

CS7290 Applied Bayesian Machine Learning Project

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1. Introduction

Suppose there is a company called ABC, and one of their products is a jacket. In order to promote and advertise the jacket, they have many marketing strategies including online and offline marketing. Online marketing consists of Amazon search, youtube and facebook ads, etc. Offline marketing consists of cinema ads, TV ads, radio ads, etc. Their goal is to discover the impact of various marketing channels on sales of the jacket. In this way, they can spend more money on channels that are more effective.

This is a collaborative project between Altdeep and Artefact(A digital marketing company), and me with three other students joined this project. Artefact staff have already established a quite completed flow of this project, from DAG to model building. Therefore, supervised by Artefact staff, separated tasks were assigned to each of us in order to provide some improvements for their completed work. That is to say, each of us got tasks that were individual to others. Therefore, according to tasks that I received, the final goal mentioned above is not likely to be present in this notebook. And I will try my best to combine all of my tasks into a single story.

2. Dataset

Although due to the Non-disclosure Agreement with Artefact, the original dataset file is not allowed to be present in this notebook, the definition of each variables in the dataset can be introduced.

External Shocks: Situations that cannot be defined or controlled by human, including COVID and holidays.

Price: The price of the jacket

Distribution: The number of available stores selling the jacket and the number of available jackets sold in available stores.

Marketing Offline: Impression generated by all channels of offline marketing, including video, TV, cinema, etc.

Promotion: units sold by promotion

Competition: the sales of the jacket sold by competition companies.

Other Products: the sales of other products sold by the same company that selling the jacket.

Marketing Online: Impression generated by all channels of online marketing, including Amazon, Youtube, Facebook, etc.

TGT: the sales of the jacket.

3. How to deal with cyclicity in directed graph? (Task 1)

Artefact staff have already built a directed graph based on business knowledge and statistical test. However, there are two cycles in the graph, which are shown as following:

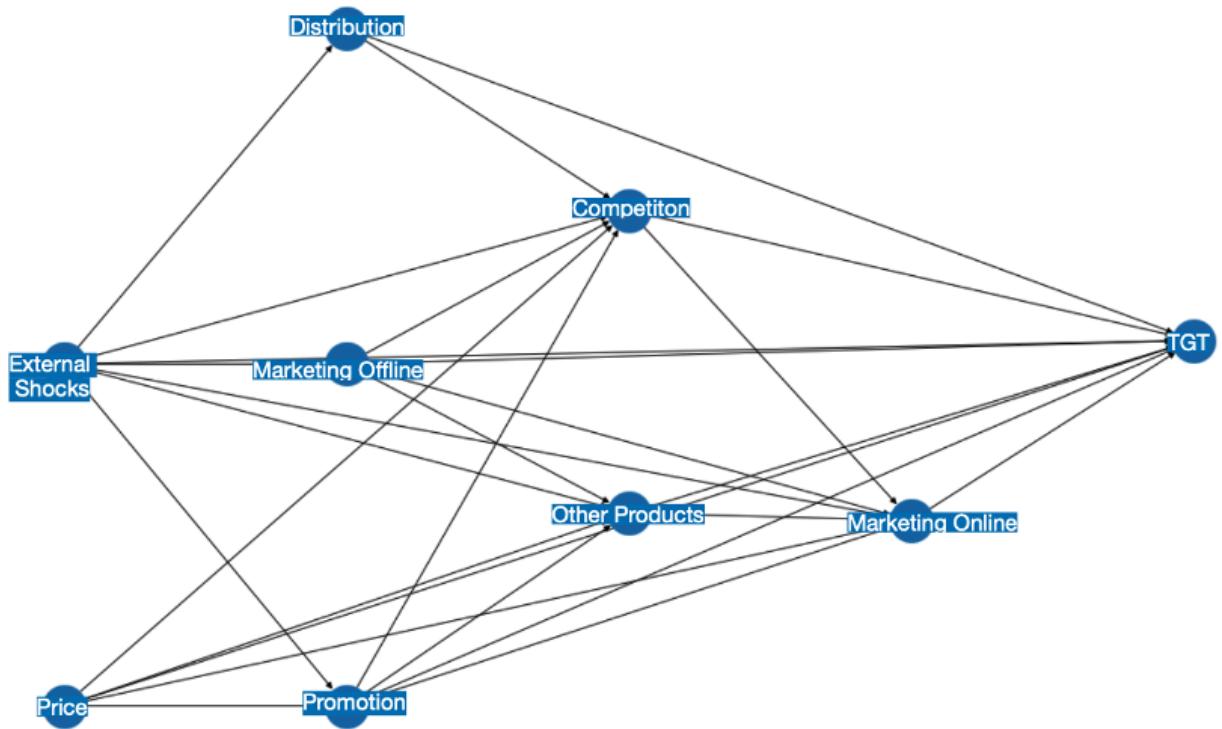
In [6]:

```
%%html

# directed graph


```

```
# directed graph
```



cycles

Cycle 1



Cycle 2



We know that the final probabilistic model should be built based on a directed acyclic graph(DAG). So how to remove cycles?

One of the solutions is Topological Sorting, which is a graph traversal in which each node v is visited only after all its dependencies are visited. The application of Topological Sorting is as following:

Step 1: Remove all lines among these nodes. Assume that there are only green blocks and no lines in each graph.

Step 2: Compare the degree of freedom of each node. That is to say, count incoming lines for each node. In the first graph, Offline Marketing is 1, Online Marketing is 3, and Competition is 3, so Offline Marketing has the highest degree of freedom. Same for the second graph.

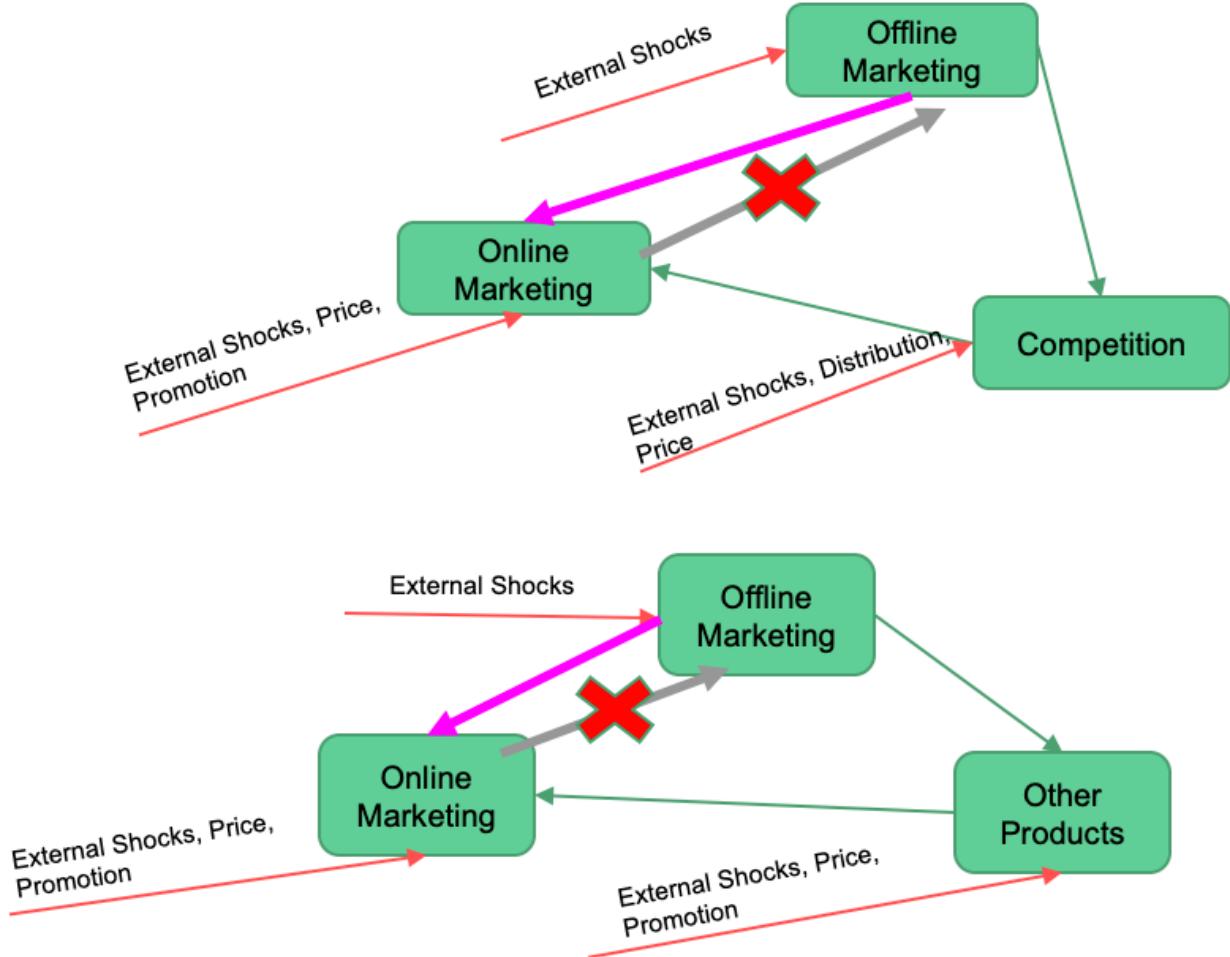
Step 3: Check if there are original lines violating the topological sorting rules. For the first graph, according to Topological Sorting, the direction between Offline and Online Marketing should be Offline to Online, and thus the grey line should be deleted and the pink line should be the correct one. Same for the second graph. Besides, for Online Marketing and Competition in the first graph, since the degree of freedom of one node is not higher than another, the original line also makes sense. Same for Online Marketing and Other Products in the second graph.

In [8]:

```
%%html  
  
# Topological Sorting Steps  

```

Topological Sorting Steps



4. What's the right metric to use for model quality control?(Task 2)

Now that we have a real DAG as well as the original model provided by Artefact, how can we know whether one model is better than another? The table below shows the advantages and disadvantages of some common evaluation metrics. In brief, Widely Applicable Information Criteria(WAIC) and Leave-one-out cross-validation (LOO) is going to be used, because they can show a balance between the goodness of fit of models and the model complexity.

In [9]:

```
%%html  
  
# metrics comparison  

```

metrics comparison

	Description	Pros	Cons
RMSE (Root Mean Square Error)	$\sqrt{\frac{1}{n} \sum_{i=1}^n (\hat{y}_i - y_i)^2}$	Reveal the difference between predicted and observed data	Cannot detect overfitting issues
MAPE (Mean Absolute Percentage Error)	$\frac{100}{n} \sum_{t=1}^n \left \frac{A_t - F_t}{A_t} \right $		
R-Hat	Values close to one indicate convergence to the underlying distribution	Reveal the degree of convergence of a random Markov Chain	
WAIC (Widely Applicable Information Criteria)	Using the computed log pointwise posterior predictive density (LPPD) and correcting for the effective number of parameters to adjust for overfitting.		
LOO (Leave-one-out cross-validation)	A cross validation method which is applied once for each instance, using all other instances as a training set and using the selected instance as a single-item test set.	Reveal the loss of information by providing a trade-off between goodness of fit and model complexity in a Bayesian way	Absolute value has no meaning, need to be used for models comparison

5. What's the right metric to use for model quality control?(Task 3)

5.1 Original Model

The original model defined variables as Normal distribution with self-defined mu and sigma(Section 5.1.4), which is based on domain knowledge. It also defined coefficients as Standard Normal distribution and Half Normal Distribution(Section 5.1.4), which are weakly informative priors. The posterior predictive check result is not bad(Section 5.1.8), but the sales data simulated from prior predictive check is not similar to the original data(Section 5.1.5). For example, the minimum and maximum value of simulated data is more extreme than original data.

For the original model, we can see from the results(Section 5.1.7) below that the convergence is perfect, since almost all values of r-hat are close to 1. For WAIC and LOO(Section 5.1.9), since the absolute value doesn't have significance, we will use them later when we have modified model.

5.1.1 Import Libraries

In [57]:

```
import pandas as pd

pd.set_option("display.max_columns", None)
pd.set_option("display.max_rows", None)

import theano.tensor as tt
import numpy as np
import matplotlib.pyplot as plt

plt.rcParams["figure.figsize"] = 20, 10

import pydot
import seaborn as sns
from matplotlib.collections import LineCollection
from statsmodels.tsa.stattools import adfuller
from scipy.stats import chi2_contingency
from pgmpy.models import BayesianModel
from pgmpy.estimators.CITests import cressie_read
import arviz as az
import pymc3 as pm
import warnings
warnings.filterwarnings('ignore')

# Pre-processing
from sklearn.preprocessing import KBinsDiscretizer
from sklearn.preprocessing import PowerTransformer

from sklearn.metrics import mean_absolute_percentage_error
from sklearn.metrics import mean_squared_error
```

5.1.2 Data Cleaning and Feature Engineering

In [58]:

```
def standard_transform(df, cols):
    mean_dict = {}
    std_dict = {}
    df_transformed = pd.DataFrame()
    for col in cols:
        col_mean = df[col].mean()
        col_std = df[col].std()
        df_transformed[col] = ((df[col] - col_mean) / col_std)
        mean_dict[col] = col_mean
        std_dict[col] = col_std
    return df_transformed, mean_dict, std_dict
```

In [59]:

```
# helper functions
def apply_mean_center(x):
    mu = np.nanmean(x)
    xm = x / mu
    return xm, mu

def mean_center_transform(df, cols):
    df_new = pd.DataFrame()
```

```

sc = {}
for col in cols:
    x = df[col].values
    df_new[col], mu = apply_mean_center(x)
    sc[col] = mu
return df_new, sc

def mean_center_transform_excl0(df, cols):
    df_new = pd.DataFrame()
    sc = {}
    df = df.replace(0, np.nan)
    for col in cols:
        x = df[col].values
        df_new[col], mu = apply_mean_center(x)
        sc[col] = mu
    df_new = df_new.replace(np.nan, 0)
    return df_new, sc

# Outlier distribution
def outlier_distribution(data):
    numeric_var_names = [
        key for key in dict(data.dtypes)
        if dict(data.dtypes)[key] in ['float64', 'int64', 'float32', 'int32']
    ]
    num = data[numeric_var_names]

    def var_summary(x):
        return pd.Series([
            x.count(),
            x.isnull().sum(),
            x.sum(),
            x.mean(),
            x.median(),
            x.std(),
            x.var(),
            x.min(),
            x.dropna().quantile(0.01),
            x.dropna().quantile(0.05),
            x.dropna().quantile(0.10),
            x.dropna().quantile(0.25),
            x.dropna().quantile(0.50),
            x.dropna().quantile(0.75),
            x.dropna().quantile(0.90),
            x.dropna().quantile(0.95),
            x.dropna().quantile(0.99),
            x.max()
        ],
        index=[
            'N', 'NMISS', 'SUM', 'MEAN', 'MEDIAN', 'STD',
            'VAR', 'MIN', 'P1', 'P5', 'P10', 'P25', 'P50',
            'P75', 'P90', 'P95', 'P99', 'MAX'
        ])
    num_summary = num.apply(lambda x: var_summary(x)).T
    return num_summary

```

```

def apply_adstock(df, col, L=8, P=3, D=1.8):
    """
    params:
    x: original media variable - column name
    L: length
    P: peak, delay in effect
    D: decay, retain rate
    returns:
    array, adstocked media variable
    """
    x = np.array(df[col])
    x = np.append(np.zeros(L - 1), x)
    weights = np.zeros(L)
    for l in range(L):
        weight = D**((l - P)**2)
        weights[L - 1 - l] = weight
    adstocked_x = []
    for i in range(L - 1, len(x)):
        x_array = x[i - L + 1:i + 1]
        xi = sum(x_array * weights) / sum(weights)
        adstocked_x.append(xi)
    return np.array(adstocked_x)

def saturation(x, s, k):
    return 1 / (1 + (x / k)**(-s))

def apply_transform(df, col, mean_transform_lkp):
    return np.log1p(df[col]) / mean_transform_lkp[col]

def geometric_adstock(x, theta, alpha, L=3):
    w = tt.as_tensor_variable(
        [tt.power(alpha, tt.power(i - theta, 2)) for i in range(L)])
    xx = tt.stack(
        [tt.concatenate([tt.zeros(i), x[:x.shape[0] - i]]) for i in range(L)])
    return tt.dot(w / tt.sum(w), xx)

def logistic_function(x_t, mu=0.1):
    return (1 * (1 - np.exp(-mu * x_t))) / (1 + np.exp(-mu * x_t))

def logistic(l):
    return 1 / (1 + tt.exp(-l))

def scale_transform(df, cols, range_min=0, range_max=1):
    min_dict = {}
    max_dict = {}
    df_transformed = pd.DataFrame()
    for col in cols:
        col_min = df[col].min()
        col_max = df[col].max()

```

```

        df_transformed[col] = (((df[col] - col_min) / (col_max - col_min)) *
                               (range_max - range_min)) + range_min
    min_dict[col] = col_min
    max_dict[col] = col_max
return df_transformed, min_dict, max_dict

def revert_scale_transform(df_transformed,
                           cols,
                           min_lookup,
                           max_lookup,
                           range_min=0,
                           range_max=1):
    df_actual = pd.DataFrame()
    for col in cols:
        if 'TGT' in col:
            col_min = min_lookup['TGT']
            col_max = max_lookup['TGT']
        else:
            col_min = min_lookup[col]
            col_max = max_lookup[col]
        df_actual[col] = (((df_transformed[col] - range_min) /
                           (range_max - range_min)) *
                           (col_max - col_min)) + col_min
    return df_actual

```

In [60]:

```
# According to the Non-disclosure Agreement, dataset is not allowed to be pre

df_init['week_id'] = pd.to_datetime(df_init['week_id'],
                                    format='%Y-%m-%d').dt.date
df_init.set_index(['core', 'npd', 'competition', 'week_id'], inplace=True)
week_index = df_init.reset_index()['week_id']
```

In [61]:

```
COLS = [
    'TGT', 'MARKETING_ONLINE', 'MARKETING_OFFLINE', 'MARKETING_ONLINE_SP',
    'MARKETING_OFFLINE_SP', 'PROMO', 'PRICE', 'DISTRIBUTION', 'OTHER_PRODUCTS',
    'COMPETITION', 'EXT_SHOCKS'
]
COLS_DICT = dict(zip(COLS, [[]] * len(COLS)))
COLS_DICT['MARKETING_ONLINE'] = [
    x for x in df_init.columns if ('core' in x)
    & ((('impressions' in x) | ('cpp' in x) | ('spend' in x))
        & (x.split('_')[1].lower() not in ['cinema', 'tv', 'bvod', 'ooh', 'radio'])
    ]
existing = list(COLS_DICT['MARKETING_ONLINE'])

COLS_DICT['MARKETING_OFFLINE'] = [
    x for x in df_init.columns if ('core' in x)
    & ((('impressions' in x) | ('cpp' in x) | ('spend' in x))
        & (x.split('_')[1].lower() in ['cinema', 'tv', 'bvod', 'ooh', 'radio']))
    ]
existing.extend(list(COLS_DICT['MARKETING_OFFLINE']))

COLS_DICT['PROMO'] = [
```

```

        x for x in df_init.columns if ('core' in x)
        & ('promo' in x)
    ]
existing.extend(list(COLS_DICT['PROMO']))

COLS_DICT['PRICE'] = [
    x for x in df_init.columns if ('core' in x)
    & ('price' in x)
]
existing.extend(list(COLS_DICT['PRICE']))

COLS_DICT['TGT'] = [
    x for x in df_init.columns if (x not in existing)
    & ('core' in x)
    & ('sales' in x)
]
existing.extend(list(COLS_DICT['TGT']))

COLS_DICT['DISTRIBUTION'] = [
    x for x in df_init.columns if (x not in existing)
    & ('core' in x)
]
existing.extend(list(COLS_DICT['DISTRIBUTION']))

COLS_DICT['OTHER_PRODUCTS'] = [
    x for x in df_init.columns if (x not in existing)
    & ('npd' in x)
    | (x.split('_')[0].lower() in ['em', 'candles', 'reeds'])
]
existing.extend(list(COLS_DICT['OTHER_PRODUCTS']))

COLS_DICT['COMPETITION'] = [
    x for x in df_init.columns if (x not in existing)
    & ('comp' in x)
]
existing.extend(list(COLS_DICT['COMPETITION']))

COLS_DICT['EXT_SHOCKS'] = [x for x in df_init.columns if (x not in existing)]
existing.extend(list(COLS_DICT['EXT_SHOCKS']))

assert len(np.unique(existing)) == len(np.unique(df_init.columns))

```

```
In [62]: # Create a dataframe: first iteration - impressions for media, units for sale
df_proc = df_init.copy()

COLS_DICT_SUBSET = dict()

# sales-based
COLS_DICT_SUBSET['TGT'] = [
    x for x in COLS_DICT['TGT'] if ('units' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['PROMO'] = [
    x for x in COLS_DICT['PROMO'] if ('units' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['COMPETITION'] = [
    x for x in COLS_DICT['COMPETITION'] if ('units' in x) & ('sum' in x)
]

# media-based
COLS_DICT_SUBSET['MARKETING_ONLINE'] = [
    x for x in COLS_DICT['MARKETING_ONLINE']
    if ('impressions' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['MARKETING_ONLINE_SP'] = [
    x for x in COLS_DICT['MARKETING_ONLINE'] if ('spend' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['MARKETING_OFFLINE'] = [
    x for x in COLS_DICT['MARKETING_OFFLINE']
    if ('impressions' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['MARKETING_OFFLINE_SP'] = [
    x for x in COLS_DICT['MARKETING_OFFLINE'] if ('spend' in x) & ('sum' in x)
]
COLS_DICT_SUBSET['OTHER_PRODUCTS'] = [
    x for x in COLS_DICT['OTHER_PRODUCTS']
    if ('impressions' in x) & ('sum' in x)
]

# other
COLS_DICT_SUBSET['DISTRIBUTION'] = [
    x for x in COLS_DICT['DISTRIBUTION'] if ('sum' in x)
]
COLS_DICT_SUBSET['PRICE'] = COLS_DICT['PRICE']
COLS_DICT_SUBSET['seasonality_holidays'] = [
    x for x in COLS_DICT['EXT_SHOCKS'] if ('seasonality_holidays' in x)
]
COLS_DICT_SUBSET['covid_new_cases'] = [
    x for x in COLS_DICT['EXT_SHOCKS'] if ('new_cases' in x)
]
```

```
In [63]: df_proc = df_proc.sort_values(by=['week_id']).reset_index(drop=True)

# Fillna with zero
df_proc = df_proc.fillna(0)

# Outlier capping
```

```

for col in df_proc.columns:
    percentiles = df_proc[col].quantile([0.01, 0.99]).values
    df_proc[col] = np.clip(df_proc[col], percentiles[0], percentiles[1])

# Media impressions
df_proc_media = df_proc[COLS_DICT_SUBSET['MARKETING_ONLINE'] +
                       COLS_DICT_SUBSET['MARKETING_OFFLINE']]

# mean center data
mean_dict_media = {}
for col in df_proc_media.columns:
    mean_dict_media[f"{col.lower()}_mean"] = df_proc_media[col].mean()

# Applying mean center transformation
df_transformed_media, transform_lookup_media = mean_center_transform_excl0(
    df_proc_media, df_proc_media.columns)

data = pd.DataFrame()
for (k, v) in COLS_DICT_SUBSET.items():
    if k == 'MARKETING_OFFLINE':
        data[k] = df_transformed_media[v].sum(axis=1)
    elif k == 'MARKETING_ONLINE':
        data[k] = df_proc_media[v].sum(axis=1)
    elif k == 'PRICE':
        data[k] = df_proc[v].median(axis=1)
    else:
        data[k] = df_proc[v].sum(axis=1)

data2 = pd.concat([
    data, df_transformed_media,
    df_proc[COLS_DICT_SUBSET['MARKETING_ONLINE_SP'] +
            COLS_DICT_SUBSET['MARKETING_OFFLINE_SP']]
],
axis=1)

# Adding absolute minimum for holidays to avoid -ve values before log transfo
data2['seasonality_holidays'] = data2['seasonality_holidays'] + abs(
    data2.seasonality_holidays.min())

# Log transformation
log_data2 = pd.DataFrame()
for col in data2.columns:
    log_data2[col] = np.log(data2[col] + 1)

# log_data2 = data2.copy()
# Applying mean center transformation
df_transformed, transform_lookup = mean_center_transform_excl0(
    log_data2, log_data2.columns)

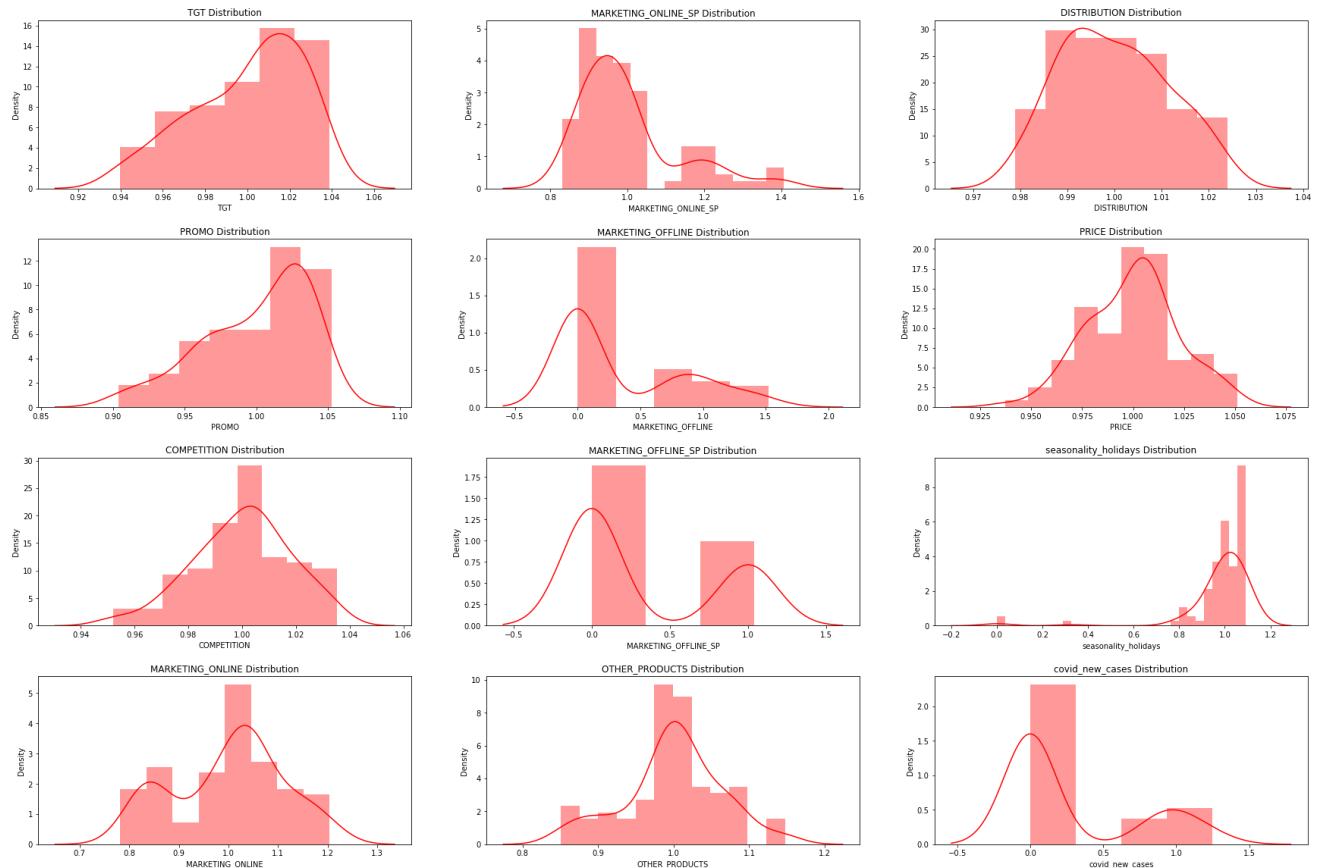
# Storing final data mean and sigma
data_dict = {}
mean_dict = {}
sigma_dict = {}
for col in df_transformed.columns:
    data_dict[col.lower()] = df_transformed[col].values
    mean_dict[f'{col.lower()}_mean'] = df_transformed[col].mean()
    sigma_dict[f'{col.lower()}_sigma'] = df_transformed[col].std()

```

5.1.3 Data Visualization

In [64]:

```
fig, ax = plt.subplots(4, 3, figsize=(30, 20))
i = 0
j = 0
k = 0
while i < 12:
    p = sns.distplot(df_transformed[df_transformed.columns[i]],
                      color="r",
                      kde=True,
                      ax=ax[j][k])
    p.set_title(df_transformed.columns[i] + ' Distribution')
    i += 1
    if j == 3:
        j = 0
        k += 1
    else:
        j += 1
plt.subplots_adjust(left=None,
                    bottom=None,
                    right=None,
                    top=None,
                    wspace=None,
                    hspace=0.3)
```



