterized with commodities produced and consumption requirements. County-level employment data for the United States outside of CMAP area, in the form of County Business Patterns (CBP) data, are aggregated to a FAF zone resolution, while the county level data are used with the CMAP area and during the firm synthesis step allocated to the smaller mesozones used in the model.

Source

The sources of this table include the 2010 U.S. Census County Business Pattern data (http://www.census.gov/econ/cbp/). The dataset is an annual series that provides subnational economic data by industry.

---

data_emp_cbpzone *Data table of employment by county*

Description

This file shows total employment for each of the zones in the CBP zone system.

Usage

```
data_emp_cbpzone
```

Format

A dataframe with 151 rows and 2 variables

COUNTY Zone numbering for CBP zone system (combination of FAF zones and counties)

CBP_EMP Total employment in the zone

Details

This employment data is used in the vehicle and tour pattern model to develop the employment by zone variable for the choice model.

Source

The sources of this table include the 2010 U.S. Census County Business Pattern data (http://www.census.gov/econ/cbp/). The dataset is an annual series that provides subnational economic data by industry.

---

data_firm_pref_weights

Data: cost and time preference weights by SCTG commodity categories

---

Description

This file shows the cost and time preference weights and the maximum single source fraction by SCTG commodity categories. Weights are calculated using the categorization of commodities (functional, semi-functional, semi-innovative, and innovative) which are determined using assumptions on commodity characteristics (e.g. demand pattern, time-sensitivity, and cost level). Commodity cost-weight is determined using FAF dollar/ton values. Commodity time-weight is determined based on commodity supply chain-related characteristics (e.g. demand pattern, lead-time focus, transportation strategy).

Usage

```
data_firm_pref_weights
```

Format

A dataframe with 43 rows and 6 variables

Commodity_SCTG SCTG commodity code

Commodity_SCTG_desc SCTG commodity description

Commodity_Type Commodity category, e.g., Innovative

CostWeight Cost weight as a share (calculated based on commodity type)

TimeWeight Time weight as a share (calculated based on commodity type)

SingleSourceMaxFraction Single source max fraction as a share (calculated based on commodity type)

Details

This table is used to develop inputs for the Procurement Market Games (PMGs). In the PMG, agents representing producers of an output commodity (buyers) are instantiated with a quantity of an input commodity to purchase and a set of preference weights that allow them to tradeoff unit costs, service time, and potentially other attributes when considering the utility of a potential trading partner.

Source

The sources of this table include the FHWAs 2007 Freight Analysis Framework data (http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/). The article by Marshall L. Fisher (1997), What is the right supply chain for your product?, is also a source for this input table that helped with the idea of categorizing product types (commodities) based on different product characteristics.

---

data_foreign_cons *Data: total export value by Country and commodity*

Description

This file shows the total exports value (domestic and foreign) valued on a free alongside ship (FAS) basis. The FAS reflects transaction price including inland freight, insurance and other charges incurred in placing the merchandise alongside the ship at the port of export. The export value in this input table is reported by six digits NAICS code and the country where the goods are to be consumed, further processed, or manufactured as known to the shipper at the time of exportation.

Usage

```
data_foreign_cons
```

Format

A dataframe with 53486 rows and 6 variables

Country Foreign country of destination names (trading with USA)

Commodity_NAICS6 Six-digit NAICS commodity code

USExpVal Total exports value in dollars

FAFZONE FAF zone of the country of destination

ctrycod Country code of the country of destination

CBPZONE CBP Zone code of the country of destination

Details

Since the CBP data does not contain foreign employment data, this table is used to include foreign firms in the model to ensure that international flows between the U.S. and foreign countries can be allocated to consuming firms at the foreign country end. This table is used in firm synthesis to develop and characterize a set of agents located in foreign countries that consume goods.

Source

The sources of this table include the USA Census Trade Online (NAICS-based data) (https://usatrade.census.gov/). Provided by the U.S. Census Bureau's Foreign Trade Division, USA Trade Online provide current and cumulative U.S. export and import data on more than 9,000 export commodities and 17,000 import commodities worldwide. NAICS-based data as part of Foreign Trade Statistics data is the most detailed available data on US imports and exports by NAICS codes (6 digits) and by country.