5.1.4 Build the Model

In [65]:

```
#  
#  
#
```

```

with pm.Model() as py_stan_dag2:

    ##### Defining Mean & Sigma #####
    len_df = len(data_dict['tgt'])
    seasonality_holidays_mean = mean_dict['seasonality_holidays_mean']
    covid_new_cases_mean = mean_dict['covid_new_cases_mean']
    seasonality_holidays_sigma = sigma_dict['seasonality_holidays_sigma']
    covid_new_cases_sigma = sigma_dict['covid_new_cases_sigma']
    price_mean = mean_dict['price_mean']
    price_sigma = sigma_dict['price_sigma']
    marketing_offline_sigma = sigma_dict['marketing_offline_sigma']
    marketing_offline_mean = mean_dict['marketing_offline_mean']
    promo_sigma = sigma_dict['promo_sigma']
    promo_mean = mean_dict['promo_mean']
    distribution_sigma = sigma_dict['distribution_sigma']
    distribution_mean = mean_dict['distribution_mean']
    competition_sigma = sigma_dict['competition_sigma']
    competition_mean = mean_dict['competition_mean']
    other_products_sigma = sigma_dict['other_products_sigma']
    other_products_mean = mean_dict['other_products_mean']
    marketing_online_sigma = sigma_dict['marketing_online_sigma']
    marketing_online_mean = mean_dict['marketing_online_mean']
    tgt_mean = mean_dict['tgt_mean']

    tgt_sigma = pm.HalfNormal('tgt_sigma', 1)
    ##### Defining Beta's #####
    BoundedNormal = pm.Bound(pm.Normal, upper=0)
    beta_price_to_promo = BoundedNormal('beta_price_to_promo', 0, 1)
    beta_seasonality_holidays_to_promo = pm.Normal(
        'beta_seasonality_holidays_to_promo', 0, 1)
    beta_covid_new_cases_to_promo = pm.Normal('beta_covid_new_cases_to_promo',
                                              0, 1)
    beta_offline_to_online = pm.HalfNormal('beta_offline_to_online', 1)
    beta_seasonality_holidays_to_online = BoundedNormal(
        'beta_seasonality_holidays_to_online', 0, 1)
    beta_covid_new_cases_to_online = BoundedNormal(
        'beta_covid_new_cases_to_online', 0, 1)
    beta_seasonality_holidays_to_distribution = pm.Normal(
        'beta_seasonality_holidays_to_distribution', 0, 1)
    beta_covid_new_cases_to_distribution = pm.Normal(
        'beta_covid_new_cases_to_distribution', 0, 1)
    beta_price_to_competition = pm.Normal('beta_price_to_competition', 0, 1)
    beta_seasonality_holidays_to_competition = pm.Normal(
        'beta_seasonality_holidays_to_competition', 0, 1)
    beta_covid_new_cases_to_competition = pm.Normal(
        'beta_covid_new_cases_to_competition', 0, 1)
    beta_promo_to_competition = BoundedNormal('beta_promo_to_competition', 0,
                                              1)
    beta_online_to_competition = BoundedNormal('beta_online_to_competition',
                                              1)
    beta_distribution_to_competition = BoundedNormal(
        'beta_distribution_to_competition', 0, 1)
    beta_offline_to_competition = pm.Normal('beta_offline_to_competition', 0,
                                             1)
    beta_price_to_otherprod = pm.Normal('beta_price_to_otherprod', 0, 1)

```

```

beta_seasonality_holidays_to_otherprod = pm.Normal(
    'beta_seasonality_holidays_to_otherprod', 0, 1)
beta_covid_new_cases_to_otherprod = pm.Normal(
    'beta_covid_new_cases_to_otherprod', 0, 1)
beta_promo_to_otherprod = pm.Normal('beta_promo_to_otherprod', 0, 1)
beta_online_to_otherprod = pm.Normal('beta_online_to_otherprod', 0, 1)
beta_offline_to_otherprod = pm.Normal('beta_offline_to_otherprod', 0, 1)
beta_seasonality_holidays_to_offline = pm.Normal(
    'beta_seasonality_holidays_to_offline', 0, 1)
beta_covid_new_cases_to_offline = pm.Normal(
    'beta_covid_new_cases_to_offline', 0, 1)
beta_promo_to_offline = pm.Normal('beta_promo_to_offline', 0, 1)
beta_price_to_offline = pm.Normal('beta_price_to_offline', 0, 1)
beta_seasonality_holidays_to_tgt = BoundedNormal(
    'beta_seasonality_holidays_to_tgt', 0, 1)
beta_covid_new_cases_to_tgt = BoundedNormal('beta_covid_new_cases_to_tgt'
                                             0, 1)
beta_distribution_to_tgt = pm.HalfNormal('beta_distribution_to_tgt', 1)
beta_competition_to_tgt = BoundedNormal('beta_competition_to_tgt', 0, 1)
beta_online_to_tgt = pm.HalfNormal('beta_online_to_tgt', 1)
beta_price_to_tgt = BoundedNormal('beta_price_to_tgt', 0, 1)
beta_promo_to_tgt = pm.HalfNormal('beta_promo_to_tgt', 1)
beta_otherprod_to_tgt = pm.HalfNormal('beta_otherprod_to_tgt', 1)
beta_offline_to_tgt = pm.HalfNormal('beta_offline_to_tgt', 1)

seasonality_holidays_alpha = pm.Normal('seasonality_holidays_alpha', 0, 1)
covid_new_cases_alpha = pm.Normal('covid_new_cases_alpha', 0, 1)
promo_mu = pm.Normal('promo_mu',
                      promo_mean,
                      sigma=promo_sigma,
                      shape=len_df)
price_mu = pm.Normal('price_mu',
                      price_mean,
                      sigma=price_sigma,
                      shape=len_df)
marketing_online_mu = pm.Normal('marketing_online_mu',
                                 marketing_online_mean,
                                 sigma=2 * marketing_online_sigma,
                                 shape=len_df)
distribution_mu = pm.Normal('distribution_mu',
                            distribution_mean,
                            sigma=distribution_sigma,
                            shape=len_df)
marketing_offline_mu = pm.Normal('marketing_offline_mu',
                                 marketing_offline_mean,
                                 sigma=marketing_offline_sigma,
                                 shape=len_df)
other_products_mu = pm.Normal('other_products_mu',
                               other_products_mean,
                               sigma=other_products_sigma,
                               shape=len_df)
competition_mu = pm.Normal('competition_mu',
                           competition_mean,
                           sigma=competition_sigma,
                           shape=len_df)
tgt_mu = pm.Normal('tgt_mu',
                   tgt_mean,

```

```

        sigma=sigma_dict['tgt_sigma'],
        shape=len_df)

beta_online = pm.Deterministic(
    f'beta_online_spend',
    tt.switch(tt.eq(data2['MARKETING_ONLINE_SP'].values, 0), 0, 1))
beta_offline = pm.Deterministic(
    f'beta_offline_spend',
    tt.switch(tt.eq(data2['MARKETING_OFFLINE_SP'].values, 0), 0, 1))

##### Defining Adstock media #####
# Offline Adstock
alpha_offline = pm.Beta('alpha_offline', 6, 6) # retain rate in adstock
# alpha_offline = pm.Beta('alpha_offline', 3, 3) # retain rate
theta_offline = pm.Uniform('theta_offline', 0, 1.5) # delay in adstock

# Online Adstock
alpha_online = pm.Beta('alpha_online', 3, 3) # retain rate in adstock
theta_online = pm.Uniform('theta_online', 0, 0.5) # delay in adstock

##### parent nodes #####
seasonality_holidays_mu = pm.Normal('seasonality_holidays_mu',
                                      seasonality_holidays_mean,
                                      sigma=seasonality_holidays_sigma,
                                      shape=len_df)
covid_new_cases_mu = pm.Normal('covid_new_cases_mu',
                               covid_new_cases_mean,
                               sigma=covid_new_cases_sigma,
                               shape=len_df)

seasonality_holidays = data_dict['seasonality_holidays']
covid_new_cases = data_dict['covid_new_cases']

price = pm.Normal('price',
                  price_mu,
                  sigma=price_sigma,
                  shape=len_df,
                  observed=data_dict['price'])

##### Child nodes #####
promo = pm.Normal(
    'promo',
    promo_mu + beta_price_to_promo * price +
    beta_seasonality_holidays_to_promo * seasonality_holidays +
    beta_covid_new_cases_to_promo * covid_new_cases,
    sigma=promo_sigma,
    shape=len_df,
    observed=data_dict['promo'])

marketing_offline_old = pm.Normal(
    'marketing_offline_old',
    beta_offline *
    (marketing_offline_mu +
     beta_seasonality_holidays_to_offline * seasonality_holidays +
     beta_covid_new_cases_to_offline * covid_new_cases +
     beta_promo_to_offline * promo + beta_price_to_offline * price),

```

```

sigma=marketing_offline_sigma,
shape=len_df,
observed=data_dict['marketing_offline'])

marketing_offline = pm.Deterministic(
    'marketing_offline',
    geometric_adstock(x=marketing_offline_old,
                       theta=theta_offline,
                       alpha=alpha_offline,
                       L=4))

distribution = pm.Normal(
    'distribution',
    distribution_mu +
    beta_seasonality_holidays_to_distribution * seasonality_holidays +
    beta_covid_new_cases_to_distribution * covid_new_cases,
    sigma=distribution_sigma,
    shape=len_df,
    observed=data_dict['distribution'])

marketing_online_old = pm.Normal(
    'marketing_online_old',
    beta_online *
    (marketing_online_mu + beta_offline_to_online * marketing_offline +
     beta_seasonality_holidays_to_online * seasonality_holidays +
     beta_covid_new_cases_to_online * covid_new_cases),
    sigma=marketing_online_sigma,
    shape=len_df,
    observed=data_dict['marketing_online']))

marketing_online = pm.Deterministic(
    'marketing_online',
    geometric_adstock(x=marketing_online_old,
                       theta=theta_online,
                       alpha=alpha_online,
                       L=2))

other_products = pm.Normal(
    'other_products',
    other_products_mu + beta_price_to_otherprod * price +
    beta_seasonality_holidays_to_otherprod * seasonality_holidays +
    beta_covid_new_cases_to_otherprod * covid_new_cases +
    beta_promo_to_otherprod * promo +
    beta_offline_to_otherprod * marketing_offline +
    beta_online_to_otherprod * marketing_online,
    sigma=other_products_sigma,
    shape=len_df,
    observed=data_dict['other_products'])

competition = pm.Normal(
    'competition',
    competition_mu + beta_price_to_competition * price +
    beta_seasonality_holidays_to_competition * seasonality_holidays +
    beta_covid_new_cases_to_competition * covid_new_cases +
    beta_promo_to_competition * promo +
    beta_online_to_competition * marketing_online +
    beta_distribution_to_competition * distribution +

```

```

        beta_offline_to_competition * marketing_offline,
        sigma=competition_sigma,
        shape=len_df,
        observed=data_dict[ 'competition' ])

#####
##### Prediction #####
y = pm.Normal(
    'tgt_pred',
    tgt_mu + beta_seasonality_holidays_to_tgt * seasonality_holidays +
    beta_covid_new_cases_to_tgt * covid_new_cases +
    beta_distribution_to_tgt * distribution +
    beta_competition_to_tgt * competition +
    beta_offline_to_tgt * marketing_offline + beta_price_to_tgt * price +
    beta_promo_to_tgt * promo + beta_otherprod_to_tgt * other_products +
    beta_online_to_tgt * marketing_online,
    sigma=tgt_sigma,
    observed=data_dict[ 'tgt' ])

```

CPU times: user 4.94 s, sys: 248 ms, total: 5.19 s
Wall time: 5.53 s

5.1.5 Prior Predictive Check

In [15]:

```
sim_priors_original = pm.sample_prior_predictive(samples=400,
                                                 model=py_stan_dag2,
                                                 random_seed=101)
```

In [16]:

```
tgt_pred_sim_priors_original = []
for i in sim_priors_original[ 'tgt_pred' ][0]:
    for j in i:
        tgt_pred_sim_priors_original.append(j)

c = { "simulated tgt_pred": tgt_pred_sim_priors_original}
df_sim1 = pd.DataFrame(c)
df_sim1.describe()
```

Out[16]:

	simulated tgt_pred
count	41600.000000
mean	4.131076
std	4.943801
min	-32.996865
25%	1.134722
50%	3.638802
75%	6.679424
max	43.632048

```
In [26]: df_transformed[ 'TGT' ].describe()
```

```
Out[26]: count    104.000000
mean      1.000000
std       0.026095
min       0.939898
25%      0.980606
50%      1.006009
75%      1.021171
max      1.038779
Name: TGT, dtype: float64
```

5.1.6 Sampling

```
In [66]:
```

```
%%time
with py_stan_dag2:
    # sample using the model
    step = pm.NUTS(target_accept=0.9)
    trace_dag = pm.sample(400,
                          tune=100,
                          step=step,
                          chains=2,
                          return_inferencedata=False,
                          random_seed=101,
                          cores=4)
```

```

Only 400 samples in chain.
Multiprocess sampling (2 chains in 4 jobs)
NUTS: [covid_new_cases_mu, seasonality_holidays_mu, theta_online, alpha_online,
, theta_offline, alpha_offline, tgt_mu, competition_mu, other_products_mu, mar-
keting_offline_mu, distribution_mu, marketing_online_mu, price_mu, promo_mu, c-
ovid_new_cases_alpha, seasonality_holidays_alpha, beta_offline_to_tgt, beta_ot-
herprod_to_tgt, beta_promo_to_tgt, beta_price_to_tgt, beta_online_to_tgt, beta-
_competition_to_tgt, beta_distribution_to_tgt, beta_covid_new_cases_to_tgt, be-
ta_seasonality_holidays_to_tgt, beta_price_to_offline, beta_promo_to_offline,
beta_covid_new_cases_to_offline, beta_seasonality_holidays_to_offline, beta_of-
fline_to_otherprod, beta_online_to_otherprod, beta_promo_to_otherprod, beta_co-
vid_new_cases_to_otherprod, beta_seasonality_holidays_to_otherprod, beta_price-
_to_otherprod, beta_offline_to_competition, beta_distribution_to_competition,
beta_online_to_competition, beta_promo_to_competition, beta_covid_new_cases_to-
_competition, beta_seasonality_holidays_to_competition, beta_price_to_competi-
tion, beta_covid_new_cases_to_distribution, beta_seasonality_holidays_to_distri-
bution, beta_covid_new_cases_to_online, beta_seasonality_holidays_to_online, b-
eta_offline_to_online, beta_covid_new_cases_to_promo, beta_seasonality_holiday-
s_to_promo, beta_price_to_promo, tgt_sigma]

```

100.00% [1000/1000 05:49<00:00 Sampling

2 chains, 114 divergences]

Sampling 2 chains for 100 tune and 400 draw iterations (200 + 800 draws total) took 360 seconds.

There were 35 divergences after tuning. Increase `target_accept` or reparameterize.

The chain reached the maximum tree depth. Increase max_treedepth, increase target_accept or reparameterize.

There were 79 divergences after tuning. Increase `target_accept` or reparameterize.

The chain reached the maximum tree depth. Increase max_treedepth, increase target_accept or reparameterize.

The rhat statistic is larger than 1.4 for some parameters. The sampler did not converge.

The estimated number of effective samples is smaller than 200 for some parameters.

CPU times: user 1min 1s, sys: 4.18 s, total: 1min 5s

Wall time: 7min 2s

5.1.7 View Summary and trace plots

In [67]:

```
az.summary(trace_dag)
```

Got error No model on context stack. trying to find log_likelihood in translation.

Out[67]:

	mean	sd	hdi_3%	hdi_97%	mcse_mean	mcse_sd
beta_seasonality_holidays_to_promo	0.111	0.028	0.062	0.164	0.001	0.001
beta_covid_new_cases_to_promo	-0.051	0.012	-0.072	-0.027	0.000	0.000
beta_seasonality_holidays_to_distribution	0.004	0.002	0.001	0.008	0.000	0.000
beta_covid_new_cases_to_distribution	-0.015	0.003	-0.021	-0.008	0.000	0.000
beta_price_to_competition	0.128	0.102	-0.040	0.316	0.015	0.015

beta_seasonality_holidays_to_competition	0.065	0.016	0.036	0.094	0.001	0.0
beta_covid_new_cases_to_competition	-0.003	0.008	-0.019	0.013	0.001	0.0
beta_offline_to_competition	0.004	0.007	-0.008	0.017	0.000	0.0
beta_price_to_otherprod	-0.361	0.303	-0.954	0.218	0.056	0.0
beta_seasonality_holidays_to_otherprod	0.056	0.077	-0.078	0.209	0.010	0.0
beta_covid_new_cases_to_otherprod	0.017	0.036	-0.049	0.084	0.005	0.0
beta_promo_to_otherprod	0.434	0.351	-0.235	1.162	0.069	0.0
beta_online_to_otherprod	-0.133	0.085	-0.281	0.027	0.003	0.0
beta_offline_to_otherprod	0.000	0.025	-0.046	0.048	0.001	0.0
beta_seasonality_holidays_to_offline	0.188	0.534	-0.739	1.329	0.121	0.0
beta_covid_new_cases_to_offline	0.487	1.013	-1.177	2.367	0.344	0.2
beta_promo_to_offline	0.333	0.636	-0.907	1.428	0.153	0.1
beta_price_to_offline	0.119	0.640	-1.231	1.136	0.220	0.1
seasonality_holidays_alpha	-0.076	1.028	-1.949	1.613	0.511	0.3
covid_new_cases_alpha	-0.127	0.851	-1.619	1.347	0.354	0.2
promo_mu[0]	1.000	0.026	0.950	1.048	0.001	0.0
promo_mu[1]	0.997	0.027	0.945	1.049	0.001	0.0
promo_mu[2]	1.003	0.027	0.956	1.057	0.001	0.0
promo_mu[3]	1.008	0.026	0.962	1.057	0.001	0.0
promo_mu[4]	1.003	0.028	0.953	1.058	0.001	0.0
promo_mu[5]	1.003	0.026	0.956	1.052	0.001	0.0
promo_mu[6]	1.006	0.024	0.963	1.052	0.001	0.0
promo_mu[7]	0.990	0.026	0.942	1.038	0.001	0.0
promo_mu[8]	0.998	0.028	0.947	1.050	0.001	0.0
promo_mu[9]	1.007	0.026	0.962	1.056	0.001	0.0
promo_mu[10]	1.006	0.026	0.954	1.052	0.001	0.0
promo_mu[11]	1.006	0.030	0.947	1.056	0.001	0.0
promo_mu[12]	1.001	0.026	0.959	1.059	0.001	0.0
promo_mu[13]	1.002	0.026	0.956	1.055	0.001	0.0
promo_mu[14]	1.000	0.027	0.949	1.053	0.001	0.0
promo_mu[15]	0.999	0.025	0.951	1.048	0.001	0.0
promo_mu[16]	1.010	0.026	0.969	1.061	0.001	0.0
promo_mu[17]	1.001	0.027	0.951	1.049	0.001	0.0
promo_mu[18]	0.993	0.027	0.939	1.040	0.001	0.0

promo_mu[19]	1.002	0.027	0.958	1.057	0.001	0.0
promo_mu[20]	0.996	0.028	0.945	1.049	0.001	0.0
promo_mu[21]	1.024	0.029	0.967	1.074	0.001	0.0
promo_mu[22]	1.009	0.024	0.959	1.048	0.001	0.0
promo_mu[23]	1.002	0.028	0.942	1.046	0.001	0.0
promo_mu[24]	0.999	0.025	0.952	1.040	0.001	0.0
promo_mu[25]	1.003	0.029	0.951	1.061	0.001	0.0
promo_mu[26]	0.998	0.026	0.949	1.044	0.001	0.0
promo_mu[27]	0.997	0.026	0.948	1.046	0.001	0.0
promo_mu[28]	1.000	0.026	0.953	1.051	0.001	0.0
promo_mu[29]	1.002	0.025	0.960	1.051	0.001	0.0
promo_mu[30]	1.006	0.025	0.965	1.054	0.001	0.0
promo_mu[31]	1.001	0.027	0.951	1.047	0.001	0.0
promo_mu[32]	0.994	0.028	0.942	1.043	0.001	0.0
promo_mu[33]	1.006	0.026	0.958	1.053	0.001	0.0
promo_mu[34]	1.008	0.028	0.960	1.064	0.001	0.0
promo_mu[35]	1.004	0.025	0.955	1.047	0.001	0.0
promo_mu[36]	1.000	0.025	0.954	1.045	0.001	0.0
promo_mu[37]	1.002	0.026	0.953	1.048	0.001	0.0
promo_mu[38]	1.002	0.025	0.957	1.058	0.001	0.0
promo_mu[39]	1.002	0.026	0.956	1.048	0.001	0.0
promo_mu[40]	1.005	0.027	0.953	1.052	0.001	0.0
promo_mu[41]	1.011	0.029	0.960	1.061	0.001	0.0
promo_mu[42]	1.008	0.026	0.962	1.061	0.001	0.0
promo_mu[43]	1.004	0.029	0.952	1.054	0.001	0.0
promo_mu[44]	1.001	0.026	0.958	1.051	0.001	0.0
promo_mu[45]	1.001	0.026	0.955	1.048	0.001	0.0
promo_mu[46]	1.008	0.027	0.959	1.059	0.001	0.0
promo_mu[47]	1.005	0.027	0.955	1.054	0.001	0.0
promo_mu[48]	1.009	0.026	0.968	1.065	0.001	0.0
promo_mu[49]	1.005	0.027	0.954	1.054	0.001	0.0
promo_mu[50]	1.011	0.028	0.960	1.061	0.001	0.0
promo_mu[51]	1.013	0.025	0.964	1.059	0.001	0.0
promo_mu[52]	1.004	0.026	0.958	1.058	0.001	0.0

promo_mu[53]	0.998	0.025	0.949	1.041	0.001	0.0
promo_mu[54]	1.001	0.027	0.947	1.050	0.001	0.0
promo_mu[55]	1.004	0.027	0.954	1.053	0.001	0.0
promo_mu[56]	1.004	0.028	0.950	1.057	0.001	0.0
promo_mu[57]	1.011	0.026	0.964	1.058	0.001	0.0
promo_mu[58]	1.014	0.025	0.968	1.057	0.001	0.0
promo_mu[59]	1.004	0.025	0.961	1.053	0.001	0.0
promo_mu[60]	0.939	0.027	0.890	0.990	0.001	0.0
promo_mu[61]	0.983	0.026	0.931	1.031	0.001	0.0
promo_mu[62]	0.988	0.031	0.928	1.040	0.001	0.0
promo_mu[63]	1.006	0.027	0.959	1.059	0.001	0.0
promo_mu[64]	1.006	0.027	0.958	1.057	0.001	0.0
promo_mu[65]	1.005	0.025	0.958	1.051	0.001	0.0
promo_mu[66]	0.991	0.026	0.944	1.036	0.001	0.0
promo_mu[67]	0.981	0.027	0.933	1.034	0.001	0.0
promo_mu[68]	0.979	0.027	0.928	1.031	0.001	0.0
promo_mu[69]	0.986	0.025	0.939	1.032	0.001	0.0
promo_mu[70]	0.988	0.027	0.937	1.034	0.001	0.0
promo_mu[71]	0.987	0.028	0.934	1.037	0.001	0.0
promo_mu[72]	0.967	0.027	0.921	1.018	0.001	0.0
promo_mu[73]	1.008	0.030	0.953	1.067	0.001	0.0
promo_mu[74]	1.000	0.030	0.946	1.060	0.001	0.0
promo_mu[75]	0.991	0.025	0.947	1.035	0.001	0.0
promo_mu[76]	0.978	0.027	0.924	1.022	0.001	0.0
promo_mu[77]	0.986	0.026	0.933	1.029	0.001	0.0
promo_mu[78]	0.994	0.026	0.944	1.037	0.001	0.0
promo_mu[79]	0.996	0.026	0.949	1.047	0.001	0.0
promo_mu[80]	0.998	0.027	0.947	1.045	0.001	0.0
promo_mu[81]	0.996	0.026	0.947	1.045	0.001	0.0
promo_mu[82]	0.999	0.027	0.945	1.046	0.001	0.0
promo_mu[83]	0.999	0.026	0.952	1.044	0.001	0.0
promo_mu[84]	0.993	0.028	0.941	1.043	0.001	0.0
promo_mu[85]	0.980	0.028	0.928	1.036	0.001	0.0
promo_mu[86]	1.001	0.031	0.945	1.056	0.001	0.0

promo_mu[87]	1.000	0.027	0.953	1.055	0.001	0.0
promo_mu[88]	0.997	0.028	0.940	1.044	0.001	0.0
promo_mu[89]	0.997	0.025	0.947	1.040	0.001	0.0
promo_mu[90]	0.999	0.026	0.953	1.046	0.001	0.0
promo_mu[91]	0.989	0.026	0.945	1.035	0.001	0.0
promo_mu[92]	0.992	0.027	0.937	1.037	0.001	0.0
promo_mu[93]	0.998	0.027	0.943	1.045	0.001	0.0
promo_mu[94]	1.004	0.027	0.953	1.055	0.001	0.0
promo_mu[95]	1.011	0.026	0.964	1.058	0.001	0.0
promo_mu[96]	1.002	0.026	0.955	1.051	0.001	0.0
promo_mu[97]	0.998	0.026	0.948	1.045	0.001	0.0
promo_mu[98]	1.000	0.027	0.955	1.054	0.001	0.0
promo_mu[99]	1.006	0.026	0.960	1.055	0.001	0.0
promo_mu[100]	1.011	0.028	0.961	1.065	0.001	0.0
promo_mu[101]	1.010	0.028	0.957	1.061	0.001	0.0
promo_mu[102]	1.019	0.028	0.965	1.069	0.001	0.0
promo_mu[103]	1.027	0.027	0.979	1.075	0.001	0.0
price_mu[0]	1.003	0.016	0.974	1.033	0.001	0.0
price_mu[1]	0.998	0.016	0.972	1.030	0.001	0.0
price_mu[2]	0.996	0.017	0.963	1.027	0.001	0.0
price_mu[3]	1.000	0.016	0.968	1.027	0.001	0.0
price_mu[4]	1.003	0.016	0.973	1.032	0.001	0.0
price_mu[5]	1.005	0.015	0.976	1.030	0.001	0.0
price_mu[6]	1.005	0.015	0.975	1.031	0.001	0.0
price_mu[7]	0.998	0.017	0.964	1.027	0.001	0.0
price_mu[8]	1.010	0.015	0.977	1.036	0.001	0.0
price_mu[9]	1.001	0.016	0.969	1.028	0.001	0.0
price_mu[10]	0.986	0.015	0.959	1.015	0.001	0.0
price_mu[11]	0.980	0.017	0.949	1.010	0.001	0.0
price_mu[12]	0.997	0.015	0.972	1.027	0.001	0.0
price_mu[13]	0.992	0.016	0.960	1.019	0.001	0.0
price_mu[14]	1.003	0.015	0.972	1.030	0.001	0.0
price_mu[15]	1.005	0.016	0.975	1.036	0.001	0.0

price_mu[16]	1.005	0.015	0.977	1.032	0.001	0.0
price_mu[17]	1.001	0.016	0.972	1.030	0.001	0.0
price_mu[18]	1.006	0.015	0.975	1.031	0.001	0.0
price_mu[19]	1.003	0.015	0.976	1.032	0.001	0.0
price_mu[20]	1.000	0.015	0.973	1.027	0.001	0.0
price_mu[21]	1.005	0.015	0.978	1.032	0.000	0.0
price_mu[22]	1.007	0.015	0.980	1.036	0.001	0.0
price_mu[23]	1.003	0.015	0.976	1.034	0.000	0.0
price_mu[24]	0.996	0.015	0.970	1.026	0.001	0.0
price_mu[25]	1.011	0.016	0.981	1.040	0.001	0.0
price_mu[26]	1.005	0.015	0.978	1.030	0.001	0.0
price_mu[27]	0.999	0.014	0.974	1.026	0.001	0.0
price_mu[28]	1.002	0.016	0.972	1.034	0.001	0.0
price_mu[29]	0.998	0.016	0.966	1.024	0.001	0.0
price_mu[30]	0.996	0.015	0.967	1.024	0.001	0.0
price_mu[31]	1.006	0.016	0.975	1.035	0.001	0.0
price_mu[32]	0.998	0.015	0.967	1.025	0.001	0.0
price_mu[33]	0.989	0.015	0.963	1.019	0.001	0.0
price_mu[34]	0.979	0.014	0.953	1.007	0.001	0.0
price_mu[35]	0.984	0.015	0.959	1.015	0.000	0.0
price_mu[36]	0.984	0.017	0.951	1.015	0.001	0.0
price_mu[37]	0.985	0.016	0.956	1.012	0.001	0.0
price_mu[38]	0.985	0.016	0.955	1.013	0.001	0.0
price_mu[39]	0.998	0.015	0.971	1.026	0.001	0.0
price_mu[40]	1.005	0.015	0.976	1.032	0.001	0.0
price_mu[41]	0.994	0.016	0.965	1.021	0.001	0.0
price_mu[42]	0.987	0.016	0.957	1.016	0.001	0.0
price_mu[43]	0.988	0.017	0.955	1.019	0.001	0.0
price_mu[44]	0.987	0.016	0.959	1.020	0.001	0.0
price_mu[45]	0.991	0.016	0.963	1.021	0.001	0.0
price_mu[46]	1.001	0.016	0.971	1.030	0.001	0.0
price_mu[47]	1.004	0.016	0.975	1.031	0.001	0.0
price_mu[48]	1.004	0.016	0.977	1.036	0.001	0.0
price_mu[49]	0.998	0.016	0.967	1.026	0.001	0.0