`data_foreign_prod` *Data: total import value by Country and commodity*

Description

This file shows the cost, insurance, and freight (CIF) value of US imports by country and 6-digit NAICS code. The CIF value represents the landed value of the merchandise at the first port of arrival in the US. It is computed by adding the Customs Value to the aggregate cost of all freight, insurance, and other charges (excluding US import duties) incurred in moving merchandise from alongside the carrier at the port of exportation in the country of export and placing it alongside the carrier at the first port of entry in the US.

Usage

```
data_foreign_prod
```

Format

A dataframe with 28470 rows and 6 variables

Country Foreign country of origin names (trading with USA)

Commodity_NAICS6 Six-digit NAICS commodity code

USImpVal Total imports value

FAFZONE FAF zone of the country of origin

ctrycod Country code of the country of origin

CBPZONE CBP Zone code the country of origin

Details

Since the CBP data does not contain foreign employment data, this table is used to include foreign firms in the model to ensure that international flows to the U.S. from foreign countries can be allocated to producing firms at the foreign country end. This table is used in firm synthesis to develop and characterize a set of agents located in foreign countries that produce goods.

Source

The sources of this table include the USA Census Trade Online (NAICS-based data) (https://usatrade.census.gov/). Provided by the U.S. Census Bureau's Foreign Trade Division, USA Trade Online provide current and cumulative U.S. export and import data on more than 9,000 export commodities and 17,000 import commodities worldwide. NAICS-based data as part of Foreign Trade Statistics data is the most detailed available data on US imports and exports by NAICS codes (6 digits) and by country.

`data_mesozone_centroids`
Data: centroids of the mesozones

Description

This file contains the centroids of the mesozones.

Usage

```
data_mesozone_centroids
```

Format

A dataframe with 269 rows and 3 variables

stop_zone Mesozone ID number

x_coord X coordinate of the zone centroid

y_coord Y coordinate of the zone centroid

Details

This file is used in the stop sequence portion of the truck-touring model.

Source

The data are derived from the mesozone GIS polygon layer used in the mesoscale model.

`data_mesozone_emprankings`
Employment Ranking by Industry by County

Description

This file shows the employment ranking by industry by county. A dataset is prepared from employment data that contains the percentile ranking of each of 21 NAICS categories by TAZ based on employment numbers in each of those industries. Higher employment numbers implies a higher percentile rank. Within each county, each mesozone is assigned to one of ten percentile-ranking categories. Thresholds of 10 percent are used to determine the categories. Mesozones with the highest employment are classified as Rank 10, zones with the lowest employment Rank 1, and so on. Mesozones are FAF3 zones outside of the region, county-sized zones on the fringes of the region, and township-sized zones in the inner counties.

Usage

```
data_mesozone_emprankings
```

Format

A dataframe with 23 variables

COUNTY County FIPS code

MESOZONE Mesozone ID number

rank11 to rank3133 Rank of each 2 digit NAICS code industry

Details

For the purpose of mode choice and simulation of freight traffic, the firms in the CMAP region modeling area are assigned to mesozones within each county. A few county zones correspond to only one TAZ. The other counties correspond to more than one TAZ. TAZs are assigned to firms in these counties based on employment ranking by industry. The model uses percentile rankings to assign larger firms to mesozones with more employment and smaller firms to zones with any employment in their industry classes. The model prevents firms from being assigned to mesozones with no employment in the firms industry class.

Source

The sources of this table include the 2010 U.S. Census County Business Pattern data (http://www.census.gov/econ/cbp/).

`data_mesozone_gcd` *Great Circle Distances between Mesozones*

Description

This file shows the great circle distance (GCD) between the mesozones in the model.

Usage

```
data_mesozone_gcd
```

Format

A dataframe with 7 variables

Production_zone Production zone ID number

Production_lon Longitude of the Pzone

Production_lat Latitude of the Pzone

Consumption_zone Consumption zone ID number

Consumption_lon Longitude of the Czone

Consumption_lat Latitude of the Czone

GCD Great Circle Distance between the Pzone and Czone (in Miles)

Details

This table is used to calculate distances used as a variable in the distribution channel model.