	0.000	0.010	0.007	1.020	0.001	0.0
price_mu[50]	0.990	0.017	0.958	1.020	0.001	0.0
price_mu[51]	0.991	0.016	0.961	1.020	0.001	0.0
price_mu[52]	1.000	0.016	0.971	1.029	0.001	0.0
price_mu[53]	1.003	0.015	0.971	1.028	0.000	0.0
price_mu[54]	1.004	0.015	0.976	1.033	0.001	0.0
price_mu[55]	1.003	0.014	0.976	1.029	0.001	0.0
price_mu[56]	0.996	0.016	0.969	1.026	0.001	0.0
price_mu[57]	0.991	0.015	0.961	1.018	0.001	0.0
price_mu[58]	0.980	0.016	0.951	1.010	0.001	0.0
price_mu[59]	0.992	0.015	0.966	1.021	0.001	0.0
price_mu[60]	0.968	0.016	0.940	0.997	0.001	0.0
price_mu[61]	1.000	0.015	0.970	1.028	0.001	0.0
price_mu[62]	0.976	0.015	0.947	1.002	0.001	0.0
price_mu[63]	0.988	0.015	0.962	1.014	0.001	0.0
price_mu[64]	0.989	0.015	0.963	1.019	0.001	0.0
price_mu[65]	0.983	0.016	0.954	1.013	0.001	0.0
price_mu[66]	0.989	0.017	0.961	1.021	0.001	0.0
price_mu[67]	0.989	0.016	0.959	1.017	0.001	0.0
price_mu[68]	0.986	0.016	0.956	1.015	0.001	0.0
price_mu[69]	0.990	0.016	0.957	1.019	0.001	0.0
price_mu[70]	0.996	0.016	0.965	1.024	0.001	0.0
price_mu[71]	1.004	0.017	0.975	1.035	0.001	0.0
price_mu[72]	1.016	0.017	0.985	1.048	0.001	0.0
price_mu[73]	1.024	0.017	0.991	1.055	0.001	0.0
price_mu[74]	1.026	0.017	0.992	1.057	0.001	0.0
price_mu[75]	1.006	0.014	0.981	1.032	0.001	0.0
price_mu[76]	0.991	0.015	0.966	1.018	0.001	0.0
price_mu[77]	0.992	0.015	0.964	1.020	0.001	0.0
price_mu[78]	1.002	0.016	0.970	1.030	0.001	0.0
price_mu[79]	1.016	0.015	0.989	1.044	0.001	0.0
price_mu[80]	1.020	0.016	0.993	1.048	0.001	0.0
price_mu[81]	1.010	0.017	0.979	1.039	0.001	0.0
price_mu[82]	1.004	0.016	0.975	1.032	0.001	0.0

price_mu[83]	1.001	0.015	0.974	1.028	0.001	0.0
price_mu[84]	1.002	0.017	0.972	1.033	0.001	0.0
price_mu[85]	0.998	0.016	0.968	1.028	0.001	0.0
price_mu[86]	1.005	0.015	0.978	1.034	0.001	0.0
price_mu[87]	1.018	0.016	0.984	1.044	0.001	0.0
price_mu[88]	1.015	0.016	0.985	1.046	0.001	0.0
price_mu[89]	1.013	0.015	0.987	1.041	0.001	0.0
price_mu[90]	1.017	0.015	0.990	1.044	0.001	0.0
price_mu[91]	1.009	0.015	0.982	1.037	0.001	0.0
price_mu[92]	0.992	0.015	0.964	1.021	0.001	0.0
price_mu[93]	0.992	0.016	0.962	1.020	0.001	0.0
price_mu[94]	1.007	0.016	0.977	1.035	0.001	0.0
price_mu[95]	1.018	0.016	0.988	1.048	0.001	0.0
price_mu[96]	1.020	0.016	0.985	1.048	0.001	0.0
price_mu[97]	1.011	0.017	0.983	1.049	0.001	0.0
price_mu[98]	1.018	0.016	0.990	1.050	0.001	0.0
price_mu[99]	1.022	0.014	0.999	1.050	0.001	0.0
price_mu[100]	1.016	0.014	0.989	1.044	0.001	0.0
price_mu[101]	1.009	0.016	0.976	1.036	0.001	0.0
price_mu[102]	1.008	0.016	0.978	1.037	0.001	0.0
price_mu[103]	1.007	0.015	0.977	1.034	0.001	0.0
marketing_online_mu[0]	1.164	0.102	0.978	1.352	0.004	0.0
marketing_online_mu[1]	1.140	0.102	0.951	1.322	0.004	0.0
marketing_online_mu[2]	1.081	0.107	0.881	1.267	0.004	0.0
marketing_online_mu[3]	1.012	0.111	0.802	1.223	0.005	0.0
marketing_online_mu[4]	1.111	0.102	0.925	1.301	0.005	0.0
marketing_online_mu[5]	1.074	0.100	0.902	1.297	0.004	0.0
marketing_online_mu[6]	0.826	0.104	0.635	1.017	0.005	0.0
marketing_online_mu[7]	0.854	0.098	0.671	1.025	0.004	0.0
marketing_online_mu[8]	0.878	0.100	0.693	1.065	0.004	0.0
marketing_online_mu[9]	0.885	0.099	0.687	1.053	0.003	0.0
marketing_online_mu[10]	0.869	0.103	0.684	1.061	0.003	0.0
marketing_online_mu[11]	0.884	0.101	0.712	1.076	0.004	0.0
marketing_online_mu[12]	0.890	0.104	0.682	1.083	0.004	0.0

marketing_online_mu[13]	0.869	0.099	0.694	1.052	0.004	0.0
marketing_online_mu[14]	0.848	0.100	0.696	1.066	0.006	0.0
marketing_online_mu[15]	0.843	0.097	0.659	1.019	0.004	0.0
marketing_online_mu[16]	0.861	0.101	0.663	1.040	0.003	0.0
marketing_online_mu[17]	0.855	0.101	0.671	1.058	0.004	0.0
marketing_online_mu[18]	0.833	0.103	0.605	1.001	0.004	0.0
marketing_online_mu[19]	0.830	0.100	0.640	1.013	0.004	0.0
marketing_online_mu[20]	0.845	0.105	0.653	1.045	0.004	0.0
marketing_online_mu[21]	0.855	0.100	0.670	1.046	0.004	0.0
marketing_online_mu[22]	1.038	0.106	0.837	1.224	0.005	0.0
marketing_online_mu[23]	1.058	0.104	0.869	1.251	0.005	0.0
marketing_online_mu[24]	1.143	0.102	0.925	1.313	0.004	0.0
marketing_online_mu[25]	1.094	0.093	0.932	1.274	0.004	0.0
marketing_online_mu[26]	1.080	0.099	0.896	1.265	0.004	0.0
marketing_online_mu[27]	1.080	0.104	0.885	1.270	0.005	0.0
marketing_online_mu[28]	1.039	0.097	0.866	1.213	0.004	0.0
marketing_online_mu[29]	1.143	0.101	0.934	1.314	0.004	0.0
marketing_online_mu[30]	1.107	0.104	0.900	1.278	0.004	0.0
marketing_online_mu[31]	1.125	0.096	0.949	1.313	0.004	0.0
marketing_online_mu[32]	1.072	0.104	0.874	1.262	0.004	0.0
marketing_online_mu[33]	1.043	0.103	0.831	1.213	0.004	0.0
marketing_online_mu[34]	1.053	0.098	0.889	1.259	0.003	0.0
marketing_online_mu[35]	1.050	0.094	0.870	1.228	0.003	0.0
marketing_online_mu[36]	1.031	0.103	0.847	1.231	0.004	0.0
marketing_online_mu[37]	1.028	0.107	0.818	1.224	0.004	0.0
marketing_online_mu[38]	1.037	0.103	0.849	1.240	0.004	0.0
marketing_online_mu[39]	1.039	0.100	0.873	1.252	0.004	0.0
marketing_online_mu[40]	1.053	0.100	0.843	1.214	0.003	0.0
marketing_online_mu[41]	1.052	0.110	0.855	1.265	0.004	0.0
marketing_online_mu[42]	1.061	0.099	0.875	1.246	0.004	0.0
marketing_online_mu[43]	1.054	0.100	0.867	1.236	0.004	0.0
marketing_online_mu[44]	1.049	0.101	0.862	1.241	0.003	0.0
marketing_online_mu[45]	1.050	0.090	0.877	1.203	0.003	0.0
marketing_online_mu[46]	1.055	0.102	0.873	1.245	0.004	0.0

marketing_online_mu[47]	1.025	0.106	0.838	1.235	0.005	0.0
marketing_online_mu[48]	0.998	0.101	0.796	1.162	0.006	0.0
marketing_online_mu[49]	0.973	0.100	0.807	1.182	0.005	0.0
marketing_online_mu[50]	0.981	0.107	0.767	1.169	0.005	0.0
marketing_online_mu[51]	0.964	0.098	0.766	1.135	0.005	0.0
marketing_online_mu[52]	0.976	0.103	0.789	1.175	0.005	0.0
marketing_online_mu[53]	0.968	0.112	0.766	1.177	0.006	0.0
marketing_online_mu[54]	0.980	0.105	0.785	1.175	0.005	0.0
marketing_online_mu[55]	0.983	0.107	0.773	1.172	0.005	0.0
marketing_online_mu[56]	1.049	0.106	0.859	1.260	0.005	0.0
marketing_online_mu[57]	1.064	0.116	0.860	1.294	0.006	0.0
marketing_online_mu[58]	1.078	0.105	0.874	1.259	0.005	0.0
marketing_online_mu[59]	1.131	0.100	0.961	1.354	0.005	0.0
marketing_online_mu[60]	1.132	0.102	0.948	1.328	0.003	0.0
marketing_online_mu[61]	1.036	0.101	0.844	1.221	0.003	0.0
marketing_online_mu[62]	1.041	0.107	0.814	1.224	0.004	0.0
marketing_online_mu[63]	1.048	0.095	0.874	1.230	0.003	0.0
marketing_online_mu[64]	1.081	0.101	0.904	1.279	0.004	0.0
marketing_online_mu[65]	1.040	0.106	0.857	1.241	0.003	0.0
marketing_online_mu[66]	1.011	0.098	0.832	1.190	0.004	0.0
marketing_online_mu[67]	1.002	0.104	0.801	1.199	0.004	0.0
marketing_online_mu[68]	1.012	0.097	0.839	1.195	0.004	0.0
marketing_online_mu[69]	1.071	0.096	0.876	1.225	0.004	0.0
marketing_online_mu[70]	1.081	0.106	0.880	1.277	0.004	0.0
marketing_online_mu[71]	1.055	0.102	0.853	1.243	0.004	0.0
marketing_online_mu[72]	1.036	0.102	0.842	1.224	0.004	0.0
marketing_online_mu[73]	0.998	0.096	0.837	1.189	0.003	0.0
marketing_online_mu[74]	0.997	0.106	0.800	1.210	0.004	0.0
marketing_online_mu[75]	1.058	0.106	0.871	1.251	0.005	0.0
marketing_online_mu[76]	1.056	0.105	0.852	1.239	0.004	0.0
marketing_online_mu[77]	1.053	0.094	0.879	1.226	0.004	0.0
marketing_online_mu[78]	1.046	0.098	0.850	1.213	0.004	0.0
marketing_online_mu[79]	1.041	0.103	0.857	1.241	0.005	0.0

marketing_online_mu[80]	1.060	0.099	0.866	1.234	0.004	0.0
marketing_online_mu[81]	1.037	0.103	0.828	1.206	0.004	0.0
marketing_online_mu[82]	0.893	0.099	0.701	1.052	0.004	0.0
marketing_online_mu[83]	0.930	0.100	0.749	1.113	0.004	0.0
marketing_online_mu[84]	0.940	0.099	0.748	1.114	0.003	0.0
marketing_online_mu[85]	0.875	0.106	0.680	1.078	0.004	0.0
marketing_online_mu[86]	0.981	0.098	0.797	1.161	0.004	0.0
marketing_online_mu[87]	0.957	0.111	0.774	1.199	0.005	0.0
marketing_online_mu[88]	0.959	0.099	0.778	1.145	0.004	0.0
marketing_online_mu[89]	0.919	0.099	0.741	1.112	0.004	0.0
marketing_online_mu[90]	0.939	0.107	0.726	1.125	0.004	0.0
marketing_online_mu[91]	1.011	0.104	0.798	1.192	0.004	0.0
marketing_online_mu[92]	1.020	0.101	0.844	1.214	0.004	0.0
marketing_online_mu[93]	1.024	0.107	0.839	1.226	0.005	0.0
marketing_online_mu[94]	1.023	0.094	0.859	1.209	0.005	0.0
marketing_online_mu[95]	1.023	0.093	0.862	1.211	0.004	0.0
marketing_online_mu[96]	1.026	0.104	0.845	1.232	0.004	0.0
marketing_online_mu[97]	1.001	0.100	0.836	1.207	0.004	0.0
marketing_online_mu[98]	1.001	0.102	0.809	1.185	0.004	0.0
marketing_online_mu[99]	1.043	0.102	0.853	1.231	0.004	0.0
marketing_online_mu[100]	1.043	0.105	0.842	1.225	0.005	0.0
marketing_online_mu[101]	1.118	0.104	0.935	1.325	0.004	0.0
marketing_online_mu[102]	1.076	0.105	0.870	1.257	0.004	0.0
marketing_online_mu[103]	1.056	0.109	0.841	1.257	0.005	0.0
distribution_mu[0]	0.997	0.008	0.982	1.011	0.000	0.0
distribution_mu[1]	0.998	0.008	0.983	1.013	0.000	0.0
distribution_mu[2]	1.002	0.008	0.986	1.017	0.000	0.0
distribution_mu[3]	1.001	0.008	0.986	1.016	0.000	0.0
distribution_mu[4]	1.000	0.008	0.985	1.015	0.000	0.0
distribution_mu[5]	1.003	0.008	0.988	1.018	0.000	0.0
distribution_mu[6]	1.007	0.009	0.990	1.023	0.000	0.0
distribution_mu[7]	1.006	0.008	0.990	1.019	0.000	0.0
distribution_mu[8]	1.007	0.008	0.990	1.021	0.000	0.0
distribution_mu[9]	1.007	0.008	0.993	1.022	0.000	0.0

distribution_mu[10]	1.005	0.008	0.988	1.019	0.000	0.0
distribution_mu[11]	1.007	0.007	0.993	1.021	0.000	0.0
distribution_mu[12]	1.004	0.009	0.988	1.020	0.000	0.0
distribution_mu[13]	1.006	0.008	0.991	1.020	0.000	0.0
distribution_mu[14]	1.004	0.008	0.989	1.019	0.000	0.0
distribution_mu[15]	1.007	0.008	0.993	1.023	0.000	0.0
distribution_mu[16]	1.009	0.008	0.992	1.023	0.000	0.0
distribution_mu[17]	1.010	0.008	0.995	1.023	0.000	0.0
distribution_mu[18]	1.010	0.008	0.995	1.024	0.000	0.0
distribution_mu[19]	1.009	0.008	0.995	1.024	0.000	0.0
distribution_mu[20]	1.004	0.008	0.990	1.020	0.000	0.0
distribution_mu[21]	1.005	0.008	0.991	1.021	0.000	0.0
distribution_mu[22]	1.003	0.008	0.989	1.017	0.000	0.0
distribution_mu[23]	1.005	0.008	0.990	1.022	0.000	0.0
distribution_mu[24]	1.007	0.008	0.992	1.022	0.000	0.0
distribution_mu[25]	1.007	0.008	0.992	1.021	0.000	0.0
distribution_mu[26]	1.008	0.008	0.992	1.023	0.000	0.0
distribution_mu[27]	1.000	0.008	0.983	1.013	0.000	0.0
distribution_mu[28]	1.000	0.008	0.985	1.015	0.000	0.0
distribution_mu[29]	1.000	0.008	0.985	1.014	0.000	0.0
distribution_mu[30]	1.002	0.008	0.986	1.018	0.000	0.0
distribution_mu[31]	1.003	0.008	0.989	1.018	0.000	0.0
distribution_mu[32]	1.002	0.008	0.987	1.017	0.000	0.0
distribution_mu[33]	1.000	0.008	0.984	1.016	0.000	0.0
distribution_mu[34]	0.998	0.008	0.983	1.015	0.000	0.0
distribution_mu[35]	1.002	0.008	0.986	1.018	0.000	0.0
distribution_mu[36]	1.002	0.008	0.987	1.016	0.000	0.0
distribution_mu[37]	0.999	0.008	0.983	1.012	0.000	0.0
distribution_mu[38]	1.001	0.008	0.986	1.015	0.000	0.0
distribution_mu[39]	1.001	0.008	0.986	1.015	0.000	0.0
distribution_mu[40]	1.000	0.008	0.986	1.015	0.000	0.0
distribution_mu[41]	1.000	0.009	0.985	1.016	0.000	0.0
distribution_mu[42]	0.997	0.008	0.982	1.010	0.000	0.0
distribution_mu[43]	0.997	0.008	0.983	1.014	0.000	0.0

distribution_mu[44]	0.998	0.009	0.982	1.014	0.000	0.0
distribution_mu[45]	1.000	0.008	0.985	1.014	0.000	0.0
distribution_mu[46]	1.002	0.007	0.986	1.013	0.000	0.0
distribution_mu[47]	1.002	0.008	0.987	1.017	0.000	0.0
distribution_mu[48]	0.998	0.008	0.981	1.012	0.000	0.0
distribution_mu[49]	0.995	0.008	0.980	1.010	0.000	0.0
distribution_mu[50]	0.999	0.008	0.984	1.014	0.000	0.0
distribution_mu[51]	0.998	0.008	0.982	1.013	0.000	0.0
distribution_mu[52]	1.000	0.008	0.986	1.015	0.000	0.0
distribution_mu[53]	0.999	0.008	0.986	1.014	0.000	0.0
distribution_mu[54]	0.996	0.008	0.981	1.011	0.000	0.0
distribution_mu[55]	0.998	0.008	0.981	1.012	0.000	0.0
distribution_mu[56]	0.993	0.008	0.979	1.008	0.000	0.0
distribution_mu[57]	0.995	0.008	0.981	1.011	0.000	0.0
distribution_mu[58]	0.994	0.008	0.981	1.009	0.000	0.0
distribution_mu[59]	0.995	0.008	0.981	1.011	0.000	0.0
distribution_mu[60]	0.995	0.008	0.982	1.010	0.000	0.0
distribution_mu[61]	0.995	0.009	0.980	1.011	0.000	0.0
distribution_mu[62]	0.995	0.008	0.982	1.010	0.000	0.0
distribution_mu[63]	0.991	0.008	0.976	1.005	0.000	0.0
distribution_mu[64]	0.991	0.008	0.974	1.004	0.000	0.0
distribution_mu[65]	0.992	0.008	0.977	1.007	0.000	0.0
distribution_mu[66]	0.993	0.008	0.977	1.006	0.000	0.0
distribution_mu[67]	0.992	0.008	0.978	1.007	0.000	0.0
distribution_mu[68]	0.992	0.008	0.975	1.006	0.000	0.0
distribution_mu[69]	0.994	0.009	0.978	1.009	0.000	0.0
distribution_mu[70]	0.995	0.008	0.979	1.011	0.000	0.0
distribution_mu[71]	0.995	0.008	0.981	1.008	0.000	0.0
distribution_mu[72]	0.993	0.008	0.978	1.009	0.000	0.0
distribution_mu[73]	0.995	0.008	0.979	1.009	0.000	0.0
distribution_mu[74]	0.995	0.008	0.979	1.011	0.000	0.0
distribution_mu[75]	0.999	0.008	0.983	1.013	0.000	0.0
distribution_mu[76]	1.000	0.009	0.986	1.018	0.000	0.0

distribution_mu[77]	0.997	0.008	0.981	1.012	0.000	0.0
distribution_mu[78]	0.995	0.009	0.979	1.010	0.000	0.0
distribution_mu[79]	0.998	0.009	0.983	1.016	0.000	0.0
distribution_mu[80]	0.997	0.008	0.983	1.012	0.000	0.0
distribution_mu[81]	1.000	0.008	0.984	1.014	0.000	0.0
distribution_mu[82]	1.003	0.009	0.986	1.019	0.000	0.0
distribution_mu[83]	1.003	0.008	0.989	1.021	0.000	0.0
distribution_mu[84]	1.002	0.008	0.988	1.016	0.000	0.0
distribution_mu[85]	0.999	0.008	0.984	1.013	0.000	0.0
distribution_mu[86]	1.003	0.008	0.988	1.018	0.000	0.0
distribution_mu[87]	0.996	0.009	0.979	1.012	0.000	0.0
distribution_mu[88]	1.001	0.008	0.986	1.015	0.000	0.0
distribution_mu[89]	0.999	0.009	0.982	1.015	0.000	0.0
distribution_mu[90]	0.995	0.008	0.981	1.010	0.000	0.0
distribution_mu[91]	0.995	0.007	0.981	1.007	0.000	0.0
distribution_mu[92]	0.994	0.008	0.979	1.009	0.000	0.0
distribution_mu[93]	0.996	0.008	0.983	1.014	0.000	0.0
distribution_mu[94]	0.999	0.008	0.985	1.014	0.000	0.0
distribution_mu[95]	0.999	0.008	0.983	1.013	0.000	0.0
distribution_mu[96]	1.001	0.009	0.986	1.018	0.000	0.0
distribution_mu[97]	0.998	0.009	0.983	1.014	0.000	0.0
distribution_mu[98]	1.001	0.008	0.985	1.015	0.000	0.0
distribution_mu[99]	1.003	0.008	0.989	1.019	0.000	0.0
distribution_mu[100]	1.002	0.009	0.986	1.016	0.000	0.0
distribution_mu[101]	1.006	0.008	0.992	1.023	0.000	0.0
distribution_mu[102]	1.005	0.008	0.990	1.019	0.000	0.0
distribution_mu[103]	1.006	0.008	0.991	1.019	0.000	0.0
marketing_offline_mu[0]	0.309	0.385	-0.385	1.020	0.054	0.0
marketing_offline_mu[1]	0.212	0.375	-0.438	0.982	0.051	0.0
marketing_offline_mu[2]	0.201	0.356	-0.495	0.845	0.042	0.0
marketing_offline_mu[3]	0.408	0.313	-0.158	0.982	0.033	0.0
marketing_offline_mu[4]	0.337	0.342	-0.246	0.949	0.046	0.0
marketing_offline_mu[5]	0.301	0.336	-0.319	0.885	0.030	0.0
marketing_offline_mu[6]	0.214	0.370	-0.490	0.951	0.050	0.0

marketing_offline_mu[7]	0.368	0.498	-0.541	1.278	0.088	0.0
marketing_offline_mu[8]	0.377	0.465	-0.556	1.149	0.155	0.1
marketing_offline_mu[9]	0.372	0.512	-0.442	1.396	0.091	0.0
marketing_offline_mu[10]	0.258	0.495	-0.607	1.163	0.064	0.0
marketing_offline_mu[11]	0.417	0.473	-0.330	1.327	0.085	0.0
marketing_offline_mu[12]	0.329	0.557	-0.682	1.512	0.128	0.0
marketing_offline_mu[13]	0.365	0.323	-0.263	0.892	0.035	0.0
marketing_offline_mu[14]	0.171	0.313	-0.477	0.686	0.043	0.0
marketing_offline_mu[15]	0.186	0.356	-0.410	0.891	0.045	0.0
marketing_offline_mu[16]	0.287	0.454	-0.668	1.062	0.070	0.0
marketing_offline_mu[17]	0.421	0.382	-0.285	1.060	0.051	0.0
marketing_offline_mu[18]	0.209	0.388	-0.448	1.031	0.052	0.0
marketing_offline_mu[19]	0.308	0.370	-0.358	0.933	0.052	0.0
marketing_offline_mu[20]	0.241	0.499	-0.647	1.118	0.055	0.0
marketing_offline_mu[21]	0.508	0.388	-0.174	1.246	0.059	0.0
marketing_offline_mu[22]	0.306	0.345	-0.251	1.042	0.032	0.0
marketing_offline_mu[23]	0.295	0.358	-0.400	0.910	0.058	0.0
marketing_offline_mu[24]	0.344	0.461	-0.573	1.175	0.055	0.0
marketing_offline_mu[25]	0.105	0.352	-0.479	0.765	0.044	0.0
marketing_offline_mu[26]	0.188	0.341	-0.445	0.775	0.061	0.0
marketing_offline_mu[27]	0.163	0.338	-0.462	0.766	0.035	0.0
marketing_offline_mu[28]	0.319	0.467	-0.504	1.208	0.059	0.0
marketing_offline_mu[29]	0.367	0.350	-0.344	0.968	0.046	0.0
marketing_offline_mu[30]	0.284	0.310	-0.251	0.857	0.037	0.0
marketing_offline_mu[31]	0.346	0.340	-0.237	1.031	0.037	0.0
marketing_offline_mu[32]	0.427	0.550	-0.738	1.435	0.091	0.0
marketing_offline_mu[33]	0.287	0.567	-0.741	1.334	0.166	0.1
marketing_offline_mu[34]	0.384	0.487	-0.507	1.227	0.078	0.0
marketing_offline_mu[35]	0.328	0.453	-0.508	1.152	0.068	0.0
marketing_offline_mu[36]	0.390	0.514	-0.550	1.335	0.085	0.0
marketing_offline_mu[37]	0.357	0.517	-0.486	1.325	0.072	0.0
marketing_offline_mu[38]	0.307	0.463	-0.676	1.070	0.060	0.0
marketing_offline_mu[39]	0.265	0.535	-0.685	1.252	0.166	0.1
marketing_offline_mu[40]	0.319	0.480	-0.523	1.338	0.059	0.0

marketing_offline_mu[41]	0.265	0.487	-0.632	1.139	0.168	0.1
marketing_offline_mu[42]	0.353	0.473	-0.489	1.185	0.070	0.0
marketing_offline_mu[43]	0.245	0.493	-0.698	1.173	0.104	0.0
marketing_offline_mu[44]	0.488	0.491	-0.350	1.480	0.084	0.0
marketing_offline_mu[45]	0.348	0.541	-0.541	1.363	0.223	0.1
marketing_offline_mu[46]	0.452	0.476	-0.381	1.437	0.104	0.0
marketing_offline_mu[47]	0.633	0.374	-0.039	1.352	0.059	0.0
marketing_offline_mu[48]	0.499	0.324	-0.060	1.142	0.036	0.0
marketing_offline_mu[49]	0.554	0.385	-0.089	1.400	0.069	0.0
marketing_offline_mu[50]	0.215	0.326	-0.275	0.907	0.032	0.0
marketing_offline_mu[51]	0.642	0.344	0.076	1.273	0.064	0.0
marketing_offline_mu[52]	0.480	0.398	-0.146	1.352	0.050	0.0
marketing_offline_mu[53]	0.403	0.364	-0.276	1.054	0.090	0.0
marketing_offline_mu[54]	0.344	0.364	-0.238	1.116	0.050	0.0
marketing_offline_mu[55]	0.537	0.365	-0.144	1.193	0.046	0.0
marketing_offline_mu[56]	0.484	0.327	-0.119	1.049	0.043	0.0
marketing_offline_mu[57]	0.504	0.361	-0.135	1.222	0.035	0.0
marketing_offline_mu[58]	0.133	0.522	-0.849	1.147	0.081	0.0
marketing_offline_mu[59]	0.314	0.501	-0.515	1.313	0.067	0.0
marketing_offline_mu[60]	0.358	0.447	-0.496	1.065	0.059	0.0
marketing_offline_mu[61]	0.381	0.404	-0.381	1.139	0.048	0.0
marketing_offline_mu[62]	0.469	0.593	-0.659	1.567	0.126	0.0
marketing_offline_mu[63]	0.359	0.499	-0.574	1.274	0.063	0.0
marketing_offline_mu[64]	0.422	0.471	-0.386	1.263	0.061	0.0
marketing_offline_mu[65]	0.361	0.325	-0.221	0.988	0.039	0.0
marketing_offline_mu[66]	0.416	0.350	-0.247	1.066	0.051	0.0
marketing_offline_mu[67]	0.344	0.351	-0.366	0.902	0.044	0.0
marketing_offline_mu[68]	0.341	0.464	-0.598	1.204	0.064	0.0
marketing_offline_mu[69]	0.540	0.474	-0.358	1.429	0.086	0.0
marketing_offline_mu[70]	0.410	0.522	-0.545	1.250	0.091	0.0
marketing_offline_mu[71]	0.361	0.520	-0.671	1.224	0.066	0.0
marketing_offline_mu[72]	0.291	0.489	-0.571	1.263	0.057	0.0
marketing_offline_mu[73]	0.391	0.563	-0.897	1.280	0.082	0.0

marketing_offline_mu[74]	0.277	0.486	-0.475	1.325	0.087	0.0
marketing_offline_mu[75]	0.310	0.495	-0.602	1.195	0.073	0.0
marketing_offline_mu[76]	0.399	0.431	-0.414	1.202	0.045	0.0
marketing_offline_mu[77]	0.310	0.518	-0.562	1.442	0.071	0.0
marketing_offline_mu[78]	0.369	0.431	-0.422	1.159	0.067	0.0
marketing_offline_mu[79]	0.247	0.528	-0.656	1.227	0.169	0.1
marketing_offline_mu[80]	0.313	0.533	-0.599	1.285	0.100	0.0
marketing_offline_mu[81]	0.263	0.494	-0.697	1.083	0.055	0.0
marketing_offline_mu[82]	0.244	0.454	-0.610	1.133	0.062	0.0
marketing_offline_mu[83]	0.378	0.555	-0.675	1.485	0.092	0.0
marketing_offline_mu[84]	0.449	0.465	-0.463	1.226	0.060	0.0
marketing_offline_mu[85]	0.347	0.546	-0.757	1.250	0.182	0.1
marketing_offline_mu[86]	0.229	0.456	-0.643	1.006	0.065	0.0
marketing_offline_mu[87]	0.337	0.455	-0.710	1.082	0.056	0.0
marketing_offline_mu[88]	0.319	0.463	-0.556	1.171	0.056	0.0
marketing_offline_mu[89]	0.396	0.490	-0.544	1.199	0.062	0.0
marketing_offline_mu[90]	0.277	0.555	-0.950	1.082	0.086	0.0
marketing_offline_mu[91]	0.345	0.491	-0.539	1.350	0.104	0.0
marketing_offline_mu[92]	0.425	0.517	-0.747	1.224	0.072	0.0
marketing_offline_mu[93]	0.448	0.490	-0.392	1.456	0.087	0.0
marketing_offline_mu[94]	0.429	0.495	-0.436	1.392	0.097	0.1
marketing_offline_mu[95]	0.432	0.523	-0.516	1.403	0.062	0.0
marketing_offline_mu[96]	0.296	0.506	-0.688	1.157	0.064	0.0
marketing_offline_mu[97]	0.362	0.512	-0.615	1.189	0.093	0.0
marketing_offline_mu[98]	0.441	0.476	-0.433	1.294	0.064	0.0
marketing_offline_mu[99]	0.521	0.502	-0.424	1.490	0.090	0.0
marketing_offline_mu[100]	0.333	0.462	-0.443	1.368	0.083	0.0
marketing_offline_mu[101]	0.364	0.494	-0.540	1.171	0.078	0.0
marketing_offline_mu[102]	0.239	0.494	-0.640	1.218	0.090	0.0
marketing_offline_mu[103]	0.325	0.499	-0.662	1.144	0.080	0.0
other_products_mu[0]	0.982	0.048	0.899	1.072	0.002	0.0
other_products_mu[1]	1.010	0.044	0.926	1.087	0.002	0.0
other_products_mu[2]	0.974	0.043	0.898	1.054	0.002	0.0
other_products_mu[3]	1.013	0.046	0.925	1.098	0.002	0.0