Source

Distances between zones were estimated using the Haversine formula (http://en.wikipedia.org/wiki/Haversine_formula)

---

data_mesozone_skims *Zone to Zone Travel Times Between Mesozones*

Description

This file shows the zone to zone travel times between mesozones within the CMAP region.

Usage

```
data_mesozone_skims
```

Format

A dataframe with 3 variables

Origin Origin mesozone ID number

Destination Destination mesozone ID number

Time Zone to zone travel time (Hours)

Details

This file is used in the stop sequencing component of the truck-touring model.

Source

The skims values in this file are derived from CMAPs meso freight network.

---

data_modepath_skims *Skimned Costs and Travel Times for Mode and Path Combinations*

Description

This file contains the skims for origins and destinations with available path costs and times. The skims are based on 54 paths for different modal and route alternatives defined in the mesoscale model. These alternatives included direct modes (such as truck â€“ Full truck load, truck â€“ less than truck load, rail etc), indirect mode (such as rail-truck, water-truck etc), and also intermodal facilities (such as airports, truck terminals, rail terminals, and ports). This table has times and costs associated with all the 54 mode-path choices between all buyer-seller pairs.

Usage

```
data_modepath_skims
```

Format

A dataframe with 241 variables

Origin Origin ID of the zone pair

Destination Destination ID of the zone pair

... (series of fields not used in the model)

Cost 1 : Cost 54 Travel Cost per unit weight for each of 54 path alternatives

Time 1 : Time 54 Travel Time for each of 54 path alternatives

Details

This table is used in the mode and path choice model to define travel times and cost for each of the 54 path alternatives for travel to, from and within the CMAP region.

Source

The sources of this table are the networks, cost assumptions, and path-building assumptions as defined in the mesoscale model documentation.

`data_unitcost` *Unit Costs for SCTG Commodities*

Description

This file shows the unit cost (dollar per ton) by two digits SCTG commodity codes. Commodity unit cost is determined using FAF dollar per ton values for all modes by commodity. The total tons carried by all modes all movements are divided to the total value to calculate the unit cost of the commodity.

Usage

```
data_unitcost
```

Format

A dataframe with 2 variables

Commodity_SCTG Two digits SCTG commodity code

UnitCost Commodity unit cost (Dollars/Ton)

Details

This table is used to convert production and consumption values from the BEA input output tables to tonnages produced and consumed.

Source

The sources of this table include the FHWAs 2007 Freight Analysis Framework data (http://www.ops.fhwa.dot.gov/freight/freight_analysis/faf/).

loadInputs *Load a set of files to objects*

Description

Loads a set of inputs files to objects in the global environment

Usage

```
loadInputs(filelist, inputdir)
```

Arguments

filelist	list of strings containing file names; uses the names of the list as the object names
inputdir	file path to the inputs directory (e.g. model$inputdir)

loadPackage *Install and load required R packages*

Description

Load required R packaging, first testing whether a package is available and installs without popping up the Cran mirror list.

Usage

```
loadPackage(package)
```

Arguments

package	Name of R package to load/download and install (character string)

model_distchannel_calibration *Distribution Channel Calibration Shares*

Description

This file shows the distribution channel type (number of stops, 0, 1 or 2+ stops) shares by commodity groups. Shipping chain or distribution channel indicates whether the goods went through a consolidation center, a distribution center, and/or a warehouse. The commodity group codes are aggregations of the 43 SCTG commodity groups as follows: A: Agricultural Products, B: Chemical/Pharmaceutical products, C: Coal/Mineral/Ores, D: Electronics, E: Prepared Foodstuffs, F: Gravel/Natural Sands/Cements, G: Machinery/Metal Products, H: Mixed Freight/Miscellaneous, I: Motorized and Other Vehicles (incl. parts), J: Wood/Paper/textile/Leather products, K: Other

Usage

```
model_distchannel_calibration
```

Format

A dataframe with 3 variables

Commodity_Category Commodity groups based on the reference paper used

NumberofStops_Choice Shipping chain type

Target_Share proportion of shipments by distribution channel for each commodity group

Details

This table is used for distribution channel model calibration.

Source

The source of this table is the study done by University of Illinois at Chicago: Pourabdollahi, Z., Karimi, B., Mohammadian, A. K., & Kawamura, K. (2014). Shipping Chain Choices in Long Distance Supply Chains: Descriptive Analysis and a Decision Tree Model 2. In Transportation Research Board 93rd Annual Meeting (No. 14-1706).

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model_distchannel_food

Distribution Channel Model Variables and Coefficients: Food Products

---

Description

This file shows the distribution channel model variables and coefficients by distributing channel type for food products. A multinomial logit (MNL) model was estimated for choice of distribution channel.

Usage

```
model_distchannel_food
```

Format

A dataframe with 5 variables

CHID Distribution channel choice ID

CHDESC Distribution channel choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the distribution channel step of the model for food commodities.

Source

The sources of this table include the FAME survey data developed by the University of Illinois at Chicago

---

`model_distchannel_mfg` *Distribution Channel Model Variables and Coefficients: Manufactured Goods*

Description

This file shows the distribution channel model variables and coefficients by distributing channel type for manufactured goods. A multinomial logit (MNL) model was estimated for choice of distribution channel.

Usage

```
model_distchannel_mfg
```

Format

A dataframe with 5 variables

CHID Distribution channel choice ID

CHDESC Distribution channel choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the distribution channel step of the model for manufactured goods.

Source

The sources of this table include the FAME survey data developed by the University of Illinois at Chicago.

model_numberoftours *Number of Tours Model Variables and Coefficients*

Description

This file shows the number of tours model variables and coefficients by number of tours. A multinomial logit (MNL) model was estimated for choice of the number of tours.

Usage

```
model_numberoftours
```

Format

A dataframe with 5 variables

CHID Number of tours model choice ID

CHDESC Number of tours model choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the number of tours component of the truck-touring model.

Source

The number of tours model was estimated using the Texas Commercial Vehicle Survey (RSG (2012) Tour-based and Supply Chain Freight Forecasting Framework Final Report Framework, developed for the Federal Highway Administration with University of Illinois at Chicago and John Bowman BAA DTFH61-10-R-00013.)

model_shipsize_calibration *Shipment Size Calibration Shares*

Description

This file shows the shipment size shares by shipment weight groups and commodity groups for value and tons.

Usage

```
model_shipsize_calibration
```

Format

A dataframe with 6 variables

Commodity_SCTG Two digits SCTG commodity code

Commodity_SCTG_desc Description of SCTG commodity

ShipmentWeight Shipment weight category (lbs)

WeightCategory Shipment weight category ID

ValuePct Percentage of value in each shipment weight category by SCTG commodity

TonsPct Percentage of tons in each shipment weight category by SCTG commodity

Details

This table is used for shipment size model calibration.

Source

The sources of this table include the Census Bureau and the Bureau of Transportation Statistics (BTS) Commodity Flow Survey (CFS 2007) data. The CFS is the primary source of national and state-level data on domestic freight shipments by American establishments in mining, manufacturing, wholesale, auxiliaries, and selected retail and services trade industries. Data are provided on the types, origins and destinations, values, weights, modes of transport, distance shipped, and ton-miles of commodities shipped.

---

model_shipsize_food *Shipment Size Model Variables and Coefficients: Food Products*

Description

This file shows the shipment size model variables and coefficients by shipment size groups for food products. A multinomial logit (MNL) model was estimated for choice of shipment size.

Usage

```
model_shipsize_food
```

Format

A dataframe with 5 variables

CHID Shipment size choice ID

CHDESC Shipment size choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the shipment size step of the model for food commodities.

Source

The Texas commercial vehicle survey dataset was used for estimating the discrete choice model.

model_shipsize_mfg *Shipment Size Model Variables and Coefficients: Manufactured Goods*

Description

This file shows the shipment size model variables and coefficients by shipment size groups for manufactured. A multinomial logit (MNL) model was estimated for choice of shipment size.

Usage

```
model_shipsize_mfg
```

Format

A dataframe with 5 variables

CHID Shipment size choice ID

CHDESC Shipment size choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the shipment size step of the model for manufactured goods.