other_products_mu[4]	1.046	0.048	0.954	1.134	0.002	0.0
other_products_mu[5]	1.044	0.043	0.959	1.117	0.002	0.0
other_products_mu[6]	0.988	0.044	0.898	1.060	0.002	0.0
other_products_mu[7]	0.968	0.046	0.891	1.060	0.002	0.0
other_products_mu[8]	0.990	0.046	0.897	1.067	0.002	0.0
other_products_mu[9]	0.985	0.047	0.899	1.078	0.002	0.0
other_products_mu[10]	0.984	0.047	0.886	1.069	0.002	0.0
other_products_mu[11]	0.991	0.045	0.902	1.071	0.002	0.0
other_products_mu[12]	1.002	0.049	0.909	1.086	0.002	0.0
other_products_mu[13]	0.988	0.046	0.907	1.074	0.002	0.0
other_products_mu[14]	0.990	0.046	0.910	1.084	0.002	0.0
other_products_mu[15]	0.994	0.045	0.913	1.075	0.002	0.0
other_products_mu[16]	0.985	0.047	0.887	1.064	0.002	0.0
other_products_mu[17]	0.983	0.045	0.899	1.062	0.002	0.0
other_products_mu[18]	1.038	0.051	0.937	1.130	0.002	0.0
other_products_mu[19]	1.036	0.048	0.954	1.127	0.002	0.0
other_products_mu[20]	0.998	0.045	0.919	1.082	0.002	0.0
other_products_mu[21]	1.020	0.051	0.929	1.120	0.003	0.0
other_products_mu[22]	1.008	0.051	0.904	1.100	0.002	0.0
other_products_mu[23]	0.999	0.047	0.917	1.093	0.002	0.0
other_products_mu[24]	1.003	0.047	0.920	1.098	0.002	0.0
other_products_mu[25]	1.021	0.046	0.925	1.096	0.002	0.0
other_products_mu[26]	1.017	0.048	0.929	1.106	0.002	0.0
other_products_mu[27]	0.982	0.046	0.892	1.062	0.002	0.0
other_products_mu[28]	1.016	0.044	0.935	1.092	0.002	0.0
other_products_mu[29]	1.017	0.049	0.933	1.115	0.002	0.0
other_products_mu[30]	0.982	0.050	0.893	1.073	0.002	0.0
other_products_mu[31]	0.957	0.048	0.868	1.041	0.002	0.0
other_products_mu[32]	0.959	0.049	0.868	1.046	0.002	0.0
other_products_mu[33]	1.009	0.049	0.927	1.103	0.002	0.0
other_products_mu[34]	0.993	0.047	0.902	1.078	0.002	0.0
other_products_mu[35]	0.935	0.045	0.848	1.015	0.002	0.0
other_products_mu[36]	0.989	0.042	0.909	1.067	0.002	0.0
other_products_mu[37]	0.987	0.045	0.904	1.072	0.002	0.0

other_products_mu[38]	0.996	0.043	0.920	1.084	0.002	0.0
other_products_mu[39]	0.993	0.049	0.907	1.087	0.002	0.0
other_products_mu[40]	0.987	0.043	0.910	1.069	0.002	0.0
other_products_mu[41]	0.953	0.046	0.864	1.039	0.002	0.0
other_products_mu[42]	0.981	0.047	0.885	1.065	0.002	0.0
other_products_mu[43]	1.012	0.042	0.930	1.090	0.002	0.0
other_products_mu[44]	1.015	0.045	0.929	1.089	0.002	0.0
other_products_mu[45]	1.014	0.049	0.917	1.102	0.002	0.0
other_products_mu[46]	0.961	0.044	0.882	1.046	0.002	0.0
other_products_mu[47]	0.965	0.045	0.880	1.052	0.002	0.0
other_products_mu[48]	0.996	0.047	0.912	1.083	0.002	0.0
other_products_mu[49]	0.992	0.046	0.909	1.080	0.002	0.0
other_products_mu[50]	0.982	0.047	0.900	1.073	0.002	0.0
other_products_mu[51]	0.974	0.046	0.893	1.059	0.002	0.0
other_products_mu[52]	0.989	0.047	0.898	1.069	0.002	0.0
other_products_mu[53]	0.991	0.049	0.901	1.079	0.002	0.0
other_products_mu[54]	0.997	0.046	0.910	1.091	0.002	0.0
other_products_mu[55]	0.996	0.047	0.910	1.082	0.002	0.0
other_products_mu[56]	0.997	0.047	0.917	1.087	0.002	0.0
other_products_mu[57]	0.998	0.049	0.910	1.092	0.002	0.0
other_products_mu[58]	1.002	0.043	0.917	1.078	0.002	0.0
other_products_mu[59]	1.005	0.050	0.911	1.096	0.002	0.0
other_products_mu[60]	1.002	0.051	0.905	1.097	0.003	0.0
other_products_mu[61]	1.021	0.050	0.916	1.110	0.002	0.0
other_products_mu[62]	1.036	0.048	0.953	1.129	0.002	0.0
other_products_mu[63]	1.033	0.048	0.944	1.119	0.002	0.0
other_products_mu[64]	1.018	0.046	0.928	1.097	0.002	0.0
other_products_mu[65]	1.001	0.048	0.914	1.091	0.002	0.0
other_products_mu[66]	1.010	0.043	0.934	1.084	0.002	0.0
other_products_mu[67]	1.020	0.051	0.921	1.114	0.002	0.0
other_products_mu[68]	1.033	0.046	0.954	1.120	0.002	0.0
other_products_mu[69]	1.042	0.048	0.955	1.124	0.002	0.0
other_products_mu[70]	1.041	0.049	0.948	1.127	0.002	0.0

	other_products_mu[71]	1.045	0.044	0.968	1.128	0.002	0.0
	other_products_mu[72]	0.983	0.050	0.878	1.069	0.003	0.0
	other_products_mu[73]	1.015	0.056	0.898	1.108	0.002	0.0
	other_products_mu[74]	1.009	0.055	0.913	1.117	0.002	0.0
	other_products_mu[75]	0.964	0.048	0.883	1.057	0.002	0.0
	other_products_mu[76]	0.946	0.045	0.866	1.034	0.002	0.0
	other_products_mu[77]	0.941	0.045	0.848	1.019	0.002	0.0
	other_products_mu[78]	0.938	0.049	0.857	1.044	0.002	0.0
	other_products_mu[79]	0.938	0.048	0.856	1.040	0.002	0.0
	other_products_mu[80]	0.938	0.046	0.851	1.027	0.002	0.0
	other_products_mu[81]	0.939	0.045	0.851	1.019	0.002	0.0
	other_products_mu[82]	0.993	0.043	0.918	1.076	0.002	0.0
	other_products_mu[83]	1.032	0.049	0.932	1.118	0.002	0.0
	other_products_mu[84]	1.040	0.043	0.960	1.117	0.002	0.0
	other_products_mu[85]	1.030	0.050	0.936	1.119	0.002	0.0
	other_products_mu[86]	1.029	0.047	0.937	1.108	0.002	0.0
	other_products_mu[87]	0.984	0.048	0.903	1.081	0.002	0.0
	other_products_mu[88]	0.995	0.047	0.909	1.075	0.002	0.0
	other_products_mu[89]	0.990	0.047	0.907	1.079	0.002	0.0
	other_products_mu[90]	0.989	0.050	0.889	1.078	0.002	0.0
	other_products_mu[91]	0.992	0.045	0.908	1.077	0.002	0.0
	other_products_mu[92]	1.062	0.047	0.982	1.157	0.002	0.0
	other_products_mu[93]	1.069	0.044	0.981	1.149	0.002	0.0
	other_products_mu[94]	1.064	0.046	0.980	1.149	0.002	0.0
	other_products_mu[95]	1.070	0.048	0.985	1.164	0.002	0.0
	other_products_mu[96]	0.995	0.048	0.911	1.092	0.002	0.0
	other_products_mu[97]	0.953	0.052	0.859	1.055	0.002	0.0
	other_products_mu[98]	1.006	0.046	0.909	1.090	0.002	0.0
	other_products_mu[99]	1.024	0.050	0.936	1.117	0.002	0.0
	other_products_mu[100]	1.027	0.046	0.946	1.105	0.002	0.0
	other_products_mu[101]	1.032	0.048	0.938	1.112	0.002	0.0
	other_products_mu[102]	1.005	0.046	0.923	1.099	0.002	0.0
	other_products_mu[103]	0.987	0.048	0.881	1.067	0.002	0.0

competition_mu[0]	0.995	0.013	0.968	1.018	0.001	0.0
competition_mu[1]	0.996	0.012	0.973	1.018	0.000	0.0
competition_mu[2]	0.995	0.013	0.972	1.019	0.000	0.0
competition_mu[3]	1.000	0.013	0.975	1.021	0.000	0.0
competition_mu[4]	1.001	0.013	0.976	1.027	0.001	0.0
competition_mu[5]	1.000	0.013	0.974	1.022	0.000	0.0
competition_mu[6]	0.999	0.013	0.975	1.024	0.000	0.0
competition_mu[7]	0.984	0.013	0.960	1.009	0.000	0.0
competition_mu[8]	0.995	0.013	0.971	1.020	0.001	0.0
competition_mu[9]	1.002	0.012	0.980	1.022	0.000	0.0
competition_mu[10]	1.004	0.013	0.982	1.029	0.001	0.0
competition_mu[11]	1.002	0.013	0.978	1.026	0.000	0.0
competition_mu[12]	0.988	0.013	0.961	1.011	0.000	0.0
competition_mu[13]	0.985	0.012	0.964	1.011	0.000	0.0
competition_mu[14]	0.980	0.014	0.955	1.007	0.001	0.0
competition_mu[15]	0.999	0.013	0.976	1.023	0.000	0.0
competition_mu[16]	1.010	0.013	0.986	1.034	0.000	0.0
competition_mu[17]	1.008	0.013	0.983	1.031	0.000	0.0
competition_mu[18]	0.998	0.014	0.973	1.022	0.001	0.0
competition_mu[19]	0.996	0.012	0.975	1.018	0.000	0.0
competition_mu[20]	0.998	0.014	0.970	1.022	0.000	0.0
competition_mu[21]	1.013	0.014	0.990	1.041	0.000	0.0
competition_mu[22]	0.999	0.014	0.973	1.024	0.000	0.0
competition_mu[23]	0.997	0.013	0.974	1.020	0.000	0.0
competition_mu[24]	0.991	0.013	0.967	1.014	0.000	0.0
competition_mu[25]	0.993	0.014	0.970	1.021	0.000	0.0
competition_mu[26]	0.997	0.014	0.968	1.022	0.000	0.0
competition_mu[27]	1.000	0.014	0.976	1.028	0.000	0.0
competition_mu[28]	1.003	0.013	0.982	1.029	0.000	0.0
competition_mu[29]	1.006	0.013	0.981	1.028	0.000	0.0
competition_mu[30]	0.996	0.013	0.973	1.021	0.001	0.0
competition_mu[31]	0.988	0.013	0.965	1.012	0.000	0.0
competition_mu[32]	0.990	0.014	0.963	1.015	0.001	0.0
competition_mu[33]	1.004	0.014	0.978	1.028	0.000	0.0

competition_mu[34]	1.007	0.013	0.981	1.030	0.001	0.0
competition_mu[35]	1.007	0.013	0.982	1.029	0.000	0.0
competition_mu[36]	0.998	0.013	0.974	1.022	0.001	0.0
competition_mu[37]	0.992	0.012	0.971	1.016	0.000	0.0
competition_mu[38]	0.993	0.012	0.970	1.015	0.000	0.0
competition_mu[39]	1.000	0.013	0.976	1.023	0.000	0.0
competition_mu[40]	1.004	0.013	0.981	1.029	0.000	0.0
competition_mu[41]	1.002	0.013	0.979	1.025	0.000	0.0
competition_mu[42]	0.992	0.014	0.968	1.019	0.000	0.0
competition_mu[43]	0.985	0.013	0.961	1.011	0.000	0.0
competition_mu[44]	0.998	0.012	0.975	1.020	0.000	0.0
competition_mu[45]	1.011	0.013	0.987	1.033	0.001	0.0
competition_mu[46]	1.016	0.013	0.992	1.040	0.000	0.0
competition_mu[47]	1.016	0.013	0.994	1.041	0.001	0.0
competition_mu[48]	1.003	0.013	0.978	1.027	0.000	0.0
competition_mu[49]	0.995	0.014	0.968	1.021	0.000	0.0
competition_mu[50]	0.998	0.014	0.973	1.026	0.001	0.0
competition_mu[51]	1.012	0.013	0.988	1.035	0.000	0.0
competition_mu[52]	1.010	0.014	0.984	1.036	0.001	0.0
competition_mu[53]	1.005	0.014	0.976	1.031	0.001	0.0
competition_mu[54]	0.997	0.013	0.975	1.023	0.000	0.0
competition_mu[55]	0.995	0.013	0.972	1.021	0.000	0.0
competition_mu[56]	0.994	0.013	0.970	1.019	0.001	0.0
competition_mu[57]	1.008	0.013	0.982	1.031	0.001	0.0
competition_mu[58]	1.015	0.014	0.989	1.040	0.001	0.0
competition_mu[59]	1.006	0.013	0.984	1.032	0.000	0.0
competition_mu[60]	0.996	0.014	0.973	1.023	0.001	0.0
competition_mu[61]	0.996	0.012	0.975	1.020	0.000	0.0
competition_mu[62]	1.000	0.013	0.975	1.026	0.000	0.0
competition_mu[63]	1.009	0.013	0.986	1.033	0.001	0.0
competition_mu[64]	1.016	0.013	0.989	1.039	0.001	0.0
competition_mu[65]	1.015	0.013	0.990	1.038	0.000	0.0
competition_mu[66]	1.003	0.013	0.982	1.030	0.000	0.0
competition_mu[67]	1.002	0.012	0.978	1.024	0.001	0.0

competition_mu[68]	1.004	0.012	0.981	1.026	0.000	0.0
competition_mu[69]	1.010	0.013	0.985	1.035	0.001	0.0
competition_mu[70]	1.007	0.013	0.983	1.030	0.001	0.0
competition_mu[71]	1.001	0.013	0.980	1.028	0.000	0.0
competition_mu[72]	0.977	0.014	0.952	1.004	0.000	0.0
competition_mu[73]	1.004	0.014	0.976	1.029	0.001	0.0
competition_mu[74]	1.006	0.014	0.982	1.033	0.000	0.0
competition_mu[75]	0.997	0.013	0.970	1.020	0.000	0.0
competition_mu[76]	1.000	0.013	0.976	1.024	0.001	0.0
competition_mu[77]	1.002	0.014	0.975	1.027	0.000	0.0
competition_mu[78]	0.990	0.012	0.968	1.012	0.000	0.0
competition_mu[79]	0.985	0.013	0.961	1.008	0.000	0.0
competition_mu[80]	0.989	0.013	0.966	1.015	0.000	0.0
competition_mu[81]	1.002	0.013	0.975	1.023	0.000	0.0
competition_mu[82]	1.008	0.012	0.984	1.029	0.000	0.0
competition_mu[83]	1.008	0.014	0.984	1.037	0.001	0.0
competition_mu[84]	0.998	0.013	0.975	1.022	0.000	0.0
competition_mu[85]	0.989	0.013	0.962	1.010	0.000	0.0
competition_mu[86]	0.993	0.013	0.968	1.016	0.000	0.0
competition_mu[87]	0.999	0.013	0.975	1.025	0.001	0.0
competition_mu[88]	1.003	0.013	0.981	1.030	0.000	0.0
competition_mu[89]	1.003	0.012	0.981	1.028	0.000	0.0
competition_mu[90]	0.998	0.013	0.975	1.022	0.001	0.0
competition_mu[91]	0.992	0.013	0.968	1.018	0.000	0.0
competition_mu[92]	0.995	0.012	0.971	1.017	0.001	0.0
competition_mu[93]	1.008	0.013	0.986	1.032	0.000	0.0
competition_mu[94]	1.012	0.013	0.983	1.034	0.000	0.0
competition_mu[95]	1.010	0.013	0.986	1.035	0.000	0.0
competition_mu[96]	1.008	0.013	0.983	1.034	0.001	0.0
competition_mu[97]	1.003	0.014	0.980	1.029	0.000	0.0
competition_mu[98]	1.001	0.013	0.977	1.024	0.000	0.0
competition_mu[99]	1.002	0.013	0.980	1.027	0.000	0.0
competition_mu[100]	1.002	0.013	0.977	1.026	0.000	0.0
competition_mu[101]	0.998	0.013	0.974	1.020	0.000	0.0

competition_mu[102]	1.001	0.013	0.975	1.025	0.000	0.0
competition_mu[103]	1.007	0.013	0.984	1.032	0.000	0.0
tgt_mu[0]	1.029	0.006	1.018	1.042	0.000	0.0
tgt_mu[1]	1.012	0.006	1.003	1.023	0.000	0.0
tgt_mu[2]	1.007	0.006	0.997	1.018	0.000	0.0
tgt_mu[3]	1.012	0.006	1.000	1.022	0.000	0.0
tgt_mu[4]	1.008	0.006	0.997	1.021	0.000	0.0
tgt_mu[5]	1.005	0.006	0.992	1.017	0.000	0.0
tgt_mu[6]	1.016	0.006	1.004	1.027	0.000	0.0
tgt_mu[7]	0.990	0.006	0.978	1.001	0.001	0.0
tgt_mu[8]	0.999	0.006	0.988	1.011	0.001	0.0
tgt_mu[9]	1.007	0.006	0.994	1.017	0.000	0.0
tgt_mu[10]	1.003	0.007	0.990	1.015	0.000	0.0
tgt_mu[11]	0.998	0.007	0.985	1.012	0.000	0.0
tgt_mu[12]	0.998	0.007	0.985	1.012	0.001	0.0
tgt_mu[13]	0.987	0.007	0.974	1.000	0.001	0.0
tgt_mu[14]	0.990	0.007	0.977	1.003	0.001	0.0
tgt_mu[15]	1.003	0.006	0.993	1.014	0.000	0.0
tgt_mu[16]	1.012	0.006	1.001	1.023	0.000	0.0
tgt_mu[17]	1.014	0.006	1.004	1.026	0.000	0.0
tgt_mu[18]	1.002	0.007	0.990	1.016	0.000	0.0
tgt_mu[19]	0.989	0.007	0.976	1.000	0.000	0.0
tgt_mu[20]	1.000	0.006	0.988	1.011	0.000	0.0
tgt_mu[21]	0.997	0.008	0.982	1.012	0.001	0.0
tgt_mu[22]	0.993	0.006	0.982	1.005	0.000	0.0
tgt_mu[23]	0.992	0.006	0.981	1.003	0.000	0.0
tgt_mu[24]	0.983	0.007	0.970	0.994	0.001	0.0
tgt_mu[25]	1.001	0.006	0.988	1.012	0.001	0.0
tgt_mu[26]	0.995	0.006	0.984	1.006	0.000	0.0
tgt_mu[27]	0.999	0.005	0.988	1.009	0.000	0.0
tgt_mu[28]	0.999	0.005	0.990	1.011	0.000	0.0
tgt_mu[29]	1.001	0.005	0.991	1.010	0.000	0.0
tgt_mu[30]	0.993	0.006	0.982	1.004	0.000	0.0

tgt_mu[31]	0.995	0.00/	0.980	1.00/	0.000	0.0
tgt_mu[32]	0.995	0.006	0.983	1.006	0.001	0.0
tgt_mu[33]	0.994	0.006	0.982	1.005	0.001	0.0
tgt_mu[34]	0.993	0.007	0.980	1.007	0.001	0.0
tgt_mu[35]	0.998	0.008	0.984	1.012	0.000	0.0
tgt_mu[36]	0.987	0.006	0.975	0.998	0.000	0.0
tgt_mu[37]	0.986	0.007	0.974	0.999	0.000	0.0
tgt_mu[38]	0.991	0.007	0.978	1.003	0.000	0.0
tgt_mu[39]	1.001	0.005	0.992	1.011	0.000	0.0
tgt_mu[40]	1.011	0.006	0.998	1.021	0.001	0.0
tgt_mu[41]	1.009	0.007	0.995	1.023	0.001	0.0
tgt_mu[42]	0.999	0.007	0.985	1.012	0.001	0.0
tgt_mu[43]	0.999	0.008	0.984	1.013	0.001	0.0
tgt_mu[44]	1.004	0.006	0.992	1.015	0.000	0.0
tgt_mu[45]	1.007	0.006	0.996	1.018	0.000	0.0
tgt_mu[46]	1.027	0.007	1.016	1.040	0.001	0.0
tgt_mu[47]	1.026	0.007	1.013	1.039	0.002	0.0
tgt_mu[48]	1.003	0.007	0.990	1.015	0.001	0.0
tgt_mu[49]	0.997	0.007	0.986	1.010	0.000	0.0
tgt_mu[50]	0.995	0.006	0.985	1.009	0.000	0.0
tgt_mu[51]	1.004	0.007	0.989	1.017	0.000	0.0
tgt_mu[52]	1.010	0.008	0.995	1.023	0.000	0.0
tgt_mu[53]	1.008	0.007	0.995	1.021	0.000	0.0
tgt_mu[54]	1.004	0.006	0.992	1.015	0.000	0.0
tgt_mu[55]	1.006	0.006	0.994	1.018	0.000	0.0
tgt_mu[56]	0.999	0.007	0.988	1.014	0.000	0.0
tgt_mu[57]	0.992	0.007	0.977	1.005	0.000	0.0
tgt_mu[58]	1.002	0.008	0.986	1.017	0.001	0.0
tgt_mu[59]	0.993	0.007	0.980	1.004	0.001	0.0
tgt_mu[60]	0.962	0.010	0.943	0.980	0.001	0.0
tgt_mu[61]	1.002	0.005	0.992	1.012	0.000	0.0
tgt_mu[62]	0.985	0.006	0.973	0.996	0.000	0.0
tgt_mu[63]	0.995	0.007	0.981	1.008	0.000	0.0
tgt_mu[64]	1.000	0.007	0.986	1.014	0.000	0.0

tgt_mu[65]	0.993	0.007	0.979	1.008	0.001	0.0
tgt_mu[66]	0.983	0.006	0.971	0.994	0.001	0.0
tgt_mu[67]	0.975	0.007	0.962	0.988	0.001	0.0
tgt_mu[68]	0.980	0.007	0.967	0.994	0.001	0.0
tgt_mu[69]	0.988	0.007	0.975	1.001	0.001	0.0
tgt_mu[70]	0.992	0.006	0.981	1.003	0.000	0.0
tgt_mu[71]	0.991	0.006	0.980	1.001	0.000	0.0
tgt_mu[72]	0.975	0.008	0.960	0.993	0.001	0.0
tgt_mu[73]	0.983	0.011	0.965	1.004	0.001	0.0
tgt_mu[74]	0.988	0.011	0.969	1.010	0.001	0.0
tgt_mu[75]	0.990	0.007	0.975	1.001	0.000	0.0
tgt_mu[76]	0.994	0.008	0.978	1.009	0.001	0.0
tgt_mu[77]	1.001	0.008	0.986	1.015	0.001	0.0
tgt_mu[78]	0.991	0.006	0.980	1.003	0.000	0.0
tgt_mu[79]	1.000	0.007	0.986	1.014	0.000	0.0
tgt_mu[80]	1.005	0.007	0.991	1.018	0.000	0.0
tgt_mu[81]	0.999	0.007	0.988	1.012	0.000	0.0
tgt_mu[82]	1.000	0.006	0.989	1.011	0.000	0.0
tgt_mu[83]	0.998	0.006	0.986	1.010	0.000	0.0
tgt_mu[84]	0.996	0.006	0.985	1.009	0.000	0.0
tgt_mu[85]	0.991	0.007	0.978	1.003	0.000	0.0
tgt_mu[86]	1.003	0.006	0.992	1.015	0.000	0.0
tgt_mu[87]	1.008	0.006	0.999	1.021	0.000	0.0
tgt_mu[88]	1.007	0.006	0.996	1.020	0.000	0.0
tgt_mu[89]	1.003	0.006	0.991	1.014	0.000	0.0
tgt_mu[90]	1.007	0.006	0.994	1.018	0.000	0.0
tgt_mu[91]	0.997	0.006	0.987	1.010	0.000	0.0
tgt_mu[92]	0.985	0.007	0.972	0.996	0.000	0.0
tgt_mu[93]	0.995	0.007	0.982	1.009	0.000	0.0
tgt_mu[94]	1.012	0.007	1.000	1.024	0.000	0.0
tgt_mu[95]	1.018	0.007	1.005	1.030	0.000	0.0
tgt_mu[96]	1.024	0.006	1.013	1.036	0.000	0.0
tgt_mu[97]	1.018	0.007	1.006	1.030	0.000	0.0
tgt_mu[98]	1.017	0.006	1.005	1.028	0.000	0.0

tgt_mu[99]	1.021	0.006	1.009	1.034	0.000	0.0
tgt_mu[100]	1.013	0.006	1.003	1.025	0.000	0.0
tgt_mu[101]	1.004	0.006	0.994	1.017	0.000	0.0
tgt_mu[102]	1.003	0.006	0.992	1.014	0.000	0.0
tgt_mu[103]	1.012	0.006	1.000	1.024	0.000	0.0
seasonality_holidays_mu[0]	0.974	0.167	0.679	1.287	0.008	0.0
seasonality_holidays_mu[1]	0.990	0.176	0.674	1.298	0.009	0.0
seasonality_holidays_mu[2]	0.991	0.159	0.676	1.259	0.008	0.0
seasonality_holidays_mu[3]	0.985	0.163	0.690	1.286	0.008	0.0
seasonality_holidays_mu[4]	0.957	0.160	0.642	1.231	0.009	0.0
seasonality_holidays_mu[5]	0.983	0.162	0.682	1.296	0.008	0.0
seasonality_holidays_mu[6]	0.974	0.158	0.680	1.288	0.009	0.0
seasonality_holidays_mu[7]	0.987	0.157	0.682	1.272	0.008	0.0
seasonality_holidays_mu[8]	0.987	0.179	0.655	1.301	0.010	0.0
seasonality_holidays_mu[9]	0.990	0.160	0.680	1.266	0.008	0.0
seasonality_holidays_mu[10]	0.984	0.170	0.706	1.322	0.008	0.0
seasonality_holidays_mu[11]	0.977	0.160	0.678	1.254	0.008	0.0
seasonality_holidays_mu[12]	0.996	0.169	0.690	1.339	0.010	0.0
seasonality_holidays_mu[13]	0.996	0.171	0.669	1.297	0.009	0.0
seasonality_holidays_mu[14]	0.977	0.160	0.667	1.257	0.009	0.0
seasonality_holidays_mu[15]	0.975	0.162	0.682	1.294	0.007	0.0
seasonality_holidays_mu[16]	0.974	0.177	0.641	1.280	0.010	0.0
seasonality_holidays_mu[17]	0.972	0.180	0.635	1.341	0.009	0.0
seasonality_holidays_mu[18]	0.985	0.165	0.704	1.311	0.008	0.0
seasonality_holidays_mu[19]	0.993	0.166	0.708	1.320	0.009	0.0
seasonality_holidays_mu[20]	0.983	0.169	0.652	1.263	0.009	0.0
seasonality_holidays_mu[21]	0.998	0.159	0.698	1.301	0.008	0.0
seasonality_holidays_mu[22]	0.994	0.163	0.714	1.303	0.008	0.0
seasonality_holidays_mu[23]	0.977	0.173	0.591	1.238	0.008	0.0
seasonality_holidays_mu[24]	0.980	0.161	0.669	1.247	0.009	0.0
seasonality_holidays_mu[25]	0.993	0.168	0.703	1.343	0.008	0.0
seasonality_holidays_mu[26]	0.971	0.157	0.705	1.311	0.008	0.0
seasonality_holidays_mu[27]	0.968	0.163	0.639	1.250	0.009	0.0

seasonality_holidays_mu[28]	0.989	0.167	0.663	1.291	0.010	0.0
seasonality_holidays_mu[29]	0.972	0.173	0.578	1.257	0.009	0.0
seasonality_holidays_mu[30]	0.976	0.174	0.641	1.304	0.009	0.0
seasonality_holidays_mu[31]	0.982	0.170	0.626	1.283	0.009	0.0
seasonality_holidays_mu[32]	0.976	0.175	0.640	1.282	0.008	0.0
seasonality_holidays_mu[33]	0.990	0.180	0.686	1.316	0.011	0.0
seasonality_holidays_mu[34]	0.996	0.170	0.689	1.329	0.010	0.0
seasonality_holidays_mu[35]	0.976	0.173	0.614	1.280	0.010	0.0
seasonality_holidays_mu[36]	0.975	0.179	0.658	1.318	0.012	0.0
seasonality_holidays_mu[37]	0.978	0.177	0.671	1.316	0.009	0.0
seasonality_holidays_mu[38]	0.974	0.181	0.605	1.302	0.011	0.0
seasonality_holidays_mu[39]	0.991	0.171	0.671	1.294	0.009	0.0
seasonality_holidays_mu[40]	0.979	0.169	0.668	1.284	0.009	0.0
seasonality_holidays_mu[41]	0.973	0.170	0.638	1.268	0.008	0.0
seasonality_holidays_mu[42]	0.968	0.162	0.683	1.258	0.009	0.0
seasonality_holidays_mu[43]	0.984	0.170	0.683	1.313	0.009	0.0
seasonality_holidays_mu[44]	0.992	0.166	0.669	1.314	0.009	0.0
seasonality_holidays_mu[45]	0.982	0.175	0.642	1.304	0.009	0.0
seasonality_holidays_mu[46]	0.978	0.169	0.628	1.249	0.009	0.0
seasonality_holidays_mu[47]	1.001	0.167	0.708	1.326	0.009	0.0
seasonality_holidays_mu[48]	0.978	0.169	0.675	1.301	0.008	0.0
seasonality_holidays_mu[49]	0.981	0.165	0.684	1.294	0.007	0.0
seasonality_holidays_mu[50]	0.977	0.163	0.656	1.280	0.008	0.0
seasonality_holidays_mu[51]	0.987	0.173	0.670	1.331	0.009	0.0
seasonality_holidays_mu[52]	0.984	0.165	0.662	1.272	0.008	0.0
seasonality_holidays_mu[53]	0.980	0.162	0.687	1.284	0.007	0.0
seasonality_holidays_mu[54]	0.974	0.170	0.667	1.314	0.009	0.0
seasonality_holidays_mu[55]	0.984	0.160	0.658	1.243	0.008	0.0
seasonality_holidays_mu[56]	0.982	0.180	0.655	1.325	0.009	0.0
seasonality_holidays_mu[57]	0.971	0.173	0.654	1.297	0.010	0.0
seasonality_holidays_mu[58]	0.982	0.153	0.701	1.254	0.007	0.0
seasonality_holidays_mu[59]	0.982	0.170	0.687	1.290	0.009	0.0
seasonality_holidays_mu[60]	0.983	0.173	0.656	1.322	0.009	0.0
seasonality_holidays_mu[61]	0.982	0.171	0.665	1.295	0.009	0.0

seasonality_holidays_mu[62]	0.974	0.179	0.655	1.306	0.011	0.0
seasonality_holidays_mu[63]	0.988	0.170	0.663	1.294	0.008	0.0
seasonality_holidays_mu[64]	1.002	0.162	0.715	1.333	0.008	0.0
seasonality_holidays_mu[65]	0.983	0.166	0.694	1.314	0.009	0.0
seasonality_holidays_mu[66]	0.976	0.180	0.608	1.300	0.009	0.0
seasonality_holidays_mu[67]	0.990	0.165	0.653	1.287	0.008	0.0
seasonality_holidays_mu[68]	0.978	0.169	0.694	1.316	0.009	0.0
seasonality_holidays_mu[69]	0.976	0.175	0.685	1.324	0.009	0.0
seasonality_holidays_mu[70]	0.980	0.172	0.652	1.297	0.009	0.0
seasonality_holidays_mu[71]	0.985	0.173	0.671	1.302	0.010	0.0
seasonality_holidays_mu[72]	0.977	0.160	0.656	1.252	0.009	0.0
seasonality_holidays_mu[73]	0.979	0.155	0.677	1.243	0.008	0.0
seasonality_holidays_mu[74]	0.988	0.169	0.699	1.333	0.009	0.0
seasonality_holidays_mu[75]	0.986	0.161	0.705	1.292	0.009	0.0
seasonality_holidays_mu[76]	0.989	0.161	0.680	1.258	0.007	0.0
seasonality_holidays_mu[77]	0.983	0.174	0.651	1.281	0.009	0.0
seasonality_holidays_mu[78]	0.975	0.158	0.657	1.258	0.008	0.0
seasonality_holidays_mu[79]	0.982	0.167	0.670	1.285	0.008	0.0
seasonality_holidays_mu[80]	0.976	0.174	0.653	1.261	0.009	0.0
seasonality_holidays_mu[81]	0.970	0.161	0.650	1.264	0.008	0.0
seasonality_holidays_mu[82]	0.982	0.161	0.679	1.253	0.008	0.0
seasonality_holidays_mu[83]	0.984	0.161	0.658	1.250	0.008	0.0
seasonality_holidays_mu[84]	0.977	0.161	0.682	1.280	0.008	0.0
seasonality_holidays_mu[85]	0.978	0.158	0.683	1.271	0.007	0.0
seasonality_holidays_mu[86]	0.984	0.168	0.690	1.325	0.008	0.0
seasonality_holidays_mu[87]	0.974	0.168	0.674	1.281	0.007	0.0
seasonality_holidays_mu[88]	0.981	0.178	0.701	1.391	0.010	0.0
seasonality_holidays_mu[89]	0.975	0.162	0.652	1.257	0.009	0.0
seasonality_holidays_mu[90]	0.978	0.163	0.673	1.287	0.008	0.0
seasonality_holidays_mu[91]	0.993	0.168	0.687	1.300	0.008	0.0
seasonality_holidays_mu[92]	0.996	0.166	0.684	1.300	0.008	0.0
seasonality_holidays_mu[93]	0.990	0.170	0.686	1.318	0.008	0.0
seasonality_holidays_mu[94]	0.976	0.166	0.688	1.310	0.009	0.0
seasonality_holidays_mu[95]	0.975	0.164	0.685	1.298	0.009	0.0

seasonality_holidays_mu[96]	1.000	0.164	0.676	1.287	0.008	0.0
seasonality_holidays_mu[97]	0.973	0.178	0.676	1.316	0.008	0.0
seasonality_holidays_mu[98]	0.977	0.163	0.650	1.263	0.009	0.0
seasonality_holidays_mu[99]	0.976	0.172	0.648	1.289	0.010	0.0
seasonality_holidays_mu[100]	0.970	0.173	0.653	1.278	0.009	0.0
seasonality_holidays_mu[101]	0.995	0.167	0.698	1.331	0.008	0.0
seasonality_holidays_mu[102]	0.983	0.159	0.693	1.283	0.007	0.0
seasonality_holidays_mu[103]	0.976	0.164	0.699	1.327	0.009	0.0
covid_new_cases_mu[0]	0.274	0.492	-0.640	1.194	0.072	0.0
covid_new_cases_mu[1]	0.127	0.399	-0.544	0.934	0.079	0.0
covid_new_cases_mu[2]	0.328	0.507	-0.779	1.199	0.077	0.0
covid_new_cases_mu[3]	0.153	0.509	-0.892	0.997	0.085	0.0
covid_new_cases_mu[4]	0.332	0.477	-0.573	1.177	0.075	0.0
covid_new_cases_mu[5]	0.331	0.502	-0.509	1.182	0.095	0.0
covid_new_cases_mu[6]	0.181	0.422	-0.599	0.867	0.065	0.0
covid_new_cases_mu[7]	0.223	0.413	-0.636	0.961	0.047	0.0
covid_new_cases_mu[8]	0.074	0.452	-0.765	0.842	0.150	0.0
covid_new_cases_mu[9]	0.280	0.444	-0.530	1.050	0.109	0.0
covid_new_cases_mu[10]	0.166	0.448	-0.826	0.883	0.057	0.0
covid_new_cases_mu[11]	0.380	0.409	-0.346	1.129	0.055	0.0
covid_new_cases_mu[12]	0.306	0.445	-0.584	1.089	0.053	0.0
covid_new_cases_mu[13]	0.332	0.530	-0.594	1.380	0.093	0.0
covid_new_cases_mu[14]	0.380	0.418	-0.318	1.167	0.089	0.0
covid_new_cases_mu[15]	0.330	0.448	-0.567	1.121	0.054	0.0
covid_new_cases_mu[16]	0.316	0.456	-0.511	1.201	0.050	0.0
covid_new_cases_mu[17]	0.255	0.472	-0.645	1.095	0.052	0.0
covid_new_cases_mu[18]	0.239	0.484	-0.640	1.098	0.077	0.0
covid_new_cases_mu[19]	0.198	0.430	-0.562	0.984	0.068	0.0
covid_new_cases_mu[20]	0.338	0.481	-0.510	1.132	0.067	0.0
covid_new_cases_mu[21]	0.350	0.420	-0.457	1.145	0.057	0.0
covid_new_cases_mu[22]	0.263	0.483	-0.581	1.116	0.065	0.0
covid_new_cases_mu[23]	0.236	0.426	-0.563	1.013	0.054	0.0
covid_new_cases_mu[24]	0.133	0.533	-0.918	1.046	0.108	0.0
covid_new_cases_mu[25]	0.279	0.500	-0.601	1.256	0.073	0.0

covid_new_cases_mu[26]	0.355	0.452	-0.559	1.123	0.077	0.0
covid_new_cases_mu[27]	0.275	0.449	-0.461	1.200	0.047	0.0
covid_new_cases_mu[28]	0.235	0.451	-0.591	1.144	0.079	0.0
covid_new_cases_mu[29]	0.216	0.436	-0.677	0.983	0.072	0.0
covid_new_cases_mu[30]	0.239	0.446	-0.561	1.080	0.073	0.0
covid_new_cases_mu[31]	0.199	0.466	-0.601	1.124	0.083	0.0
covid_new_cases_mu[32]	0.332	0.383	-0.383	1.021	0.049	0.0
covid_new_cases_mu[33]	0.320	0.397	-0.427	1.056	0.048	0.0
covid_new_cases_mu[34]	0.154	0.470	-0.633	1.142	0.089	0.0
covid_new_cases_mu[35]	0.355	0.460	-0.529	1.158	0.058	0.0
covid_new_cases_mu[36]	0.318	0.556	-0.679	1.470	0.095	0.0
covid_new_cases_mu[37]	0.212	0.430	-0.564	1.058	0.064	0.0
covid_new_cases_mu[38]	0.330	0.439	-0.419	1.127	0.074	0.0
covid_new_cases_mu[39]	0.286	0.461	-0.540	1.183	0.062	0.0
covid_new_cases_mu[40]	0.343	0.452	-0.421	1.234	0.076	0.0
covid_new_cases_mu[41]	0.193	0.430	-0.725	0.951	0.044	0.0
covid_new_cases_mu[42]	0.279	0.516	-0.634	1.172	0.107	0.0
covid_new_cases_mu[43]	0.269	0.405	-0.565	1.004	0.048	0.0
covid_new_cases_mu[44]	0.160	0.380	-0.472	0.974	0.077	0.0
covid_new_cases_mu[45]	0.267	0.400	-0.473	0.998	0.055	0.0
covid_new_cases_mu[46]	0.375	0.412	-0.248	1.284	0.060	0.0
covid_new_cases_mu[47]	0.386	0.467	-0.439	1.232	0.087	0.0
covid_new_cases_mu[48]	0.256	0.439	-0.598	1.015	0.056	0.0
covid_new_cases_mu[49]	0.324	0.476	-0.580	1.199	0.073	0.0
covid_new_cases_mu[50]	0.202	0.433	-0.577	1.045	0.067	0.0
covid_new_cases_mu[51]	0.295	0.438	-0.546	1.064	0.063	0.0
covid_new_cases_mu[52]	0.215	0.441	-0.557	1.066	0.063	0.0
covid_new_cases_mu[53]	0.251	0.426	-0.630	1.020	0.038	0.0
covid_new_cases_mu[54]	0.311	0.436	-0.424	1.113	0.076	0.0
covid_new_cases_mu[55]	0.278	0.436	-0.614	0.982	0.107	0.0
covid_new_cases_mu[56]	0.155	0.492	-0.781	1.049	0.176	0.1
covid_new_cases_mu[57]	0.347	0.490	-0.484	1.345	0.075	0.0
covid_new_cases_mu[58]	0.360	0.478	-0.591	1.295	0.092	0.0
covid_new_cases_mu[59]	0.299	0.481	-0.581	1.086	0.066	0.0

covid_new_cases_mu[55]	0.299	0.401	-0.501	1.000	0.000	0.0
covid_new_cases_mu[60]	0.243	0.507	-0.666	1.106	0.074	0.0
covid_new_cases_mu[61]	0.297	0.504	-0.632	1.229	0.105	0.0
covid_new_cases_mu[62]	0.399	0.492	-0.469	1.268	0.082	0.0
covid_new_cases_mu[63]	0.402	0.478	-0.416	1.275	0.087	0.0
covid_new_cases_mu[64]	0.274	0.412	-0.457	1.121	0.052	0.0
covid_new_cases_mu[65]	0.214	0.407	-0.532	1.005	0.061	0.0
covid_new_cases_mu[66]	0.352	0.400	-0.337	1.080	0.045	0.0
covid_new_cases_mu[67]	0.274	0.396	-0.425	1.081	0.063	0.0
covid_new_cases_mu[68]	0.372	0.429	-0.350	1.234	0.068	0.0
covid_new_cases_mu[69]	0.311	0.382	-0.418	1.002	0.052	0.0
covid_new_cases_mu[70]	0.193	0.419	-0.563	0.935	0.053	0.0
covid_new_cases_mu[71]	0.266	0.469	-0.612	1.218	0.068	0.0
covid_new_cases_mu[72]	0.220	0.444	-0.540	1.135	0.062	0.0
covid_new_cases_mu[73]	0.291	0.409	-0.559	1.070	0.087	0.0
covid_new_cases_mu[74]	0.216	0.466	-0.538	1.290	0.084	0.0
covid_new_cases_mu[75]	0.138	0.422	-0.679	0.899	0.068	0.0
covid_new_cases_mu[76]	0.299	0.482	-0.531	1.270	0.074	0.0
covid_new_cases_mu[77]	0.052	0.403	-0.675	0.810	0.049	0.0
covid_new_cases_mu[78]	0.294	0.443	-0.429	1.196	0.093	0.0
covid_new_cases_mu[79]	0.151	0.455	-0.633	1.072	0.053	0.0
covid_new_cases_mu[80]	0.355	0.445	-0.533	1.151	0.064	0.0
covid_new_cases_mu[81]	0.278	0.474	-0.700	1.131	0.106	0.0
covid_new_cases_mu[82]	0.326	0.428	-0.446	1.059	0.048	0.0
covid_new_cases_mu[83]	0.233	0.425	-0.625	0.914	0.059	0.0
covid_new_cases_mu[84]	0.381	0.477	-0.397	1.375	0.070	0.0
covid_new_cases_mu[85]	0.330	0.437	-0.419	1.174	0.060	0.0
covid_new_cases_mu[86]	0.384	0.459	-0.470	1.258	0.099	0.0
covid_new_cases_mu[87]	0.273	0.402	-0.561	0.888	0.123	0.0
covid_new_cases_mu[88]	0.262	0.440	-0.525	1.055	0.054	0.0
covid_new_cases_mu[89]	0.171	0.488	-0.845	1.002	0.079	0.0
covid_new_cases_mu[90]	0.262	0.504	-0.584	1.200	0.080	0.0
covid_new_cases_mu[91]	0.312	0.469	-0.533	1.163	0.083	0.0
covid_new_cases_mu[92]	0.186	0.385	-0.509	0.938	0.045	0.0
covid_new_cases_mu[93]	0.212	0.472	0.576	1.001	0.000	0.0

	0.515	0.475	-0.570	1.051	0.000	0.0
covid_new_cases_mu[93]	0.515	0.475	-0.570	1.051	0.000	0.0
covid_new_cases_mu[94]	0.248	0.522	-0.774	1.216	0.065	0.0
covid_new_cases_mu[95]	0.279	0.485	-0.611	1.196	0.058	0.0
covid_new_cases_mu[96]	0.300	0.429	-0.447	1.152	0.071	0.0
covid_new_cases_mu[97]	0.394	0.452	-0.413	1.210	0.054	0.0
covid_new_cases_mu[98]	0.112	0.453	-0.716	0.898	0.058	0.0
covid_new_cases_mu[99]	0.297	0.495	-0.553	1.278	0.071	0.0
covid_new_cases_mu[100]	0.371	0.418	-0.397	1.123	0.078	0.0
covid_new_cases_mu[101]	0.226	0.446	-0.594	1.092	0.069	0.0
covid_new_cases_mu[102]	0.219	0.409	-0.595	0.918	0.041	0.0
covid_new_cases_mu[103]	0.391	0.438	-0.487	1.145	0.058	0.0
tgt_sigma	0.004	0.001	0.002	0.006	0.000	0.0
beta_price_to_promo	-0.094	0.028	-0.139	-0.038	0.001	0.0
beta_offline_to_online	0.079	0.043	0.010	0.155	0.004	0.0
beta_seasonality_holidays_to_online	-0.025	0.021	-0.061	-0.000	0.003	0.0
beta_covid_new_cases_to_online	-0.053	0.036	-0.116	-0.000	0.005	0.0
beta_promo_to_competition	-0.036	0.031	-0.091	-0.000	0.002	0.0
beta_online_to_competition	-0.023	0.015	-0.048	-0.000	0.001	0.0
beta_distribution_to_competition	-0.133	0.105	-0.324	-0.001	0.016	0.0
beta_seasonality_holidays_to_tgt	-0.009	0.009	-0.026	-0.000	0.001	0.0
beta_covid_new_cases_to_tgt	-0.004	0.003	-0.010	-0.000	0.000	0.0
beta_distribution_to_tgt	0.062	0.055	0.003	0.165	0.006	0.0
beta_competition_to_tgt	-0.246	0.114	-0.431	-0.007	0.013	0.0
beta_online_to_tgt	0.015	0.012	0.000	0.037	0.001	0.0
beta_price_to_tgt	-0.311	0.086	-0.461	-0.150	0.008	0.0
beta_promo_to_tgt	0.438	0.090	0.256	0.607	0.009	0.0
beta_otherprod_to_tgt	0.048	0.028	0.002	0.093	0.002	0.0
beta_offline_to_tgt	0.011	0.006	0.000	0.020	0.000	0.0
beta_online_spend[0]	1.000	0.000	1.000	1.000	0.000	0.0
beta_online_spend[1]	1.000	0.000	1.000	1.000	0.000	0.0
beta_online_spend[2]	1.000	0.000	1.000	1.000	0.000	0.0
beta_online_spend[3]	1.000	0.000	1.000	1.000	0.000	0.0
beta_online_spend[4]	1.000	0.000	1.000	1.000	0.000	0.0
beta_online_spend[5]	1.000	0.000	1.000	1.000	0.000	0.0

meta_online_spent[0]	0.000	0.000	0.000	0.000	0.000	0.000
alpha_offline	0.513	0.136	0.284	0.783	0.028	0.0
theta_offline	0.701	0.450	0.052	1.384	0.250	0.2
alpha_online	0.523	0.191	0.223	0.854	0.041	0.0
theta_online	0.215	0.106	0.050	0.401	0.036	0.0
marketing_offline[0]	0.286	0.132	0.081	0.485	0.066	0.0
marketing_offline[1]	0.569	0.106	0.398	0.699	0.058	0.0
marketing_offline[2]	0.679	0.028	0.626	0.704	0.014	0.0
marketing_offline[3]	0.821	0.055	0.734	0.903	0.027	0.0
marketing_offline[4]	0.932	0.042	0.863	0.982	0.023	0.0
marketing_offline[5]	0.949	0.009	0.936	0.973	0.002	0.0
marketing_offline[6]	0.907	0.021	0.878	0.940	0.011	0.0
marketing_offline[7]	0.545	0.161	0.312	0.796	0.082	0.0
marketing_offline[8]	0.181	0.136	0.011	0.407	0.074	0.0
marketing_offline[9]	0.032	0.039	0.000	0.103	0.020	0.0
marketing_offline[10]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[11]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[12]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[13]	0.376	0.174	0.107	0.638	0.087	0.0
marketing_offline[14]	0.672	0.108	0.488	0.811	0.059	0.0
marketing_offline[15]	0.720	0.022	0.692	0.772	0.004	0.0
marketing_offline[16]	0.443	0.132	0.248	0.636	0.068	0.0
marketing_offline[17]	0.581	0.108	0.381	0.784	0.044	0.0
marketing_offline[18]	0.800	0.094	0.647	0.919	0.051	0.0
marketing_offline[19]	0.851	0.021	0.813	0.895	0.004	0.0
marketing_offline[20]	0.534	0.153	0.309	0.760	0.079	0.0
marketing_offline[21]	0.613	0.092	0.443	0.792	0.032	0.0
marketing_offline[22]	0.891	0.124	0.701	1.048	0.066	0.0
marketing_offline[23]	0.941	0.033	0.887	1.017	0.006	0.0
marketing_offline[24]	0.570	0.178	0.311	0.838	0.092	0.0
marketing_offline[25]	0.465	0.054	0.351	0.562	0.013	0.0
marketing_offline[26]	0.618	0.083	0.487	0.731	0.043	0.0
marketing_offline[27]	0.678	0.026	0.628	0.720	0.008	0.0
marketing_offline[28]	0.422	0.128	0.238	0.620	0.065	0.0

marketing_offline[29]	0.522	0.090	0.355	0.695	0.034	0.0
marketing_offline[30]	0.773	0.110	0.604	0.912	0.059	0.0
marketing_offline[31]	0.861	0.028	0.806	0.902	0.009	0.0
marketing_offline[32]	0.542	0.158	0.312	0.786	0.080	0.0
marketing_offline[33]	0.181	0.135	0.018	0.409	0.074	0.0
marketing_offline[34]	0.032	0.040	0.000	0.104	0.020	0.0
marketing_offline[35]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[36]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[37]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[38]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[39]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[40]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[41]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[42]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[43]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[44]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[45]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[46]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[47]	0.560	0.259	0.159	0.949	0.130	0.1
marketing_offline[48]	1.085	0.196	0.765	1.322	0.108	0.0
marketing_offline[49]	1.274	0.046	1.183	1.312	0.021	0.0
marketing_offline[50]	1.148	0.076	1.035	1.260	0.039	0.0
marketing_offline[51]	1.211	0.056	1.111	1.319	0.021	0.0
marketing_offline[52]	1.362	0.065	1.260	1.444	0.035	0.0
marketing_offline[53]	1.365	0.023	1.321	1.410	0.005	0.0
marketing_offline[54]	1.163	0.095	1.024	1.302	0.049	0.0
marketing_offline[55]	1.175	0.042	1.093	1.253	0.011	0.0
marketing_offline[56]	1.284	0.051	1.203	1.348	0.028	0.0
marketing_offline[57]	1.344	0.019	1.305	1.366	0.010	0.0
marketing_offline[58]	0.850	0.236	0.493	1.213	0.119	0.0
marketing_offline[59]	0.288	0.213	0.034	0.649	0.116	0.0
marketing_offline[60]	0.052	0.064	0.000	0.168	0.033	0.0
marketing_offline[61]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[62]	0.000	0.000	0.000	0.000	0.000	0.0

marketing_offline[63]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[64]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[65]	0.356	0.165	0.101	0.603	0.083	0.0
marketing_offline[66]	0.754	0.152	0.502	0.942	0.083	0.0
marketing_offline[67]	0.918	0.044	0.837	0.956	0.022	0.0
marketing_offline[68]	0.589	0.168	0.337	0.850	0.085	0.0
marketing_offline[69]	0.199	0.148	0.019	0.450	0.081	0.0
marketing_offline[70]	0.035	0.043	0.000	0.114	0.022	0.0
marketing_offline[71]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[72]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[73]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[74]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[75]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[76]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[77]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[78]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[79]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[80]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[81]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[82]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[83]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[84]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[85]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[86]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[87]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[88]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[89]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[90]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[91]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[92]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[93]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[94]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[95]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[96]	0.000	0.000	0.000	0.000	0.000	0.0

marketing_offline[97]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[98]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[99]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[100]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[101]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[102]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_offline[103]	0.000	0.000	0.000	0.000	0.000	0.0
marketing_online[0]	0.716	0.074	0.606	0.854	0.018	0.0
marketing_online[1]	1.197	0.000	1.197	1.197	0.000	0.0
marketing_online[2]	1.155	0.004	1.147	1.161	0.001	0.0
marketing_online[3]	1.080	0.005	1.071	1.087	0.001	0.0
marketing_online[4]	1.129	0.008	1.116	1.144	0.002	0.0
marketing_online[5]	1.160	0.002	1.156	1.164	0.001	0.0
marketing_online[6]	0.958	0.019	0.922	0.987	0.005	0.0
marketing_online[7]	0.833	0.000	0.833	0.833	0.000	0.0
marketing_online[8]	0.837	0.000	0.837	0.838	0.000	0.0
marketing_online[9]	0.834	0.001	0.833	0.835	0.000	0.0
marketing_online[10]	0.825	0.001	0.824	0.825	0.000	0.0
marketing_online[11]	0.826	0.001	0.826	0.827	0.000	0.0
marketing_online[12]	0.834	0.000	0.834	0.835	0.000	0.0
marketing_online[13]	0.840	0.000	0.840	0.840	0.000	0.0
marketing_online[14]	0.836	0.001	0.835	0.837	0.000	0.0
marketing_online[15]	0.835	0.000	0.835	0.836	0.000	0.0
marketing_online[16]	0.838	0.000	0.838	0.838	0.000	0.0
marketing_online[17]	0.838	0.000	0.837	0.838	0.000	0.0
marketing_online[18]	0.838	0.000	0.838	0.838	0.000	0.0
marketing_online[19]	0.837	0.000	0.836	0.837	0.000	0.0
marketing_online[20]	0.832	0.000	0.831	0.833	0.000	0.0
marketing_online[21]	0.844	0.001	0.842	0.846	0.000	0.0
marketing_online[22]	0.999	0.015	0.977	1.027	0.004	0.0
marketing_online[23]	1.113	0.002	1.111	1.116	0.000	0.0
marketing_online[24]	1.168	0.005	1.161	1.177	0.001	0.0
marketing_online[25]	1.163	0.004	1.156	1.168	0.001	0.0

marketing_online[26]	1.134	0.001	1.133	1.135	0.000	0.0
marketing_online[27]	1.130	0.000	1.130	1.130	0.000	0.0
marketing_online[28]	1.085	0.005	1.077	1.092	0.001	0.0
marketing_online[29]	1.139	0.009	1.126	1.155	0.002	0.0
marketing_online[30]	1.182	0.001	1.180	1.184	0.000	0.0
marketing_online[31]	1.191	0.002	1.189	1.195	0.000	0.0
marketing_online[32]	1.147	0.006	1.136	1.155	0.001	0.0
marketing_online[33]	1.069	0.004	1.061	1.075	0.001	0.0
marketing_online[34]	1.044	0.000	1.044	1.044	0.000	0.0
marketing_online[35]	1.042	0.000	1.041	1.042	0.000	0.0
marketing_online[36]	1.027	0.001	1.025	1.029	0.000	0.0
marketing_online[37]	1.014	0.000	1.014	1.015	0.000	0.0
marketing_online[38]	1.020	0.001	1.019	1.022	0.000	0.0
marketing_online[39]	1.026	0.000	1.026	1.026	0.000	0.0
marketing_online[40]	1.032	0.001	1.031	1.033	0.000	0.0
marketing_online[41]	1.038	0.000	1.038	1.038	0.000	0.0
marketing_online[42]	1.042	0.000	1.042	1.043	0.000	0.0
marketing_online[43]	1.046	0.000	1.046	1.047	0.000	0.0
marketing_online[44]	1.044	0.000	1.043	1.044	0.000	0.0
marketing_online[45]	1.040	0.000	1.039	1.040	0.000	0.0
marketing_online[46]	1.041	0.000	1.041	1.042	0.000	0.0
marketing_online[47]	1.049	0.001	1.048	1.050	0.000	0.0
marketing_online[48]	1.053	0.000	1.053	1.053	0.000	0.0
marketing_online[49]	1.052	0.000	1.052	1.052	0.000	0.0
marketing_online[50]	1.043	0.001	1.041	1.044	0.000	0.0
marketing_online[51]	1.030	0.001	1.028	1.031	0.000	0.0
marketing_online[52]	1.037	0.001	1.035	1.039	0.000	0.0
marketing_online[53]	1.045	0.000	1.045	1.045	0.000	0.0
marketing_online[54]	1.044	0.000	1.044	1.044	0.000	0.0
marketing_online[55]	1.044	0.000	1.044	1.044	0.000	0.0
marketing_online[56]	1.093	0.005	1.086	1.103	0.001	0.0
marketing_online[57]	1.143	0.002	1.140	1.146	0.000	0.0
marketing_online[58]	1.144	0.001	1.142	1.145	0.000	0.0
marketing_online[59]	1.149	0.001	1.147	1.152	0.000	0.0

marketing_online[60]	1.148	0.001	1.146	1.149	0.000	0.0
marketing_online[61]	1.067	0.008	1.053	1.079	0.002	0.0
marketing_online[62]	1.023	0.001	1.022	1.024	0.000	0.0
marketing_online[63]	1.030	0.000	1.030	1.030	0.000	0.0
marketing_online[64]	1.057	0.003	1.053	1.061	0.001	0.0
marketing_online[65]	1.065	0.001	1.063	1.066	0.000	0.0
marketing_online[66]	1.055	0.000	1.054	1.055	0.000	0.0
marketing_online[67]	1.050	0.000	1.049	1.050	0.000	0.0
marketing_online[68]	1.038	0.001	1.036	1.040	0.000	0.0
marketing_online[69]	1.062	0.003	1.058	1.068	0.001	0.0
marketing_online[70]	1.083	0.000	1.083	1.083	0.000	0.0
marketing_online[71]	1.061	0.002	1.056	1.064	0.001	0.0
marketing_online[72]	1.028	0.002	1.025	1.031	0.000	0.0
marketing_online[73]	1.011	0.001	1.009	1.011	0.000	0.0
marketing_online[74]	1.000	0.001	0.999	1.001	0.000	0.0
marketing_online[75]	0.996	0.000	0.996	0.996	0.000	0.0
marketing_online[76]	0.994	0.000	0.993	0.994	0.000	0.0
marketing_online[77]	0.995	0.000	0.994	0.995	0.000	0.0
marketing_online[78]	0.990	0.001	0.989	0.991	0.000	0.0
marketing_online[79]	0.982	0.000	0.982	0.983	0.000	0.0
marketing_online[80]	0.987	0.001	0.986	0.988	0.000	0.0
marketing_online[81]	0.979	0.001	0.977	0.981	0.000	0.0
marketing_online[82]	0.868	0.011	0.848	0.884	0.003	0.0
marketing_online[83]	0.824	0.003	0.820	0.829	0.001	0.0
marketing_online[84]	0.849	0.001	0.848	0.851	0.000	0.0
marketing_online[85]	0.811	0.004	0.803	0.818	0.001	0.0
marketing_online[86]	0.848	0.007	0.838	0.861	0.002	0.0
marketing_online[87]	0.880	0.001	0.878	0.882	0.000	0.0
marketing_online[88]	0.875	0.000	0.875	0.876	0.000	0.0
marketing_online[89]	0.851	0.003	0.846	0.855	0.001	0.0
marketing_online[90]	0.842	0.001	0.841	0.844	0.000	0.0
marketing_online[91]	0.899	0.005	0.891	0.909	0.001	0.0
marketing_online[92]	0.947	0.001	0.945	0.950	0.000	0.0
marketing_online[93]	0.956	0.000	0.956	0.956	0.000	0.0

	marketing_online[93]	0.950	0.000	0.950	0.950	0.000	0.0
marketing_online[94]	0.954	0.000	0.953	0.954	0.000	0.0	
marketing_online[95]	0.954	0.000	0.953	0.954	0.000	0.0	
marketing_online[96]	0.947	0.001	0.946	0.948	0.000	0.0	
marketing_online[97]	0.929	0.001	0.927	0.931	0.000	0.0	
marketing_online[98]	0.914	0.001	0.913	0.915	0.000	0.0	
marketing_online[99]	0.943	0.003	0.938	0.950	0.001	0.0	
marketing_online[100]	0.965	0.000	0.965	0.965	0.000	0.0	
marketing_online[101]	1.018	0.006	1.010	1.029	0.001	0.0	
marketing_online[102]	1.023	0.003	1.017	1.028	0.001	0.0	