Source

The Texas commercial vehicle survey dataset was used for estimating the discrete choice model.

model_stopduration *Stop Duration Model Variables and Coefficients*

Description

This file shows the stop duration model and coefficients. A multinomial logit (MNL) model was estimated for choice of stop duration.

Usage

```
model_stopduration
```

Format

A dataframe with 5 variables

CHID Stop duration model choice ID

CHDESC Stop duration model choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the stop duration component of the truck-touring model.

Source

The stop duration model was estimated using the Texas Commercial Vehicle Survey (RSG (2012) Tour-based and Supply Chain Freight Forecasting Framework Final Report Framework, developed for the Federal Highway Administration with University of Illinois at Chicago and John Bowman BAA DTFH61-10-R-00013.)

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model_timeofday *Time of Day Model Variables and Coefficients*

Description

This file shows the time of day model and coefficients. A multinomial logit (MNL) model was estimated for choice of tour start time of day.

Usage

```
model_timeofday
```

Format

A dataframe with 5 variables

CHID Time of day model choice ID

CHDESC Time of day model choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the tour time of day component of the truck-touring model.

Source

The time of day model was estimated using the Texas Commercial Vehicle Survey (RSG (2012) Tour-based and Supply Chain Freight Forecasting Framework Final Report Framework, developed for the Federal Highway Administration with University of Illinois at Chicago and John Bowman BAA DTFH61-10-R-00013.)

model_vehicle_tourpattern *Vehicle and Tour Pattern Model Variables and Coefficients*

Description

This file shows the vehicle and tour pattern model and coefficients. A multinomial logit (MNL) model was estimated for the joint choice of vehicle type and tour pattern.

Usage

```
model_vehicle_tourpattern
```

Format

A dataframe with 5 variables

CHID Vehicle and tour pattern model choice ID

CHDESC Vehicle and tour pattern model choice description

VAR Explanatory variable

TYPE Type of the explanatory variable

COEFF Coefficient of the variable

Details

This table is used in the vehicle and tour pattern component of the truck-touring model.

Source

The vehicle and tour pattern model was estimated using the Texas Commercial Vehicle Survey (RSG (2012) Tour-based and Supply Chain Freight Forecasting Framework Final Report Framework, developed for the Federal Highway Administration with University of Illinois at Chicago and John Bowman BAA DTFH61-10-R-00013.)

naics6naics2 *Convert NAICS 6 to top level 2 digit codes*

Description

Given naics6 codes (Census, not BEA IO), returns naics2 codes with some aggregation (e.g. 31,32,33 reclassed as 31 Manufacturing)

Usage

```
naics6naics2(naics6)
```

Arguments

naics6	vector of naics6 codes (Census, not BEA IO)

predict_logit *Simulates the application of a logit model, with calibration*

Description

This is a generic function that is capable for simulating a logit choice inputs required are a data.table and model specification data.frame the output is a vector of the simulated choices

Usage

```
predict_logit(df, mod, cal = NULL, calcats = NULL, iter = 1)
```

Arguments

df	data.table of observations
mod	a table of coefficients (df and mod must contain the same set of variables)
cal	a table of calibration data
calcats	a correspondence table between the choice categories and the calibration categories
iter	the number of iterations of the application to run; 1 simply applies the model, >1 adjusts constants in the model to match calibration targets

Examples

```
## Not run:
predict_logit(df,mod) #applies the model without calibration

## End(Not run)
```

progressEnd *Ends a model step*

Description

This function is called at the end of a model component. It produces outputs, save workspaces, closes the progress bar, and saves the runtimes for the model component.

Usage

```
progressEnd(steplist, modellist = model)
```

Arguments

steplist	List object for the current model component
modellist	List object for the model, defaults to model

Examples

```
## Not run:
progressEnd(firm_synthesis)

## End(Not run)
```

progressManager *Starts and stops the overall progress management system for a model*

Description

This function is the main manager for the model progress management framework that controls the progress bars, run time recording, logging, and profiling

Usage

```
progressManager(StartStop, Step_RunTimes, outputlog = FALSE,
  Main_Log = "Main_Log.txt", outputprofile = FALSE,
  Profile_Log = "Profile.out", Profile_Summary = "Profile_Summary.txt")
```