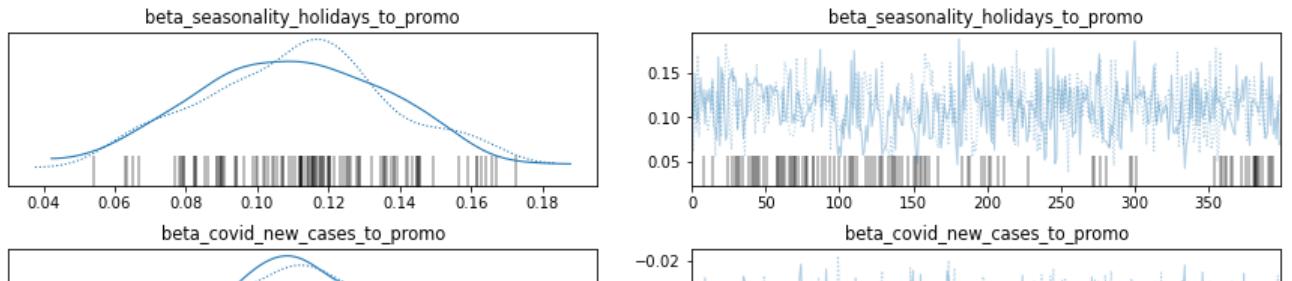
In [68]: `pm.traceplot(trace_dag)`

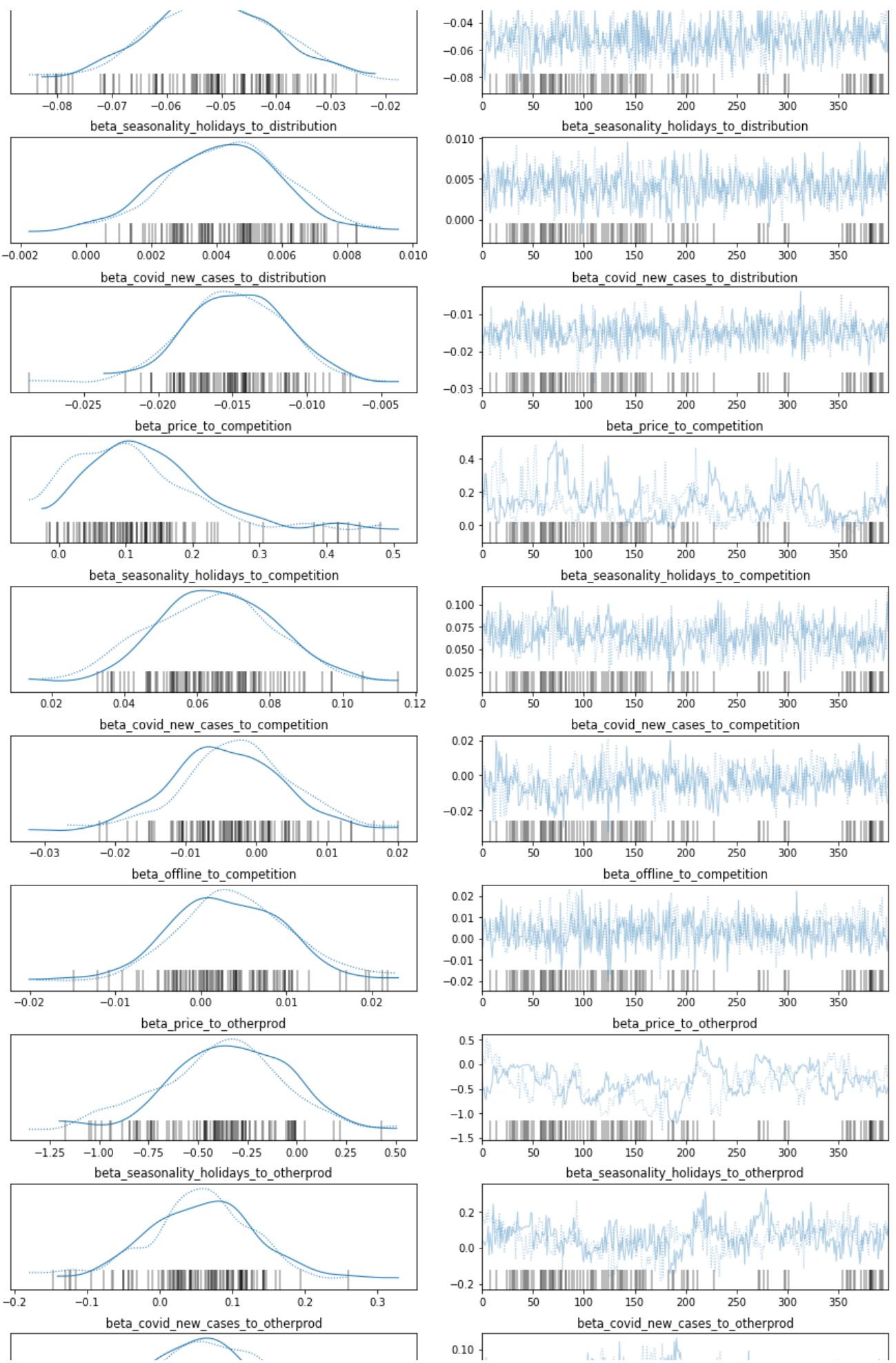
Got error No model on context stack. trying to find log_likelihood in translation.
Got error No model on context stack. trying to find log_likelihood in translation.

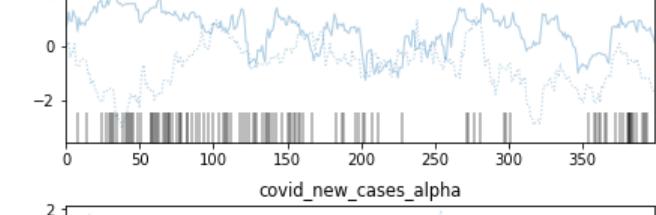
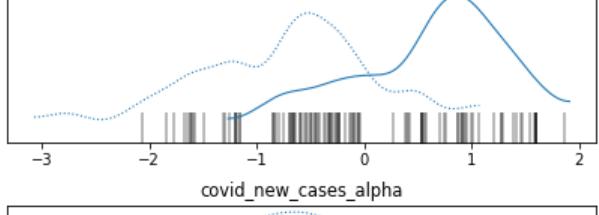
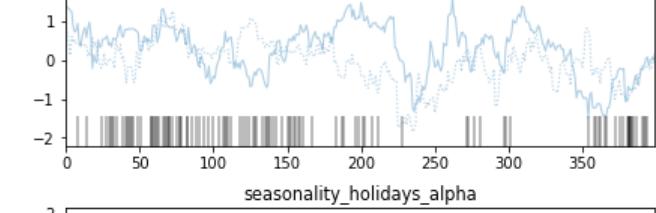
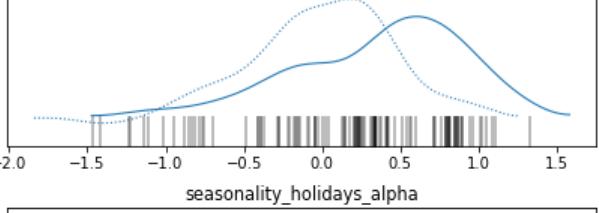
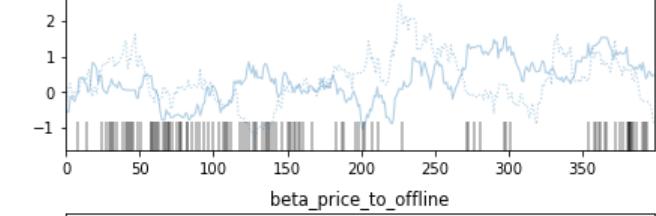
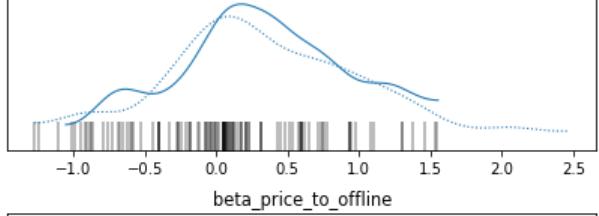
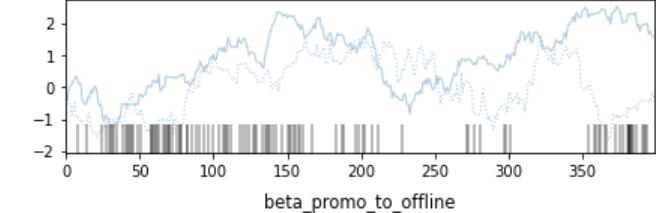
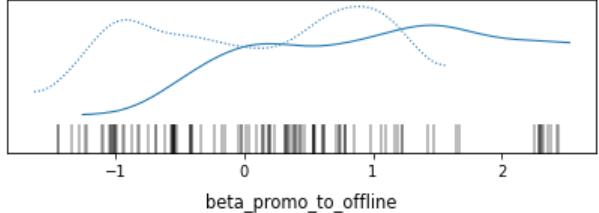
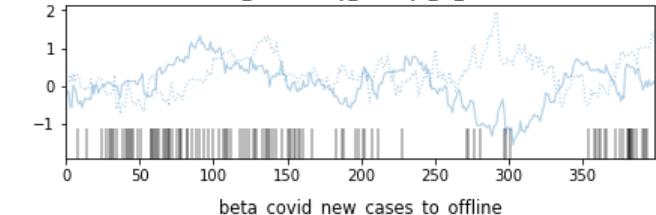
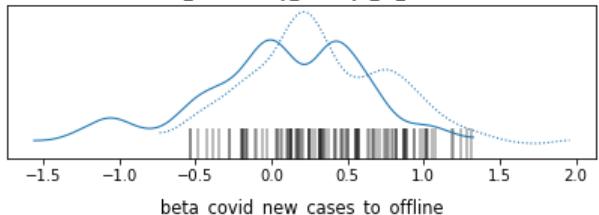
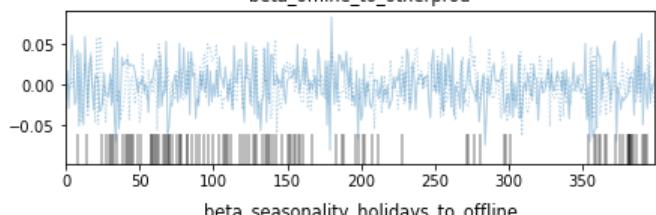
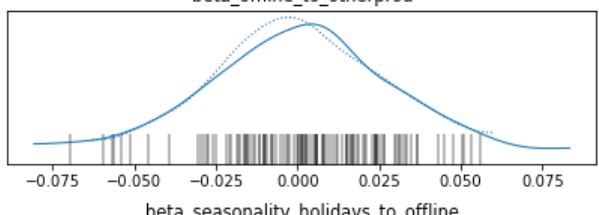
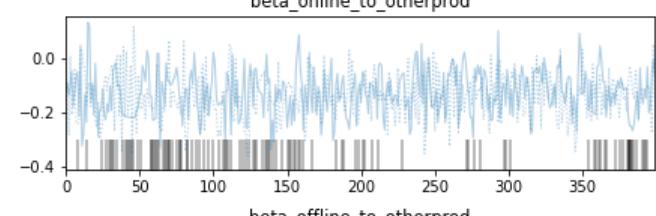
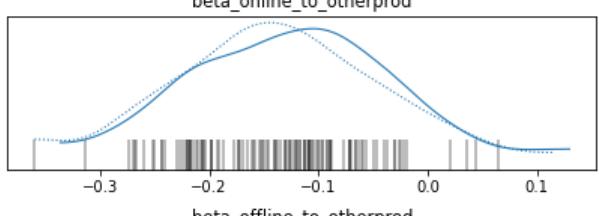
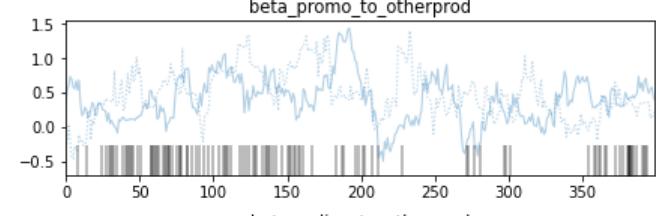
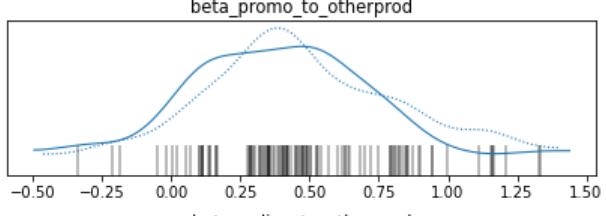
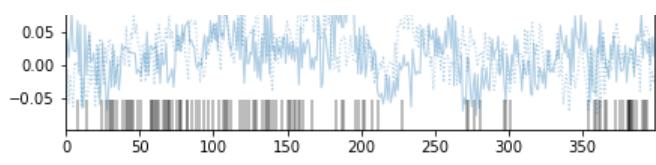
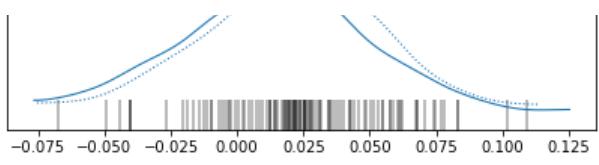
```

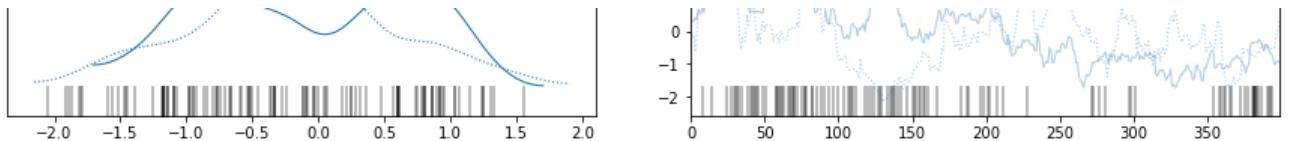
Out[68]: array([ [

```









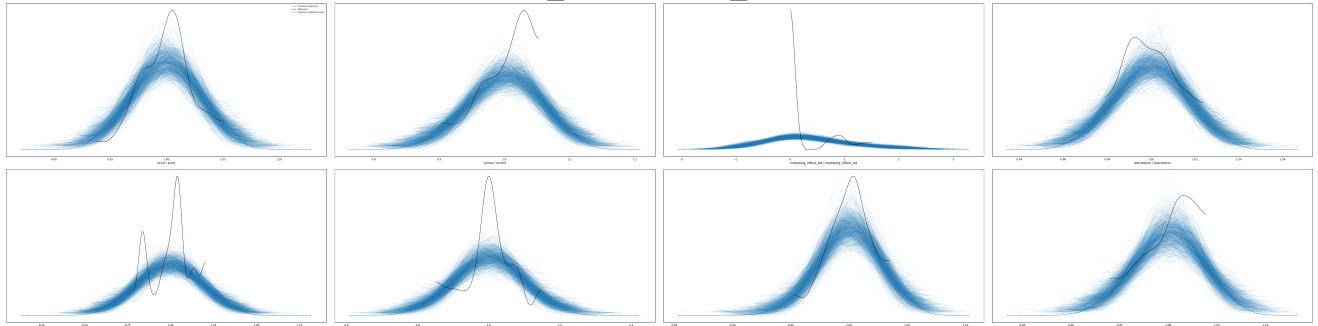
5.1.8 Posterior Predictive Check

```
In [33]: with py_stan_dag2:
    ppc = pm.sample_posterior_predictive(
        trace_dag,
        var_names=trace_dag.varnames + [
            'tgt_pred', 'other_products', 'promo', 'price', 'competition',
            'distribution', 'marketing_online_old', 'marketing_offline_old',
            'marketing_online', 'marketing_offline'
        ],
        random_seed=101)

az.plot_ppc(az.from_pymc3(posterior_predictive=ppc, model=py_stan_dag2))
```

100.00% [800/800 00:23<00:00]

```
Out[33]: array([[<AxesSubplot:xlabel='price / price'>,
   <AxesSubplot:xlabel='promo / promo'>,
   <AxesSubplot:xlabel='marketing_offline_old / marketing_offline_old'>,
   <AxesSubplot:xlabel='distribution / distribution'>],
  [<AxesSubplot:xlabel='marketing_online_old / marketing_online_old'>,
   <AxesSubplot:xlabel='other_products / other_products'>,
   <AxesSubplot:xlabel='competition / competition'>,
   <AxesSubplot:xlabel='tgt_pred / tgt_pred'>]], dtype=object)
```



5.1.9 View Evaluation Metrics

```
In [69]: print(az.waic(trace_dag, var_name="tgt_pred", scale='deviance'),
      az.loo(trace_dag, var_name="tgt_pred", scale='deviance'))
```

```
Got error No model on context stack. trying to find log_likelihood in translation.  
Got error No model on context stack. trying to find log_likelihood in translation.  
Computed from 800 by 104 log-likelihood matrix
```

	Estimate	SE
deviance_waic	-804.72	2.60
p_waic	63.42	-

There has been a warning during the calculation. Please check the results. Computed from 800 by 104 log-likelihood matrix

	Estimate	SE
deviance_loo	-772.20	5.17
p_loo	79.68	-

There has been a warning during the calculation. Please check the results.

5.2 Change Priors

The original model was only weakly identified, since the given priors were consistent with all sorts of parameter values that did not make scientific sense. So I decided to take the time to specify more informative priors, and thus the original model was played as a default version that could be improved.

First, according to the plot in Section 5.1.3, some variables are not normally distributed. So we can change the distribution of variables in the model to their true distribution, like Normal to SkewNormal(Section 5.2.4).

Second, for interaction coefficients, after sampling from the original model without having any observed data(do not set the parameter ‘obs’, see Section 5.2.1), I modified mu and sigma of some interaction coefficients according to the summary statistics of the sampling (Section 5.2.3 and 5.2.4).

How well does it work? We can see from the prior predictive checks(Section 5.2.5). We have to admit that real-world data is really hard to perfectly simulate, but at least the modified model successfully makes the range of simulated tgt_pred narrow compared to the data simulated by the original model. Besides, if we compare the two models in terms of predictive ability, then the modified model is better, since the lower the metric is, the better the model will be(Section 5.2.8).

5.2.1 Rebuild the original model without setting parameter 'Observed'

In [34]:

```
%%time  
  
with pm.Model() as py_stan_dag2_without_obs:  
  
    ##### Defining Mean & Sigma #####  
    len_df = len(data_dict['tgt'])
```

```

seasonality_holidays_mean = mean_dict['seasonality_holidays_mean']
covid_new_cases_mean = mean_dict['covid_new_cases_mean']
seasonality_holidays_sigma = sigma_dict['seasonality_holidays_sigma']
covid_new_cases_sigma = sigma_dict['covid_new_cases_sigma']
price_mean = mean_dict['price_mean']
price_sigma = sigma_dict['price_sigma']
marketing_offline_sigma = sigma_dict['marketing_offline_sigma']
marketing_offline_mean = mean_dict['marketing_offline_mean']
promo_sigma = sigma_dict['promo_sigma']
promo_mean = mean_dict['promo_mean']
distribution_sigma = sigma_dict['distribution_sigma']
distribution_mean = mean_dict['distribution_mean']
competition_sigma = sigma_dict['competition_sigma']
competition_mean = mean_dict['competition_mean']
other_products_sigma = sigma_dict['other_products_sigma']
other_products_mean = mean_dict['other_products_mean']
marketing_online_sigma = sigma_dict['marketing_online_sigma']
marketing_online_mean = mean_dict['marketing_online_mean']
tgt_mean = mean_dict['tgt_mean']

tgt_sigma = pm.HalfNormal('tgt_sigma', 1)
#####
##### Defining Beta's #####
BoundedNormal = pm.Bound(pm.Normal, upper=0)
beta_price_to_promo = BoundedNormal('beta_price_to_promo', 0, 1)
beta_seasonality_holidays_to_promo = pm.Normal(
    'beta_seasonality_holidays_to_promo', 0, 1)
beta_covid_new_cases_to_promo = pm.Normal('beta_covid_new_cases_to_promo'
    0, 1)
beta_offline_to_online = pm.HalfNormal('beta_offline_to_online', 1)
beta_seasonality_holidays_to_online = BoundedNormal(
    'beta_seasonality_holidays_to_online', 0, 1)
beta_covid_new_cases_to_online = BoundedNormal(
    'beta_covid_new_cases_to_online', 0, 1)
beta_seasonality_holidays_to_distribution = pm.Normal(
    'beta_seasonality_holidays_to_distribution', 0, 1)
beta_covid_new_cases_to_distribution = pm.Normal(
    'beta_covid_new_cases_to_distribution', 0, 1)
beta_price_to_competition = pm.Normal('beta_price_to_competition', 0, 1)
beta_seasonality_holidays_to_competition = pm.Normal(
    'beta_seasonality_holidays_to_competition', 0, 1)
beta_covid_new_cases_to_competition = pm.Normal(
    'beta_covid_new_cases_to_competition', 0, 1)
beta_promo_to_competition = BoundedNormal('beta_promo_to_competition', 0,
    1)
beta_online_to_competition = BoundedNormal('beta_online_to_competition',
    1)
beta_distribution_to_competition = BoundedNormal(
    'beta_distribution_to_competition', 0, 1)
beta_offline_to_competition = pm.Normal('beta_offline_to_competition', 0,
    1)
beta_price_to_otherprod = pm.Normal('beta_price_to_otherprod', 0, 1)
beta_seasonality_holidays_to_otherprod = pm.Normal(
    'beta_seasonality_holidays_to_otherprod', 0, 1)
beta_covid_new_cases_to_otherprod = pm.Normal(
    'beta_covid_new_cases_to_otherprod', 0, 1)
beta_promo_to_otherprod = pm.Normal('beta_promo_to_otherprod', 0, 1)
beta_online_to_otherprod = pm.Normal('beta_online_to_otherprod', 0, 1)

```

```

beta_offline_to_otherprod = pm.Normal('beta_offline_to_otherprod', 0, 1)
beta_seasonality_holidays_to_offline = pm.Normal(
    'beta_seasonality_holidays_to_offline', 0, 1)
beta_covid_new_cases_to_offline = pm.Normal(
    'beta_covid_new_cases_to_offline', 0, 1)
beta_promo_to_offline = pm.Normal('beta_promo_to_offline', 0, 1)
beta_price_to_offline = pm.Normal('beta_price_to_offline', 0, 1)
beta_seasonality_holidays_to_tgt = BoundedNormal(
    'beta_seasonality_holidays_to_tgt', 0, 1)
beta_covid_new_cases_to_tgt = BoundedNormal('beta_covid_new_cases_to_tgt'
    0, 1)
beta_distribution_to_tgt = pm.HalfNormal('beta_distribution_to_tgt', 1)
beta_competition_to_tgt = BoundedNormal('beta_competition_to_tgt', 0, 1)
beta_online_to_tgt = pm.HalfNormal('beta_online_to_tgt', 1)
beta_price_to_tgt = BoundedNormal('beta_price_to_tgt', 0, 1)
beta_promo_to_tgt = pm.HalfNormal('beta_promo_to_tgt', 1)
beta_otherprod_to_tgt = pm.HalfNormal('beta_otherprod_to_tgt', 1)
beta_offline_to_tgt = pm.HalfNormal('beta_offline_to_tgt', 1)

seasonality_holidays_alpha = pm.Normal('seasonality_holidays_alpha', 0, 1)
covid_new_cases_alpha = pm.Normal('covid_new_cases_alpha', 0, 1)
promo_mu = pm.Normal('promo_mu',
    promo_mean,
    sigma=promo_sigma,
    shape=len_df)
price_mu = pm.Normal('price_mu',
    price_mean,
    sigma=price_sigma,
    shape=len_df)
marketing_online_mu = pm.Normal('marketing_online_mu',
    marketing_online_mean,
    sigma=2 * marketing_online_sigma,
    shape=len_df)
distribution_mu = pm.Normal('distribution_mu',
    distribution_mean,
    sigma=distribution_sigma,
    shape=len_df)
marketing_offline_mu = pm.Normal('marketing_offline_mu',
    marketing_offline_mean,
    sigma=marketing_offline_sigma,
    shape=len_df)
other_products_mu = pm.Normal('other_products_mu',
    other_products_mean,
    sigma=other_products_sigma,
    shape=len_df)
competition_mu = pm.Normal('competition_mu',
    competition_mean,
    sigma=competition_sigma,
    shape=len_df)
tgt_mu = pm.Normal('tgt_mu',
    tgt_mean,
    sigma=sigma_dict['tgt_sigma'],
    shape=len_df)

beta_online = pm.Deterministic(
    f'beta_online_spend',
    tt.switch(tt.eq(data2['MARKETING_ONLINE_SP'].values, 0), 0, 1))

```

```

beta_offline = pm.Deterministic(
    f'beta_offline_spend',
    tt.switch(tt.eq(data2['MARKETING_OFFLINE_SP'].values, 0), 0, 1))
##### Defining Adstock media #####
#Offline Adstock
alpha_offline = pm.Beta('alpha_offline', 6, 6) # retain rate in adstock
# alpha_offline = pm.Beta('alpha_offline', 3, 3) # retain
theta_offline = pm.Uniform('theta_offline', 0, 1.5) # delay in adstock
"""marketing_offline_adstock=pm.Deterministic('marketing_offline_adstock'
                                              theta=theta_offline,alpha=
#Online Adstock
alpha_online = pm.Beta('alpha_online', 3, 3) # retain rate in adstock
theta_online = pm.Uniform('theta_online', 0, 0.5) # delay in adstock
"""marketing_online_adstock=pm.Deterministic('marketing_online_adstock',g
                                              theta=theta_online,alpha=a

##### parent nodes #####
seasonality_holidays_mu = pm.Normal('seasonality_holidays_mu',
                                      seasonality_holidays_mean,
                                      sigma=seasonality_holidays_sigma,
                                      shape=len_df)
covid_new_cases_mu = pm.Normal('covid_new_cases_mu',
                               covid_new_cases_mean,
                               sigma=covid_new_cases_sigma,
                               shape=len_df)

seasonality_holidays = data_dict['seasonality_holidays']
covid_new_cases = data_dict['covid_new_cases']

price = pm.Normal('price', price_mu, sigma=price_sigma, shape=len_df)

##### Child nodes #####
promo = pm.Normal(
    'promo',
    promo_mu + beta_price_to_promo * price +
    beta_seasonality_holidays_to_promo * seasonality_holidays +
    beta_covid_new_cases_to_promo * covid_new_cases,
    sigma=promo_sigma,
    shape=len_df)

marketing_offline_old = pm.Normal(
    'marketing_offline_old',
    beta_offline *
    (marketing_offline_mu +
     beta_seasonality_holidays_to_offline * seasonality_holidays +
     beta_covid_new_cases_to_offline * covid_new_cases +
     beta_promo_to_offline * promo + beta_price_to_offline * price),
    sigma=marketing_offline_sigma,
    shape=len_df)

marketing_offline = pm.Deterministic(
    'marketing_offline',
    geometric_adstock(x=marketing_offline_old,
                      theta=theta_offline,
                      alpha=alpha_offline,
                      L=4))

```

```

distribution = pm.Normal(
    'distribution',
    distribution_mu +
    beta_seasonality_holidays_to_distribution * seasonality_holidays +
    beta_covid_new_cases_to_distribution * covid_new_cases,
    sigma=distribution_sigma,
    shape=len_df)

marketing_online_old = pm.Normal(
    'marketing_online_old',
    beta_online *
    (marketing_online_mu + beta_offline_to_online * marketing_offline +
     beta_seasonality_holidays_to_online * seasonality_holidays +
     beta_covid_new_cases_to_online * covid_new_cases),
    sigma=marketing_online_sigma,
    shape=len_df)
marketing_online = pm.Deterministic(
    'marketing_online',
    geometric_adstock(x=marketing_online_old,
                       theta=theta_online,
                       alpha=alpha_online,
                       L=2))

other_products = pm.Normal(
    'other_products',
    other_products_mu + beta_price_to_otherprod * price +
    beta_seasonality_holidays_to_otherprod * seasonality_holidays +
    beta_covid_new_cases_to_otherprod * covid_new_cases +
    beta_promo_to_otherprod * promo +
    beta_offline_to_otherprod * marketing_offline +
    beta_online_to_otherprod * marketing_online,
    sigma=other_products_sigma,
    shape=len_df)

competition = pm.Normal(
    'competition',
    competition_mu + beta_price_to_competition * price +
    beta_seasonality_holidays_to_competition * seasonality_holidays +
    beta_covid_new_cases_to_competition * covid_new_cases +
    beta_promo_to_competition * promo +
    beta_online_to_competition * marketing_online +
    beta_distribution_to_competition * distribution +
    beta_offline_to_competition * marketing_offline,
    sigma=competition_sigma,
    shape=len_df)

#####
##### Prediction #####
y = pm.Normal(
    'tgt_pred',
    tgt_mu + beta_seasonality_holidays_to_tgt * seasonality_holidays +
    beta_covid_new_cases_to_tgt * covid_new_cases +
    beta_distribution_to_tgt * distribution +
    beta_competition_to_tgt * competition +
    beta_offline_to_tgt * marketing_offline + beta_price_to_tgt * price +
    beta_promo_to_tgt * promo + beta_otherprod_to_tgt * other_products +
    beta_online_to_tgt * marketing_online,

```

```
    sigma=tgt_sigma,  
    shape=len_df)
```

```
CPU times: user 5.69 s, sys: 90.6 ms, total: 5.78 s  
Wall time: 5.85 s
```

5.2.2 Sampling

In [35]:

```
%%time  
with py_stan_dag2_without_obs:  
    # sample using the model  
    step = pm.NUTS(target_accept=0.9)  
    trace_dag_without_obs = pm.sample(400,  
                                      tune=100,  
                                      step=step,  
                                      chains=2,  
                                      return_inferencedata=False,  
                                      random_seed=101,  
                                      cores=4)
```

```
Only 400 samples in chain.  
Multiprocess sampling (2 chains in 4 jobs)  
NUTS: [tgt_pred, competition, other_products, marketing_online_old, distribution, marketing_offline_old, promo, price, covid_new_cases_mu, seasonality_holidays_mu, theta_online, alpha_online, theta_offline, alpha_offline, tgt_mu, competition_mu, other_products_mu, marketing_offline_mu, distribution_mu, marketing_online_mu, price_mu, promo_mu, covid_new_cases_alpha, seasonality_holidays_alpha, beta_offline_to_tgt, beta_otherprod_to_tgt, beta_promo_to_tgt, beta_price_to_tgt, beta_online_to_tgt, beta_competition_to_tgt, beta_distribution_to_tgt, beta_covid_new_cases_to_tgt, beta_seasonality_holidays_to_tgt, beta_price_to_offline, beta_promo_to_offline, beta_covid_new_cases_to_offline, beta_seasonality_holidays_to_offline, beta_offline_to_otherprod, beta_online_to_otherprod, beta_promo_to_otherprod, beta_covid_new_cases_to_otherprod, beta_seasonality_holidays_to_otherprod, beta_price_to_otherprod, beta_offline_to_competition, beta_distribution_to_competition, beta_online_to_competition, beta_promo_to_competition, beta_covid_new_cases_to_competition, beta_seasonality_holidays_to_competition, beta_price_to_competition, beta_covid_new_cases_to_distribution, beta_seasonality_holidays_to_distribution, beta_covid_new_cases_to_online, beta_seasonality_holidays_to_online, beta_offline_to_online, beta_covid_new_cases_to_promo, beta_seasonality_holidays_to_promo, beta_price_to_promo, tgt_sigma]  
100.00% [1000/1000 08:11<00:00 Sampling
```

2 chains, 13 divergences]

Sampling 2 chains for 100 tune and 400 draw iterations (200 + 800 draws total) took 502 seconds.

The chain reached the maximum tree depth. Increase max_treedepth, increase target_accept or reparameterize.

There were 13 divergences after tuning. Increase `target_accept` or reparameterize.

The chain reached the maximum tree depth. Increase max_treedepth, increase target_accept or reparameterize.

The rhat statistic is larger than 1.4 for some parameters. The sampler did not converge.

The estimated number of effective samples is smaller than 200 for some parameters.

CPU times: user 42.1 s, sys: 2.45 s, total: 44.6 s

Wall time: 9min 2s

5.2.3 Viewing summary statistics

In [36]:

```
pm.summary(trace_dag_without_obs)
```

Got error No model on context stack. trying to find log_likelihood in translation.

```
//anaconda3/lib/python3.7/site-packages/arviz/data/io_pymc3_3x.py:102: FutureWarning: Using `from_pymc3` without the model will be deprecated in a future release. Not using the model will return less accurate and less useful results. Make sure you use the model argument or call from_pymc3 within a model context.
```

```
    FutureWarning,  
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: RuntimeWarning: invalid value encountered in double_scalars  
    (between_chain_variance / within_chain_variance + num_samples - 1) / (num_samples)
```

Out[36]:

	mean	sd	hdi_3%	hdi_97%	mcse_mean	mcse_sd
--	------	----	--------	---------	-----------	---------

beta_seasonality_holidays_to_promo	-0.267	0.488	-1.189	0.547	0.220	0.165
beta_covid_new_cases_to_promo	-0.104	0.415	-0.886	0.524	0.221	0.171
beta_seasonality_holidays_to_distribution	0.284	0.467	-0.481	1.098	0.297	0.241
beta_covid_new_cases_to_distribution	-0.268	0.492	-1.133	0.629	0.126	0.091
beta_price_to_competition	-0.075	0.790	-1.550	1.452	0.151	0.108
beta_seasonality_holidays_to_competition	0.305	0.856	-0.998	1.964	0.191	0.137
beta_covid_new_cases_to_competition	-0.105	0.833	-1.397	1.740	0.209	0.151
beta_offline_to_competition	-0.808	0.802	-2.350	0.422	0.424	0.329
beta_price_to_otherprod	-0.427	0.723	-1.692	0.989	0.194	0.140
beta_seasonality_holidays_to_otherprod	-0.003	0.672	-1.340	1.199	0.104	0.074
beta_covid_new_cases_to_otherprod	-0.782	0.802	-2.414	0.430	0.345	0.259
beta_promo_to_otherprod	-0.384	0.812	-1.833	1.021	0.111	0.079
beta_online_to_otherprod	0.017	0.712	-1.362	1.106	0.293	0.219
beta_offline_to_otherprod	0.210	0.823	-1.464	1.930	0.305	0.225
beta_seasonality_holidays_to_offline	-0.163	0.684	-1.481	0.961	0.200	0.145
beta_covid_new_cases_to_offline	0.015	0.972	-1.802	1.773	0.097	0.069
beta_promo_to_offline	-0.185	0.913	-1.775	1.676	0.151	0.108
beta_price_to_offline	-0.182	0.576	-1.240	0.836	0.085	0.060
seasonality_holidays_alpha	-0.009	1.142	-2.212	1.983	0.105	0.075
covid_new_cases_alpha	0.136	1.059	-1.830	2.432	0.227	0.163
promo_mu[0]	1.000	0.037	0.926	1.063	0.001	0.001
promo_mu[1]	1.002	0.037	0.939	1.075	0.001	0.001
promo_mu[2]	1.001	0.035	0.941	1.068	0.001	0.001
promo_mu[3]	1.000	0.039	0.934	1.077	0.001	0.001
promo_mu[4]	0.999	0.037	0.931	1.069	0.001	0.001
promo_mu[5]	1.000	0.038	0.928	1.072	0.001	0.001
promo_mu[6]	0.999	0.036	0.932	1.068	0.001	0.001
promo_mu[7]	1.000	0.038	0.928	1.069	0.001	0.001
promo_mu[8]	0.998	0.036	0.923	1.058	0.001	0.001
promo_mu[9]	1.001	0.037	0.928	1.069	0.001	0.001
promo_mu[10]	0.998	0.037	0.929	1.068	0.001	0.001
promo_mu[11]	0.998	0.036	0.938	1.065	0.001	0.001
promo_mu[12]	1.000	0.038	0.924	1.067	0.001	0.001

promo_mu[13]	1.001	0.037	0.929	1.067	0.001	0.001
promo_mu[14]	1.002	0.038	0.932	1.068	0.001	0.001
promo_mu[15]	1.000	0.038	0.929	1.069	0.001	0.001
promo_mu[16]	1.001	0.037	0.926	1.061	0.001	0.001
promo_mu[17]	0.998	0.039	0.926	1.071	0.001	0.001
promo_mu[18]	1.000	0.037	0.929	1.066	0.001	0.001
promo_mu[19]	1.001	0.037	0.924	1.064	0.001	0.001
promo_mu[20]	0.997	0.038	0.923	1.071	0.001	0.001
promo_mu[21]	0.999	0.038	0.928	1.070	0.001	0.001
promo_mu[22]	1.000	0.037	0.931	1.072	0.001	0.001
promo_mu[23]	1.000	0.035	0.934	1.064	0.001	0.001
promo_mu[24]	0.999	0.035	0.932	1.062	0.001	0.001
promo_mu[25]	1.001	0.036	0.938	1.074	0.001	0.001
promo_mu[26]	1.000	0.037	0.928	1.069	0.001	0.001
promo_mu[27]	0.999	0.035	0.929	1.062	0.001	0.001
promo_mu[28]	1.001	0.039	0.928	1.073	0.001	0.001
promo_mu[29]	0.999	0.039	0.930	1.078	0.001	0.001
promo_mu[30]	1.000	0.036	0.941	1.073	0.001	0.001
promo_mu[31]	1.000	0.036	0.934	1.067	0.001	0.001
promo_mu[32]	1.001	0.036	0.936	1.073	0.002	0.001
promo_mu[33]	0.999	0.037	0.929	1.069	0.001	0.001
promo_mu[34]	1.001	0.037	0.931	1.071	0.001	0.001
promo_mu[35]	1.002	0.037	0.929	1.065	0.001	0.001
promo_mu[36]	1.002	0.037	0.934	1.069	0.001	0.001
promo_mu[37]	1.001	0.036	0.941	1.072	0.001	0.001
promo_mu[38]	0.999	0.037	0.933	1.072	0.001	0.001
promo_mu[39]	1.002	0.038	0.918	1.063	0.001	0.001
promo_mu[40]	1.001	0.038	0.931	1.069	0.001	0.001
promo_mu[41]	0.999	0.037	0.922	1.061	0.001	0.001
promo_mu[42]	1.001	0.034	0.941	1.070	0.001	0.001
promo_mu[43]	0.999	0.038	0.924	1.068	0.001	0.001
promo_mu[44]	1.000	0.035	0.934	1.063	0.001	0.001
promo_mu[45]	0.997	0.037	0.918	1.056	0.001	0.001
promo_mu[46]	1.000	0.038	0.933	1.069	0.001	0.001

promo_mu[47]	0.999	0.036	0.936	1.070	0.001	0.001
promo_mu[48]	0.999	0.037	0.931	1.067	0.001	0.001
promo_mu[49]	1.003	0.039	0.926	1.068	0.001	0.001
promo_mu[50]	1.001	0.036	0.936	1.066	0.001	0.001
promo_mu[51]	1.000	0.037	0.931	1.068	0.001	0.001
promo_mu[52]	0.999	0.041	0.918	1.071	0.002	0.001
promo_mu[53]	1.001	0.036	0.934	1.067	0.001	0.001
promo_mu[54]	1.000	0.039	0.922	1.068	0.001	0.001
promo_mu[55]	1.001	0.037	0.927	1.066	0.001	0.001
promo_mu[56]	0.999	0.038	0.927	1.065	0.001	0.001
promo_mu[57]	0.998	0.039	0.919	1.063	0.001	0.001
promo_mu[58]	0.998	0.038	0.929	1.069	0.001	0.001
promo_mu[59]	1.000	0.038	0.925	1.065	0.001	0.001
promo_mu[60]	1.003	0.035	0.941	1.072	0.001	0.001
promo_mu[61]	1.000	0.038	0.923	1.064	0.001	0.001
promo_mu[62]	1.001	0.037	0.927	1.065	0.001	0.001
promo_mu[63]	1.000	0.038	0.926	1.065	0.001	0.001
promo_mu[64]	0.999	0.038	0.930	1.070	0.001	0.001
promo_mu[65]	0.998	0.039	0.924	1.067	0.002	0.001
promo_mu[66]	1.001	0.037	0.939	1.077	0.001	0.001
promo_mu[67]	1.002	0.037	0.935	1.076	0.002	0.001
promo_mu[68]	1.002	0.038	0.922	1.066	0.001	0.001
promo_mu[69]	1.001	0.038	0.933	1.075	0.001	0.001
promo_mu[70]	1.000	0.037	0.923	1.063	0.001	0.001
promo_mu[71]	1.001	0.036	0.939	1.071	0.001	0.001
promo_mu[72]	0.999	0.035	0.927	1.058	0.001	0.001
promo_mu[73]	1.000	0.036	0.929	1.066	0.001	0.001
promo_mu[74]	1.002	0.039	0.930	1.076	0.001	0.001
promo_mu[75]	0.999	0.037	0.934	1.071	0.001	0.001
promo_mu[76]	0.998	0.036	0.930	1.067	0.001	0.001
promo_mu[77]	1.001	0.037	0.928	1.066	0.001	0.001
promo_mu[78]	0.999	0.037	0.938	1.069	0.001	0.001
promo_mu[79]	0.999	0.038	0.933	1.069	0.001	0.001
promo_mu[80]	1.001	0.036	0.934	1.066	0.001	0.001

promo_mu[81]	1.003	0.037	0.937	1.073	0.001	0.001
promo_mu[82]	1.001	0.037	0.932	1.068	0.001	0.001
promo_mu[83]	0.999	0.036	0.936	1.065	0.001	0.001
promo_mu[84]	1.001	0.037	0.935	1.075	0.001	0.001
promo_mu[85]	0.999	0.038	0.927	1.067	0.001	0.001
promo_mu[86]	0.999	0.039	0.926	1.074	0.001	0.001
promo_mu[87]	1.001	0.038	0.932	1.072	0.001	0.001
promo_mu[88]	1.000	0.037	0.933	1.070	0.001	0.001
promo_mu[89]	1.000	0.037	0.934	1.066	0.001	0.001
promo_mu[90]	0.999	0.036	0.940	1.068	0.001	0.001
promo_mu[91]	1.000	0.038	0.926	1.065	0.001	0.001
promo_mu[92]	1.004	0.038	0.932	1.076	0.001	0.001
promo_mu[93]	1.002	0.036	0.943	1.075	0.001	0.001
promo_mu[94]	1.001	0.038	0.938	1.081	0.002	0.001
promo_mu[95]	0.999	0.037	0.919	1.062	0.001	0.001
promo_mu[96]	0.999	0.037	0.931	1.069	0.001	0.001
promo_mu[97]	0.998	0.037	0.931	1.069	0.001	0.001
promo_mu[98]	1.001	0.038	0.935	1.077	0.001	0.001
promo_mu[99]	1.000	0.038	0.937	1.078	0.001	0.001
promo_mu[100]	0.999	0.039	0.920	1.064	0.001	0.001
promo_mu[101]	0.998	0.036	0.939	1.076	0.001	0.001
promo_mu[102]	0.998	0.036	0.928	1.063	0.001	0.001
promo_mu[103]	0.999	0.036	0.937	1.070	0.001	0.001
price_mu[0]	0.999	0.023	0.958	1.043	0.001	0.001
price_mu[1]	1.001	0.023	0.956	1.042	0.001	0.001
price_mu[2]	0.999	0.023	0.957	1.042	0.001	0.001
price_mu[3]	1.000	0.022	0.957	1.039	0.001	0.001
price_mu[4]	1.000	0.023	0.959	1.042	0.001	0.001
price_mu[5]	1.001	0.022	0.955	1.040	0.001	0.001
price_mu[6]	1.000	0.023	0.959	1.041	0.001	0.001
price_mu[7]	1.000	0.023	0.956	1.041	0.001	0.001
price_mu[8]	1.000	0.022	0.955	1.039	0.001	0.001
price_mu[9]	1.000	0.022	0.958	1.041	0.001	0.001
price_mu[10]	1.000	0.023	0.960	1.042	0.001	0.001

price_mu[11]	1.000	0.022	0.954	1.035	0.001	0.001
price_mu[12]	1.001	0.023	0.961	1.042	0.001	0.001
price_mu[13]	1.000	0.023	0.958	1.041	0.001	0.001
price_mu[14]	1.000	0.023	0.957	1.043	0.001	0.001
price_mu[15]	0.999	0.021	0.964	1.043	0.001	0.001
price_mu[16]	1.001	0.022	0.960	1.043	0.001	0.001
price_mu[17]	1.000	0.023	0.962	1.047	0.001	0.001
price_mu[18]	1.000	0.022	0.959	1.039	0.001	0.001
price_mu[19]	0.999	0.021	0.955	1.037	0.001	0.001
price_mu[20]	1.001	0.023	0.959	1.045	0.001	0.001
price_mu[21]	1.000	0.022	0.957	1.042	0.001	0.001
price_mu[22]	1.000	0.022	0.963	1.046	0.001	0.001
price_mu[23]	1.000	0.021	0.961	1.039	0.001	0.001
price_mu[24]	1.000	0.021	0.963	1.040	0.001	0.000
price_mu[25]	1.000	0.022	0.960	1.039	0.001	0.001
price_mu[26]	1.000	0.022	0.958	1.039	0.001	0.001
price_mu[27]	1.000	0.022	0.958	1.043	0.001	0.001
price_mu[28]	1.001	0.022	0.963	1.042	0.001	0.001
price_mu[29]	1.001	0.022	0.963	1.045	0.001	0.001
price_mu[30]	1.001	0.022	0.957	1.038	0.001	0.001
price_mu[31]	1.001	0.020	0.965	1.042	0.001	0.000
price_mu[32]	1.001	0.023	0.963	1.046	0.001	0.001
price_mu[33]	0.999	0.022	0.957	1.041	0.001	0.001
price_mu[34]	1.000	0.023	0.962	1.047	0.001	0.001
price_mu[35]	1.000	0.023	0.956	1.041	0.001	0.001
price_mu[36]	1.000	0.022	0.955	1.038	0.001	0.000
price_mu[37]	1.000	0.022	0.960	1.043	0.001	0.001
price_mu[38]	0.999	0.022	0.956	1.040	0.001	0.001
price_mu[39]	1.000	0.022	0.960	1.042	0.001	0.001
price_mu[40]	1.001	0.022	0.964	1.042	0.001	0.001
price_mu[41]	1.000	0.023	0.954	1.041	0.001	0.001
price_mu[42]	1.000	0.021	0.960	1.036	0.001	0.001
price_mu[43]	0.999	0.022	0.959	1.039	0.001	0.001
price_mu[44]	0.999	0.021	0.960	1.041	0.001	0.001

price_mu[45]	1.001	0.022	0.958	1.038	0.001	0.001
price_mu[46]	0.999	0.023	0.957	1.044	0.001	0.001
price_mu[47]	0.999	0.021	0.958	1.035	0.001	0.001
price_mu[48]	1.001	0.022	0.960	1.042	0.001	0.001
price_mu[49]	1.000	0.021	0.962	1.041	0.001	0.001
price_mu[50]	1.000	0.023	0.958	1.042	0.001	0.001
price_mu[51]	1.000	0.021	0.962	1.040	0.001	0.001
price_mu[52]	1.000	0.023	0.957	1.042	0.001	0.001
price_mu[53]	1.000	0.022	0.960	1.042	0.001	0.001
price_mu[54]	0.999	0.023	0.952	1.037	0.001	0.001
price_mu[55]	0.998	0.022	0.955	1.038	0.001	0.001
price_mu[56]	1.000	0.024	0.956	1.046	0.001	0.001
price_mu[57]	1.001	0.022	0.961	1.042	0.001	0.001
price_mu[58]	1.001	0.021	0.959	1.039	0.001	0.001
price_mu[59]	0.999	0.021	0.961	1.038	0.001	0.001
price_mu[60]	1.000	0.022	0.960	1.040	0.001	0.001
price_mu[61]	1.000	0.022	0.960	1.040	0.001	0.001
price_mu[62]	0.999	0.022	0.959	1.039	0.001	0.001
price_mu[63]	1.001	0.022	0.955	1.038	0.001	0.001
price_mu[64]	1.000	0.023	0.956	1.041	0.001	0.001
price_mu[65]	1.001	0.022	0.965	1.045	0.001	0.001
price_mu[66]	1.000	0.021	0.965	1.042	0.001	0.001
price_mu[67]	1.001	0.022	0.960	1.041	0.001	0.001
price_mu[68]	1.000	0.022	0.957	1.037	0.001	0.001
price_mu[69]	1.000	0.022	0.955	1.037	0.001	0.001
price_mu[70]	1.000	0.022	0.960	1.040	0.001	0.001
price_mu[71]	0.999	0.022	0.962	1.040	0.001	0.001
price_mu[72]	1.000	0.022	0.958	1.040	0.001	0.001
price_mu[73]	1.002	0.021	0.963	1.041	0.001	0.001
price_mu[74]	1.000	0.023	0.959	1.040	0.001	0.001
price_mu[75]	0.999	0.023	0.959	1.046	0.001	0.001
price_mu[76]	1.000	0.022	0.957	1.039	0.001	0.001
price_mu[77]	0.999	0.023	0.955	1.039	0.001	0.001
price_mu[78]	1.000	0.022	0.959	1.042	0.001	0.001

price_mu[79]	1.000	0.022	0.962	1.047	0.001	0.001
price_mu[80]	1.001	0.022	0.958	1.041	0.001	0.001
price_mu[81]	1.000	0.023	0.955	1.040	0.001	0.001
price_mu[82]	1.000	0.022	0.960	1.043	0.001	0.001
price_mu[83]	1.001	0.022	0.964	1.048	0.001	0.001
price_mu[84]	1.000	0.022	0.962	1.044	0.001	0.001
price_mu[85]	0.999	0.022	0.960	1.039	0.001	0.001
price_mu[86]	1.000	0.022	0.959	1.039	0.001	0.001
price_mu[87]	0.999	0.023	0.954	1.038	0.001	0.001
price_mu[88]	1.000	0.021	0.960	1.039	0.001	0.001
price_mu[89]	1.000	0.021	0.958	1.038	0.001	0.001
price_mu[90]	0.999	0.021	0.959	1.037	0.001	0.001
price_mu[91]	1.000	0.023	0.960	1.045	0.001	0.001
price_mu[92]	1.000	0.023	0.954	1.042	0.001	0.001
price_mu[93]	0.998	0.022	0.959	1.041	0.001	0.001
price_mu[94]	1.001	0.023	0.967	1.056	0.001	0.001
price_mu[95]	0.999	0.022	0.959	1.040	0.001	0.001
price_mu[96]	0.999	0.024	0.956	1.044	0.001	0.001
price_mu[97]	0.999	0.022	0.953	1.038	0.001	0.001
price_mu[98]	1.000	0.022	0.961	1.042	0.001	0.001
price_mu[99]	1.000	0.022	0.961	1.041	0.001	0.001
price_mu[100]	0.999	0.022	0.956	1.035	0.001	0.001
price_mu[101]	0.999	0.023	0.954	1.040	0.001	0.001
price_mu[102]	0.999	0.022	0.954	1.039	0.001	0.001
price_mu[103]	1.001	0.022	0.960	1.039	0.001	0.001
marketing_online_mu[0]	1.016	0.217	0.605	1.455	0.011	0.008
marketing_online_mu[1]	0.998	0.226	0.541	1.362	0.012	0.008
marketing_online_mu[2]	0.986	0.225	0.537	1.361	0.011	0.008
marketing_online_mu[3]	0.990	0.208	0.631	1.423	0.010	0.007
marketing_online_mu[4]	1.001	0.223	0.605	1.443	0.010	0.007
marketing_online_mu[5]	1.003	0.218	0.566	1.381	0.011	0.008
marketing_online_mu[6]	1.006	0.211	0.582	1.379	0.011	0.008
marketing_online_mu[7]	1.015	0.219	0.608	1.432	0.014	0.010
marketing_online_mu[8]	1.000	0.216	0.607	1.397	0.011	0.008

marketing_online_mu[9]	1.011	0.215	0.592	1.373	0.010	0.007
marketing_online_mu[10]	1.014	0.219	0.599	1.410	0.012	0.009
marketing_online_mu[11]	0.966	0.217	0.615	1.415	0.013	0.009
marketing_online_mu[12]	1.001	0.224	0.606	1.426	0.013	0.010
marketing_online_mu[13]	0.996	0.225	0.594	1.428	0.013	0.009
marketing_online_mu[14]	0.967	0.208	0.620	1.396	0.010	0.007
marketing_online_mu[15]	1.014	0.218	0.582	1.409	0.015	0.011
marketing_online_mu[16]	1.005	0.221	0.600	1.404	0.011	0.008
marketing_online_mu[17]	0.997	0.231	0.581	1.437	0.013	0.009
marketing_online_mu[18]	0.976	0.225	0.550	1.373	0.016	0.011
marketing_online_mu[19]	0.990	0.213	0.600	1.377	0.012	0.008
marketing_online_mu[20]	0.997	0.216	0.614	1.395	0.011	0.008
marketing_online_mu[21]	1.024	0.214	0.588	1.368	0.008	0.006
marketing_online_mu[22]	1.006	0.230	0.596	1.435	0.013	0.009
marketing_online_mu[23]	1.003	0.218	0.584	1.394	0.011	0.008
marketing_online_mu[24]	1.008	0.217	0.614	1.432	0.011	0.008
marketing_online_mu[25]	0.989	0.214	0.608	1.388	0.011	0.008
marketing_online_mu[26]	0.991	0.234	0.563	1.422	0.011	0.008
marketing_online_mu[27]	1.005	0.216	0.606	1.380	0.010	0.007
marketing_online_mu[28]	1.011	0.227	0.624	1.471	0.012	0.008
marketing_online_mu[29]	1.014	0.225	0.616	1.444	0.014	0.010
marketing_online_mu[30]	1.018	0.238	0.573	1.425	0.017	0.012
marketing_online_mu[31]	0.979	0.222	0.610	1.442	0.009	0.007
marketing_online_mu[32]	0.976	0.230	0.533	1.381	0.014	0.010
marketing_online_mu[33]	0.998	0.224	0.602	1.457	0.011	0.008
marketing_online_mu[34]	1.004	0.226	0.600	1.460	0.011	0.008
marketing_online_mu[35]	1.008	0.218	0.573	1.397	0.010	0.007
marketing_online_mu[36]	0.993	0.231	0.571	1.433	0.013	0.009
marketing_online_mu[37]	0.998	0.217	0.588	1.387	0.009	0.007
marketing_online_mu[38]	0.984	0.216	0.552	1.373	0.013	0.009
marketing_online_mu[39]	0.993	0.210	0.651	1.391	0.012	0.008
marketing_online_mu[40]	1.001	0.223	0.581	1.412	0.013	0.009
marketing_online_mu[41]	1.009	0.222	0.601	1.438	0.011	0.008
marketing_online_mu[42]	1.004	0.224	0.593	1.419	0.014	0.010

marketing_online_mu[43]	1.015	0.220	0.561	1.378	0.012	0.008
marketing_online_mu[44]	1.009	0.222	0.655	1.465	0.018	0.013
marketing_online_mu[45]	1.008	0.220	0.604	1.426	0.011	0.008
marketing_online_mu[46]	1.004	0.214	0.605	1.397	0.011	0.008
marketing_online_mu[47]	0.997	0.211	0.614	1.403	0.010	0.007
marketing_online_mu[48]	1.010	0.217	0.627	1.449	0.014	0.010
marketing_online_mu[49]	1.009	0.216	0.554	1.384	0.010	0.007
marketing_online_mu[50]	0.979	0.231	0.556	1.379	0.016	0.012
marketing_online_mu[51]	0.996	0.233	0.561	1.429	0.012	0.008
marketing_online_mu[52]	1.011	0.233	0.570	1.448	0.013	0.010
marketing_online_mu[53]	1.019	0.218	0.604	1.425	0.011	0.008
marketing_online_mu[54]	0.997	0.239	0.549	1.429	0.010	0.007
marketing_online_mu[55]	0.988	0.220	0.582	1.391	0.011	0.008
marketing_online_mu[56]	1.000	0.227	0.584	1.448	0.014	0.010
marketing_online_mu[57]	0.995	0.222	0.574	1.386	0.011	0.008
marketing_online_mu[58]	0.996	0.215	0.597	1.401	0.012	0.008
marketing_online_mu[59]	1.005	0.216	0.608	1.401	0.010	0.007
marketing_online_mu[60]	1.041	0.216	0.656	1.433	0.012	0.009
marketing_online_mu[61]	1.009	0.216	0.647	1.471	0.014	0.010
marketing_online_mu[62]	0.996	0.232	0.570	1.414	0.015	0.011
marketing_online_mu[63]	0.996	0.234	0.530	1.409	0.015	0.012
marketing_online_mu[64]	0.989	0.219	0.589	1.409	0.012	0.009
marketing_online_mu[65]	0.998	0.216	0.611	1.423	0.013	0.009
marketing_online_mu[66]	0.986	0.224	0.581	1.376	0.011	0.008
marketing_online_mu[67]	0.998	0.225	0.586	1.413	0.011	0.008
marketing_online_mu[68]	0.992	0.221	0.558	1.368	0.012	0.008
marketing_online_mu[69]	0.982	0.222	0.566	1.379	0.014	0.010
marketing_online_mu[70]	0.996	0.221	0.598	1.413	0.010	0.007
marketing_online_mu[71]	1.023	0.217	0.625	1.439	0.013	0.009
marketing_online_mu[72]	1.028	0.212	0.645	1.439	0.010	0.007
marketing_online_mu[73]	0.997	0.215	0.570	1.388	0.010	0.007
marketing_online_mu[74]	1.001	0.213	0.605	1.376	0.009	0.006
marketing_online_mu[75]	1.012	0.217	0.581	1.403	0.011	0.008
marketing_online_mu[76]	1.010	0.209	0.622	1.388	0.010	0.008

marketing_online_mu[77]	1.021	0.235	0.535	1.417	0.010	0.008
marketing_online_mu[78]	1.007	0.217	0.585	1.405	0.010	0.007
marketing_online_mu[79]	1.011	0.223	0.597	1.438	0.010	0.007
marketing_online_mu[80]	1.000	0.214	0.640	1.425	0.010	0.007
marketing_online_mu[81]	0.982	0.217	0.556	1.366	0.011	0.008
marketing_online_mu[82]	0.990	0.218	0.547	1.362	0.012	0.008
marketing_online_mu[83]	0.987	0.228	0.547	1.411	0.010	0.007
marketing_online_mu[84]	0.996	0.218	0.573	1.426	0.012	0.008
marketing_online_mu[85]	0.996	0.225	0.586	1.403	0.010	0.007
marketing_online_mu[86]	0.990	0.214	0.595	1.389	0.010	0.007
marketing_online_mu[87]	1.000	0.217	0.556	1.361	0.011	0.008
marketing_online_mu[88]	0.999	0.211	0.636	1.419	0.009	0.006
marketing_online_mu[89]	1.000	0.216	0.567	1.388	0.011	0.008
marketing_online_mu[90]	1.005	0.230	0.577	1.426	0.014	0.011
marketing_online_mu[91]	0.989	0.223	0.539	1.358	0.011	0.008
marketing_online_mu[92]	0.984	0.229	0.595	1.442	0.011	0.008
marketing_online_mu[93]	1.005	0.229	0.578	1.410	0.013	0.010
marketing_online_mu[94]	1.020	0.218	0.633	1.449	0.012	0.008
marketing_online_mu[95]	0.973	0.232	0.529	1.416	0.012	0.008
marketing_online_mu[96]	1.000	0.219	0.604	1.419	0.011	0.008
marketing_online_mu[97]	1.003	0.212	0.590	1.390	0.009	0.007
marketing_online_mu[98]	1.010	0.214	0.618	1.421	0.009	0.007
marketing_online_mu[99]	1.003	0.225	0.597	1.405	0.009	0.007
marketing_online_mu[100]	1.008	0.221	0.626	1.459	0.010	0.007
marketing_online_mu[101]	0.998	0.220	0.585	1.405	0.011	0.008
marketing_online_mu[102]	1.007	0.227	0.556	1.443	0.011	0.008
marketing_online_mu[103]	1.024	0.217	0.633	1.447	0.009	0.006
distribution_mu[0]	0.999	0.011	0.979	1.018	0.000	0.000
distribution_mu[1]	1.000	0.011	0.981	1.021	0.000	0.000
distribution_mu[2]	1.000	0.011	0.979	1.022	0.000	0.000
distribution_mu[3]	1.000	0.011	0.980	1.018	0.000	0.000
distribution_mu[4]	1.000	0.011	0.977	1.018	0.000	0.000
distribution_mu[5]	1.000	0.011	0.979	1.020	0.000	0.000
distribution_mu[6]	1.001	0.011	0.981	1.025	0.000	0.000