Arguments

StartStop	flag to either start or stop progress managements, "Start" or "Stop" character string
Step_RunTimes	file path and file name for run times .csv file
outputlog	TRUE/FALSE for logging in a text file
Main_Log	file path and file name for log text file
outputprofile	TRUE/FALSE for run profiling via Rprof() and summaryRprof()
Profile_Log	file path and file name for profile output file
Profile_Summary	file path and file name for profile summary file

Examples

```
## Not run:
progressManager("Start",Step_RunTimes, outputlog, Main_Log,
                outputprofile, Profile_Log, Profile_Summary)

## End(Not run)
```

progressNextStep *Increments the progress bar to the next progress step*

Description

This function is called at the beginning of a step within a model component. It increments the progress bar and change the text describing the step now taking place. It also calculate the run time for the preceding step.

Usage

```
progressNextStep(stepname)
```

Arguments

stepname	Name of the step within a model component about to be run, character string

Examples

```
## Not run:
progressNextStep("Reading Inputs")

## End(Not run)
```

---

progressStart *Starts a model step: progress bar, timing, loading inputs*

Description

This function is called at the beginning of a model component to initiate the progress bar, to start timing the model steps, and to load the input used during the model

Usage

```
progressStart(steplist, steps, modellist = model)
```

Arguments

steplist	List object for the current model component
steps	Number of progress bar steps, integer (>=1)
modellist	List object for the model, defaults to model

Examples

```
## Not run:
progressStart(firm_Synthesis,9)

## End(Not run)
```

---

rFreight *Freight forecasting functions*

Description

A set of functions to support dissagregate simulation of freight movement – both shipments and the resulting freight vehicle movements.

Details

The functions can be used to create a complete model system that simulates firms, trading relationships, freight demand, shipment frequency and routing, and movements of freight by truck, rail, ship, and airplane.

The functions can be grouped into the following categories:

Application General model application functions; for example, simulating logit choice models

Freight-Data Functions that process elements of freight data and embody freight data specific nuances

Managerment Functions that support management of the model flow; for example, organizing inputs and outputs and reporting progress to the model user

PMG Functions to support integration with the procurement market game application

Truck-touring Functions to support application of the truck touring model components

The package also incldes a complete set of documented input datasets that have been used for an implementation of a model system in the CMAP region

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`runPMG` *Builds the system call to the PMG application and runs the application*

Description

Builds the systems call including the command line options to run the PMG application for a particular NAICs market and group sample from within the full set of buyers and sellers in that NAICS market.

Usage

```
runPMG(naics_io_code, groupnum = NA, writelog = FALSE, invisible = TRUE,
  wait = FALSE, pmgexe = "./PMG/pmg.exe", inipath = "./PMG/pmg.ini",
  inpath = "./outputs", outpath = "./outputs", logpath = "./outputs")
```

Arguments

`naics_io_code`	BEA io code for the commodity to be run, i.e., that matches with the filenaming used for the buy/sell/costs files (character string).
`groupnum`	is the sample group numbers for the group to be run, i.e., that matches with the numbering used for the buy/sell/costs files (integer).
`writelog`	TRUE/FALSE to indicate whether to capture standard output from the PMG application is a text file.
`invisible`	TRUE/FALSE to indicate whether to show the command window or not.
`wait`	TRUE/FALSE to indicate whether to R should wait for the PMG application to finish, or (if false) should run the PMG application asynchronously.
`pmgexe`	Path to the pmg executable, defaults to "./PMG/pmg.exe"
`inipath`	Path to the ini file, defaults to "./PMG/PMG.ini"
`inpath`	Path to the PMG inputs folder, defaults to "./outputs"
`outpath`	Path to the PMG outputs folder, defaults to "./outputs"
`logpath`	Path to the log file folder, defaults to "./outputs"

Examples

```
## Not run:
runPMG(naics,g,writelog=FALSE,wait=TRUE)

## End(Not run)
```

`saveOutputs` *Save a set of objects to .csv files*

Description

Saves a set of outputs to .csv files and then removes the objects from memory

Usage

```
saveOutputs(filelist)
```

Arguments

`filelist`	list of strings containing file paths; uses the names of the list as the object names

---

`saveSummary` *Save a set of summary tables*

Description

Saves a set of summary tables to locations listed in summary

Usage

```
saveSummary(objects, locations)
```

Arguments

`objects`	list of tables
`locations`	list of file locations (list naming need to be consistent with objects list)

`startModel` *Start the freight model*

Description

Creates a model object to contain model and scenario structure and variable information. Creates an outputs folder if required (i.e. the scenario has not been run). Reads in the scenario variables. Loads packages required by the model. Creates the lists objects for each of the model components ready for use during the model run.

Usage

```
startModel(basedir = getwd(), scenarioname = "base",
  scenvarfile = "scenario_variables.R", inputdir = "inputs",
  outputdir = "outputs", scriptsdir = "scripts", packages = NULL,
  steps = NULL, steptitles = NULL, stepscripts = NULL)
```

Arguments

`basedir`	Path to the root directory of the model (character string); defaults to the current working directory returned by getwd()
`scenarioname`	Name of the scenario, which should be identical to the directory name in the file system (character string); defaults to "base"
`scenvarfile`	Name of the file containing scenario variables, defaults to "scenario_variables.R"
`inputdir`	Name of the directory containing inputs within the scenario folder, defaults to "inputs"
`outputdir`	Name of the directory containing outputs within the scenario folder, defaults to "outputs"
`scriptsdir`	Name of the directory in the model containing model scripts, defaults to "scripts"
`packages`	Character vector of package names, for packages used in the course of running the model
`steps`	Character vector of model component names in the order that they need to be run
`steptitles`	Character vector of model component titles for use in progress bars, print statements, in the order that they need to be run
`stepscripts`	Character vector of model component script filenames so that the components can be called, in the order that they need to be run

`writePMGini` *Writes the ini file for the PMG application*

Description

Writes the ini file for the PMG application based on variables that have been set and combined into a list, specifically: RandomSeed, IMax, Verbose, DynamicAlternatePayoffs, ClairvoyantInitialExpectedPayoffs, SellersRankOffersByOrderSize, InitExpPayoff, Temptation, BothCoop, BothDefect, Sucker, RefusalPayoff, WallflowerPayoff, BuyersIgnoreSoldOutSellers, IgnoreSoldOutSellersMinBuyerSellerRatio, and RawFastParser

Usage

```
writePMGini(pmg_vars, pmg_ini_path)
```

Arguments

pmg_vars	List of named ini file variables
pmg_ini_path	Path to ini file including ini file name, can be a relative path (character string)

Examples

```
pmg_vars <- list()
# random starting seed for the PMGs
pmg_vars$RandomSeed <- 41
# number of iterations
pmg_vars$IMax <- 6
# want lots of detail about tradebots?
pmg_vars$Verbose <- 0
# recalculate alternate payoffs every iteration based on updated expected payoffs
pmg_vars$DynamicAlternatePayoffs <- 1
# should initial expected tradeoffs know size of other traders?
pmg_vars$ClairvoyantInitialExpectedPayoffs <- 1
# should sellers accept offers based on order size instead of expected payoff?
pmg_vars$SellersRankOffersByOrderSize <- 1
# multiplier to goose initial expected tradeoff to encourage experimentation with other traders
pmg_vars$InitExpPayoff <- 0.9
pmg_vars$Temptation    <- 0.6
pmg_vars$BothCoop      <- 1.0
pmg_vars$BothDefect    <- 0.6
pmg_vars$Sucker        <- 1.0
# amount to downgrade expected payoff of seller who outright refuses a trade offer by buyer
pmg_vars$RefusalPayoff <- 0.5
# negative payoff to sellers for not participating
pmg_vars$WallflowerPayoff <- 0.0
#buyers don't try to trade with sold out sellers
pmg_vars$BuyersIgnoreSoldOutSellers <- 1
#ratio at which buyers don't try to trade with sold out sellers
pmg_vars$IgnoreSoldOutSellersMinBuyerSellerRatio = 100
#faster reading of input files but does less checks (ok for use with R)
pmg_vars$RawFastParser = 1
#Call the writePMGini function to write out the variables above to the PMG ini file at run time
writePMGini(pmg_vars,"./PMG.ini")
```

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