distribution_mu[7]	1.000	0.011	0.981	1.022	0.000	0.000
distribution_mu[8]	1.001	0.011	0.979	1.019	0.000	0.000
distribution_mu[9]	1.000	0.011	0.979	1.018	0.000	0.000
distribution_mu[10]	1.001	0.012	0.981	1.024	0.000	0.000
distribution_mu[11]	1.000	0.011	0.980	1.022	0.000	0.000
distribution_mu[12]	0.999	0.011	0.978	1.020	0.000	0.000
distribution_mu[13]	1.001	0.011	0.979	1.019	0.000	0.000
distribution_mu[14]	1.000	0.011	0.979	1.022	0.000	0.000
distribution_mu[15]	1.000	0.012	0.980	1.022	0.000	0.000
distribution_mu[16]	1.001	0.011	0.977	1.020	0.000	0.000
distribution_mu[17]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[18]	1.000	0.011	0.980	1.021	0.000	0.000
distribution_mu[19]	1.001	0.011	0.980	1.021	0.000	0.000
distribution_mu[20]	1.000	0.012	0.979	1.020	0.000	0.000
distribution_mu[21]	1.000	0.011	0.981	1.022	0.000	0.000
distribution_mu[22]	1.000	0.012	0.980	1.021	0.000	0.000
distribution_mu[23]	1.000	0.011	0.980	1.021	0.000	0.000
distribution_mu[24]	1.000	0.011	0.981	1.023	0.000	0.000
distribution_mu[25]	1.000	0.011	0.978	1.019	0.000	0.000
distribution_mu[26]	1.000	0.011	0.979	1.022	0.000	0.000
distribution_mu[27]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[28]	1.000	0.012	0.980	1.023	0.000	0.000
distribution_mu[29]	1.000	0.011	0.981	1.020	0.000	0.000
distribution_mu[30]	0.999	0.012	0.976	1.021	0.000	0.000
distribution_mu[31]	1.000	0.011	0.979	1.022	0.000	0.000
distribution_mu[32]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[33]	1.001	0.011	0.980	1.018	0.000	0.000
distribution_mu[34]	0.999	0.011	0.980	1.023	0.000	0.000
distribution_mu[35]	1.000	0.011	0.979	1.019	0.000	0.000
distribution_mu[36]	1.001	0.011	0.978	1.021	0.000	0.000
distribution_mu[37]	1.001	0.012	0.977	1.021	0.000	0.000
distribution_mu[38]	1.000	0.011	0.980	1.021	0.000	0.000
distribution_mu[39]	1.000	0.011	0.977	1.019	0.000	0.000
distribution_mu[40]	1.001	0.012	0.979	1.024	0.000	0.000

distribution_mu[41]	1.000	0.011	0.981	1.024	0.000	0.000
distribution_mu[42]	1.000	0.011	0.981	1.021	0.000	0.000
distribution_mu[43]	1.001	0.011	0.979	1.022	0.000	0.000
distribution_mu[44]	0.999	0.011	0.980	1.021	0.000	0.000
distribution_mu[45]	1.000	0.011	0.977	1.018	0.000	0.000
distribution_mu[46]	1.000	0.011	0.978	1.020	0.000	0.000
distribution_mu[47]	1.000	0.012	0.979	1.021	0.000	0.000
distribution_mu[48]	1.001	0.011	0.980	1.022	0.000	0.000
distribution_mu[49]	1.000	0.012	0.975	1.021	0.000	0.000
distribution_mu[50]	1.000	0.011	0.980	1.022	0.000	0.000
distribution_mu[51]	1.000	0.011	0.979	1.020	0.000	0.000
distribution_mu[52]	1.000	0.012	0.979	1.022	0.000	0.000
distribution_mu[53]	1.001	0.011	0.981	1.021	0.000	0.000
distribution_mu[54]	1.001	0.011	0.979	1.021	0.000	0.000
distribution_mu[55]	1.000	0.012	0.978	1.024	0.000	0.000
distribution_mu[56]	1.000	0.011	0.978	1.020	0.000	0.000
distribution_mu[57]	1.001	0.011	0.979	1.020	0.000	0.000
distribution_mu[58]	1.000	0.011	0.981	1.022	0.000	0.000
distribution_mu[59]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[60]	1.000	0.011	0.980	1.023	0.000	0.000
distribution_mu[61]	0.999	0.012	0.976	1.021	0.000	0.000
distribution_mu[62]	1.001	0.012	0.978	1.022	0.000	0.000
distribution_mu[63]	1.000	0.011	0.981	1.023	0.000	0.000
distribution_mu[64]	1.000	0.011	0.980	1.024	0.000	0.000
distribution_mu[65]	1.000	0.012	0.979	1.023	0.000	0.000
distribution_mu[66]	1.000	0.011	0.980	1.023	0.000	0.000
distribution_mu[67]	0.999	0.011	0.979	1.020	0.000	0.000
distribution_mu[68]	1.000	0.012	0.979	1.023	0.000	0.000
distribution_mu[69]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[70]	1.000	0.012	0.979	1.022	0.000	0.000
distribution_mu[71]	1.000	0.011	0.979	1.020	0.000	0.000
distribution_mu[72]	1.000	0.011	0.980	1.021	0.000	0.000
distribution_mu[73]	1.000	0.011	0.980	1.021	0.000	0.000
distribution_mu[74]	1.001	0.012	0.979	1.022	0.000	0.000

distribution_mu[75]	0.999	0.012	0.978	1.023	0.000	0.000
distribution_mu[76]	1.000	0.011	0.977	1.020	0.000	0.000
distribution_mu[77]	1.000	0.011	0.979	1.020	0.000	0.000
distribution_mu[78]	1.000	0.011	0.979	1.022	0.000	0.000
distribution_mu[79]	1.000	0.012	0.981	1.023	0.000	0.000
distribution_mu[80]	1.000	0.012	0.978	1.022	0.000	0.000
distribution_mu[81]	1.000	0.012	0.978	1.021	0.000	0.000
distribution_mu[82]	1.000	0.012	0.976	1.020	0.000	0.000
distribution_mu[83]	1.000	0.011	0.979	1.019	0.000	0.000
distribution_mu[84]	1.001	0.012	0.977	1.021	0.000	0.000
distribution_mu[85]	1.000	0.011	0.978	1.019	0.000	0.000
distribution_mu[86]	1.000	0.012	0.979	1.021	0.000	0.000
distribution_mu[87]	1.000	0.012	0.978	1.022	0.000	0.000
distribution_mu[88]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[89]	1.000	0.012	0.980	1.025	0.000	0.000
distribution_mu[90]	1.000	0.011	0.980	1.020	0.000	0.000
distribution_mu[91]	1.000	0.012	0.978	1.020	0.000	0.000
distribution_mu[92]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[93]	1.001	0.011	0.981	1.020	0.000	0.000
distribution_mu[94]	1.001	0.011	0.980	1.022	0.000	0.000
distribution_mu[95]	0.999	0.012	0.975	1.020	0.000	0.000
distribution_mu[96]	1.000	0.011	0.979	1.019	0.000	0.000
distribution_mu[97]	1.000	0.012	0.977	1.020	0.000	0.000
distribution_mu[98]	1.000	0.011	0.980	1.019	0.000	0.000
distribution_mu[99]	1.000	0.012	0.976	1.018	0.000	0.000
distribution_mu[100]	1.000	0.011	0.979	1.021	0.000	0.000
distribution_mu[101]	1.000	0.011	0.978	1.021	0.000	0.000
distribution_mu[102]	1.001	0.011	0.981	1.022	0.000	0.000
distribution_mu[103]	0.999	0.012	0.979	1.021	0.000	0.000
marketing_offline_mu[0]	0.433	0.508	-0.588	1.261	0.071	0.050
marketing_offline_mu[1]	0.313	0.507	-0.660	1.219	0.083	0.059
marketing_offline_mu[2]	0.220	0.505	-0.732	1.156	0.139	0.100
marketing_offline_mu[3]	0.369	0.524	-0.552	1.378	0.070	0.049
marketing_offline_mu[4]	0.384	0.452	-0.407	1.344	0.039	0.027

marketing_offline_mu[5]	0.446	0.543	-0.594	1.451	0.082	0.058
marketing_offline_mu[6]	0.406	0.499	-0.512	1.335	0.060	0.043
marketing_offline_mu[7]	0.302	0.511	-0.631	1.248	0.035	0.025
marketing_offline_mu[8]	0.366	0.527	-0.602	1.302	0.041	0.029
marketing_offline_mu[9]	0.376	0.527	-0.546	1.329	0.031	0.023
marketing_offline_mu[10]	0.357	0.500	-0.645	1.183	0.040	0.028
marketing_offline_mu[11]	0.372	0.480	-0.608	1.162	0.027	0.019
marketing_offline_mu[12]	0.367	0.473	-0.556	1.229	0.030	0.021
marketing_offline_mu[13]	0.176	0.457	-0.625	1.108	0.040	0.029
marketing_offline_mu[14]	0.449	0.466	-0.434	1.349	0.052	0.040
marketing_offline_mu[15]	0.378	0.503	-0.497	1.384	0.086	0.061
marketing_offline_mu[16]	0.375	0.500	-0.497	1.350	0.030	0.021
marketing_offline_mu[17]	0.333	0.488	-0.568	1.184	0.062	0.044
marketing_offline_mu[18]	0.264	0.525	-0.559	1.386	0.063	0.045
marketing_offline_mu[19]	0.351	0.480	-0.506	1.265	0.064	0.046
marketing_offline_mu[20]	0.391	0.499	-0.545	1.227	0.033	0.024
marketing_offline_mu[21]	0.430	0.516	-0.526	1.438	0.042	0.030
marketing_offline_mu[22]	0.342	0.491	-0.636	1.142	0.043	0.031
marketing_offline_mu[23]	0.374	0.500	-0.611	1.259	0.105	0.076
marketing_offline_mu[24]	0.280	0.473	-0.559	1.189	0.027	0.019
marketing_offline_mu[25]	0.350	0.491	-0.667	1.201	0.042	0.030
marketing_offline_mu[26]	0.368	0.544	-0.696	1.322	0.062	0.044
marketing_offline_mu[27]	0.325	0.433	-0.414	1.161	0.051	0.046
marketing_offline_mu[28]	0.312	0.493	-0.555	1.228	0.034	0.024
marketing_offline_mu[29]	0.274	0.508	-0.736	1.163	0.076	0.054
marketing_offline_mu[30]	0.316	0.466	-0.510	1.253	0.039	0.027
marketing_offline_mu[31]	0.300	0.466	-0.651	1.024	0.077	0.055
marketing_offline_mu[32]	0.332	0.503	-0.692	1.186	0.028	0.020
marketing_offline_mu[33]	0.316	0.514	-0.624	1.267	0.037	0.026
marketing_offline_mu[34]	0.331	0.485	-0.598	1.230	0.028	0.020
marketing_offline_mu[35]	0.321	0.523	-0.668	1.256	0.033	0.024
marketing_offline_mu[36]	0.342	0.499	-0.577	1.314	0.034	0.024
marketing_offline_mu[37]	0.353	0.494	-0.498	1.298	0.025	0.018

marketing_offline_mu[38]	0.377	0.510	-0.525	1.384	0.028	0.020
marketing_offline_mu[39]	0.368	0.503	-0.605	1.241	0.032	0.022
marketing_offline_mu[40]	0.374	0.477	-0.555	1.244	0.027	0.019
marketing_offline_mu[41]	0.391	0.481	-0.437	1.374	0.028	0.021
marketing_offline_mu[42]	0.347	0.477	-0.451	1.305	0.033	0.023
marketing_offline_mu[43]	0.322	0.488	-0.541	1.191	0.025	0.018
marketing_offline_mu[44]	0.342	0.512	-0.543	1.269	0.026	0.018
marketing_offline_mu[45]	0.376	0.519	-0.545	1.386	0.035	0.025
marketing_offline_mu[46]	0.339	0.494	-0.554	1.243	0.028	0.020
marketing_offline_mu[47]	0.361	0.560	-0.730	1.353	0.107	0.077
marketing_offline_mu[48]	0.575	0.545	-0.369	1.642	0.194	0.142
marketing_offline_mu[49]	0.419	0.497	-0.470	1.338	0.106	0.076
marketing_offline_mu[50]	0.386	0.470	-0.509	1.284	0.050	0.035
marketing_offline_mu[51]	0.414	0.493	-0.395	1.384	0.063	0.044
marketing_offline_mu[52]	0.409	0.485	-0.503	1.332	0.052	0.037
marketing_offline_mu[53]	0.422	0.536	-0.617	1.394	0.162	0.118
marketing_offline_mu[54]	0.369	0.504	-0.465	1.436	0.052	0.037
marketing_offline_mu[55]	0.286	0.485	-0.680	1.132	0.046	0.032
marketing_offline_mu[56]	0.277	0.502	-0.558	1.270	0.052	0.037
marketing_offline_mu[57]	0.305	0.437	-0.455	1.165	0.044	0.031
marketing_offline_mu[58]	0.396	0.496	-0.553	1.333	0.033	0.023
marketing_offline_mu[59]	0.330	0.501	-0.703	1.131	0.029	0.020
marketing_offline_mu[60]	0.357	0.484	-0.471	1.364	0.033	0.024
marketing_offline_mu[61]	0.349	0.523	-0.663	1.261	0.024	0.018
marketing_offline_mu[62]	0.292	0.463	-0.507	1.223	0.028	0.020
marketing_offline_mu[63]	0.334	0.510	-0.616	1.197	0.028	0.020
marketing_offline_mu[64]	0.352	0.497	-0.554	1.277	0.028	0.020
marketing_offline_mu[65]	0.294	0.484	-0.720	1.144	0.063	0.045
marketing_offline_mu[66]	0.261	0.469	-0.667	1.113	0.045	0.032
marketing_offline_mu[67]	0.206	0.473	-0.559	1.235	0.083	0.059
marketing_offline_mu[68]	0.310	0.514	-0.623	1.270	0.034	0.024
marketing_offline_mu[69]	0.335	0.497	-0.648	1.230	0.029	0.021
marketing_offline_mu[70]	0.354	0.493	-0.523	1.258	0.030	0.021
marketing_offline_mu[71]	0.344	0.512	-0.698	1.252	0.035	0.025

marketing_offline_mu[72]	0.358	0.460	-0.522	1.213	0.029	0.020
marketing_offline_mu[73]	0.313	0.510	-0.598	1.230	0.032	0.022
marketing_offline_mu[74]	0.332	0.505	-0.642	1.172	0.042	0.030
marketing_offline_mu[75]	0.342	0.513	-0.580	1.318	0.031	0.022
marketing_offline_mu[76]	0.392	0.518	-0.617	1.322	0.037	0.026
marketing_offline_mu[77]	0.308	0.509	-0.694	1.228	0.034	0.024
marketing_offline_mu[78]	0.394	0.479	-0.668	1.245	0.031	0.022
marketing_offline_mu[79]	0.343	0.537	-0.727	1.243	0.030	0.025
marketing_offline_mu[80]	0.308	0.505	-0.684	1.201	0.031	0.022
marketing_offline_mu[81]	0.391	0.488	-0.513	1.346	0.030	0.021
marketing_offline_mu[82]	0.364	0.486	-0.631	1.205	0.032	0.022
marketing_offline_mu[83]	0.333	0.483	-0.551	1.200	0.026	0.018
marketing_offline_mu[84]	0.384	0.545	-0.634	1.309	0.039	0.027
marketing_offline_mu[85]	0.335	0.535	-0.594	1.313	0.033	0.026
marketing_offline_mu[86]	0.354	0.487	-0.529	1.311	0.035	0.025
marketing_offline_mu[87]	0.363	0.519	-0.612	1.359	0.031	0.022
marketing_offline_mu[88]	0.351	0.514	-0.544	1.356	0.031	0.022
marketing_offline_mu[89]	0.321	0.515	-0.746	1.192	0.032	0.023
marketing_offline_mu[90]	0.357	0.487	-0.517	1.257	0.028	0.020
marketing_offline_mu[91]	0.330	0.520	-0.681	1.192	0.033	0.023
marketing_offline_mu[92]	0.346	0.503	-0.554	1.258	0.028	0.020
marketing_offline_mu[93]	0.346	0.511	-0.562	1.380	0.028	0.020
marketing_offline_mu[94]	0.395	0.505	-0.578	1.332	0.027	0.019
marketing_offline_mu[95]	0.362	0.491	-0.582	1.185	0.025	0.019
marketing_offline_mu[96]	0.350	0.509	-0.596	1.327	0.032	0.023
marketing_offline_mu[97]	0.348	0.489	-0.447	1.326	0.035	0.025
marketing_offline_mu[98]	0.357	0.517	-0.559	1.403	0.024	0.019
marketing_offline_mu[99]	0.358	0.528	-0.598	1.347	0.034	0.032
marketing_offline_mu[100]	0.337	0.480	-0.522	1.304	0.029	0.021
marketing_offline_mu[101]	0.326	0.511	-0.636	1.280	0.035	0.025
marketing_offline_mu[102]	0.305	0.533	-0.697	1.263	0.045	0.032
marketing_offline_mu[103]	0.339	0.477	-0.545	1.204	0.026	0.021
other_products_mu[0]	0.998	0.065	0.889	1.136	0.002	0.002
other_products_mu[1]	0.998	0.061	0.876	1.103	0.002	0.001

other_products_mu[2]	1.003	0.063	0.891	1.123	0.002	0.002
other_products_mu[3]	1.004	0.065	0.884	1.120	0.002	0.002
other_products_mu[4]	0.996	0.066	0.861	1.112	0.002	0.002
other_products_mu[5]	1.003	0.068	0.892	1.145	0.002	0.002
other_products_mu[6]	1.000	0.064	0.889	1.124	0.002	0.002
other_products_mu[7]	0.999	0.069	0.868	1.120	0.002	0.002
other_products_mu[8]	1.000	0.061	0.892	1.116	0.002	0.002
other_products_mu[9]	1.002	0.065	0.881	1.124	0.002	0.002
other_products_mu[10]	1.000	0.065	0.872	1.112	0.002	0.002
other_products_mu[11]	1.000	0.064	0.875	1.111	0.002	0.002
other_products_mu[12]	1.002	0.064	0.870	1.104	0.002	0.002
other_products_mu[13]	0.999	0.067	0.881	1.135	0.002	0.002
other_products_mu[14]	0.996	0.065	0.890	1.129	0.002	0.002
other_products_mu[15]	1.003	0.063	0.881	1.111	0.002	0.002
other_products_mu[16]	1.000	0.064	0.890	1.137	0.002	0.001
other_products_mu[17]	0.998	0.067	0.877	1.125	0.002	0.002
other_products_mu[18]	0.997	0.062	0.875	1.111	0.002	0.002
other_products_mu[19]	1.001	0.061	0.887	1.114	0.002	0.002
other_products_mu[20]	1.002	0.068	0.880	1.135	0.002	0.002
other_products_mu[21]	1.001	0.064	0.880	1.128	0.002	0.002
other_products_mu[22]	1.004	0.069	0.875	1.123	0.003	0.002
other_products_mu[23]	1.001	0.062	0.885	1.122	0.002	0.002
other_products_mu[24]	1.000	0.062	0.890	1.120	0.002	0.002
other_products_mu[25]	0.997	0.067	0.878	1.127	0.002	0.002
other_products_mu[26]	0.996	0.064	0.871	1.102	0.002	0.001
other_products_mu[27]	0.998	0.062	0.893	1.114	0.002	0.002
other_products_mu[28]	1.000	0.065	0.889	1.126	0.002	0.002
other_products_mu[29]	1.002	0.062	0.887	1.115	0.002	0.001
other_products_mu[30]	0.996	0.064	0.876	1.110	0.002	0.002
other_products_mu[31]	1.001	0.064	0.891	1.126	0.002	0.002
other_products_mu[32]	0.997	0.062	0.879	1.105	0.002	0.002
other_products_mu[33]	1.003	0.063	0.900	1.124	0.002	0.002
other_products_mu[34]	0.998	0.065	0.873	1.111	0.002	0.002
other_products_mu[35]	1.000	0.064	0.880	1.120	0.002	0.002

other_products_mu[36]	1.002	0.067	0.884	1.129	0.002	0.002
other_products_mu[37]	0.998	0.066	0.870	1.116	0.002	0.002
other_products_mu[38]	1.000	0.062	0.889	1.117	0.002	0.001
other_products_mu[39]	1.002	0.062	0.885	1.112	0.002	0.002
other_products_mu[40]	1.001	0.066	0.871	1.121	0.002	0.002
other_products_mu[41]	1.001	0.064	0.879	1.121	0.002	0.002
other_products_mu[42]	1.001	0.063	0.889	1.129	0.002	0.002
other_products_mu[43]	1.002	0.064	0.890	1.127	0.002	0.002
other_products_mu[44]	1.000	0.064	0.868	1.109	0.002	0.001
other_products_mu[45]	0.998	0.067	0.869	1.118	0.002	0.002
other_products_mu[46]	0.998	0.065	0.884	1.125	0.002	0.002
other_products_mu[47]	1.001	0.061	0.891	1.117	0.002	0.001
other_products_mu[48]	1.000	0.063	0.876	1.107	0.002	0.002
other_products_mu[49]	1.003	0.064	0.891	1.132	0.002	0.002
other_products_mu[50]	1.001	0.063	0.891	1.131	0.002	0.001
other_products_mu[51]	0.999	0.070	0.861	1.120	0.003	0.002
other_products_mu[52]	0.997	0.065	0.879	1.115	0.002	0.002
other_products_mu[53]	0.997	0.064	0.881	1.121	0.002	0.002
other_products_mu[54]	1.000	0.066	0.885	1.135	0.002	0.002
other_products_mu[55]	1.002	0.065	0.873	1.118	0.002	0.002
other_products_mu[56]	1.000	0.064	0.891	1.128	0.002	0.002
other_products_mu[57]	0.996	0.066	0.887	1.140	0.002	0.002
other_products_mu[58]	0.998	0.063	0.892	1.124	0.002	0.002
other_products_mu[59]	1.003	0.063	0.894	1.117	0.002	0.002
other_products_mu[60]	1.000	0.063	0.886	1.123	0.002	0.002
other_products_mu[61]	0.998	0.062	0.875	1.107	0.002	0.001
other_products_mu[62]	1.003	0.064	0.883	1.118	0.002	0.002
other_products_mu[63]	1.000	0.061	0.888	1.122	0.002	0.002
other_products_mu[64]	1.002	0.062	0.891	1.120	0.002	0.001
other_products_mu[65]	0.996	0.067	0.875	1.124	0.002	0.002
other_products_mu[66]	1.005	0.066	0.879	1.127	0.002	0.002
other_products_mu[67]	1.000	0.064	0.882	1.115	0.002	0.002
other_products_mu[68]	0.999	0.065	0.899	1.143	0.002	0.002
other_products_mu[69]	1.002	0.066	0.882	1.129	0.002	0.002

other_products_mu[70]	1.001	0.066	0.876	1.113	0.003	0.002
other_products_mu[71]	1.000	0.064	0.874	1.108	0.002	0.002
other_products_mu[72]	1.002	0.063	0.886	1.125	0.002	0.001
other_products_mu[73]	0.999	0.063	0.867	1.104	0.002	0.002
other_products_mu[74]	0.998	0.070	0.874	1.133	0.002	0.002
other_products_mu[75]	1.003	0.063	0.893	1.112	0.002	0.002
other_products_mu[76]	1.001	0.064	0.870	1.118	0.002	0.001
other_products_mu[77]	0.999	0.064	0.885	1.118	0.002	0.002
other_products_mu[78]	0.997	0.063	0.880	1.111	0.002	0.002
other_products_mu[79]	0.996	0.062	0.880	1.108	0.002	0.002
other_products_mu[80]	0.998	0.064	0.873	1.112	0.002	0.002
other_products_mu[81]	1.001	0.064	0.876	1.116	0.002	0.002
other_products_mu[82]	0.998	0.067	0.868	1.107	0.002	0.002
other_products_mu[83]	1.000	0.063	0.894	1.135	0.002	0.002
other_products_mu[84]	0.996	0.065	0.881	1.122	0.002	0.002
other_products_mu[85]	1.000	0.064	0.881	1.122	0.002	0.002
other_products_mu[86]	0.998	0.067	0.882	1.133	0.002	0.002
other_products_mu[87]	0.999	0.061	0.891	1.115	0.002	0.001
other_products_mu[88]	0.998	0.062	0.884	1.112	0.002	0.002
other_products_mu[89]	1.000	0.062	0.882	1.110	0.002	0.002
other_products_mu[90]	1.001	0.062	0.891	1.117	0.002	0.001
other_products_mu[91]	1.004	0.066	0.876	1.119	0.002	0.002
other_products_mu[92]	1.002	0.065	0.868	1.116	0.002	0.002
other_products_mu[93]	0.999	0.066	0.879	1.120	0.002	0.002
other_products_mu[94]	1.000	0.064	0.883	1.120	0.002	0.002
other_products_mu[95]	1.003	0.068	0.872	1.139	0.003	0.002
other_products_mu[96]	0.999	0.064	0.871	1.112	0.002	0.002
other_products_mu[97]	1.002	0.062	0.879	1.110	0.002	0.002
other_products_mu[98]	0.999	0.065	0.884	1.125	0.002	0.002
other_products_mu[99]	1.001	0.065	0.872	1.111	0.002	0.001
other_products_mu[100]	1.000	0.065	0.883	1.119	0.002	0.002
other_products_mu[101]	1.001	0.068	0.880	1.127	0.003	0.002
other_products_mu[102]	1.000	0.064	0.888	1.129	0.002	0.001
other_products_mu[103]	0.998	0.062	0.873	1.112	0.002	0.002

competition_mu[0]	1.000	0.018	0.969	1.034	0.001	0.000
competition_mu[1]	1.000	0.018	0.969	1.033	0.001	0.000
competition_mu[2]	1.001	0.018	0.963	1.031	0.001	0.000
competition_mu[3]	1.000	0.018	0.965	1.032	0.001	0.000
competition_mu[4]	1.000	0.018	0.966	1.032	0.001	0.000
competition_mu[5]	1.000	0.018	0.967	1.035	0.001	0.000
competition_mu[6]	0.999	0.018	0.964	1.032	0.001	0.000
competition_mu[7]	1.000	0.018	0.964	1.033	0.001	0.000
competition_mu[8]	1.000	0.018	0.967	1.036	0.001	0.000
competition_mu[9]	1.000	0.017	0.971	1.032	0.001	0.000
competition_mu[10]	1.001	0.019	0.970	1.038	0.001	0.000
competition_mu[11]	1.000	0.018	0.971	1.033	0.001	0.000
competition_mu[12]	1.000	0.017	0.966	1.030	0.001	0.000
competition_mu[13]	1.000	0.018	0.967	1.035	0.001	0.000
competition_mu[14]	1.000	0.019	0.967	1.037	0.001	0.000
competition_mu[15]	1.001	0.018	0.970	1.039	0.001	0.000
competition_mu[16]	1.000	0.019	0.965	1.035	0.001	0.000
competition_mu[17]	1.001	0.018	0.971	1.039	0.001	0.000
competition_mu[18]	1.000	0.018	0.969	1.034	0.001	0.000
competition_mu[19]	1.000	0.018	0.964	1.032	0.001	0.001
competition_mu[20]	1.000	0.018	0.970	1.036	0.001	0.000
competition_mu[21]	0.999	0.018	0.967	1.035	0.001	0.000
competition_mu[22]	1.000	0.018	0.964	1.033	0.001	0.000
competition_mu[23]	1.001	0.017	0.970	1.031	0.001	0.000
competition_mu[24]	1.001	0.018	0.968	1.035	0.001	0.000
competition_mu[25]	1.000	0.017	0.966	1.032	0.001	0.000
competition_mu[26]	1.001	0.018	0.967	1.035	0.001	0.000
competition_mu[27]	0.999	0.018	0.966	1.032	0.001	0.001
competition_mu[28]	1.000	0.018	0.967	1.033	0.001	0.000
competition_mu[29]	0.999	0.018	0.965	1.031	0.001	0.000
competition_mu[30]	1.001	0.018	0.968	1.038	0.001	0.001
competition_mu[31]	1.000	0.018	0.970	1.035	0.001	0.000
competition_mu[32]	0.999	0.019	0.968	1.039	0.001	0.000
competition_mu[33]	1.000	0.017	0.968	1.031	0.001	0.000

competition_mu[34]	1.000	0.018	0.964	1.031	0.001	0.000
competition_mu[35]	1.001	0.018	0.970	1.037	0.001	0.000
competition_mu[36]	1.001	0.018	0.964	1.031	0.001	0.000
competition_mu[37]	1.000	0.018	0.962	1.027	0.001	0.000
competition_mu[38]	0.999	0.018	0.963	1.030	0.001	0.001
competition_mu[39]	1.000	0.018	0.969	1.035	0.001	0.000
competition_mu[40]	1.000	0.018	0.968	1.032	0.001	0.000
competition_mu[41]	1.000	0.018	0.966	1.035	0.001	0.000
competition_mu[42]	0.999	0.018	0.968	1.035	0.001	0.001
competition_mu[43]	1.000	0.018	0.968	1.033	0.001	0.000
competition_mu[44]	1.001	0.018	0.965	1.033	0.001	0.000
competition_mu[45]	1.000	0.017	0.968	1.033	0.001	0.000
competition_mu[46]	1.000	0.017	0.965	1.028	0.001	0.000
competition_mu[47]	1.000	0.018	0.964	1.035	0.001	0.000
competition_mu[48]	0.999	0.018	0.966	1.036	0.001	0.000
competition_mu[49]	1.000	0.018	0.966	1.036	0.001	0.000
competition_mu[50]	1.000	0.018	0.964	1.030	0.001	0.000
competition_mu[51]	1.000	0.018	0.969	1.035	0.001	0.000
competition_mu[52]	0.999	0.019	0.964	1.035	0.001	0.000
competition_mu[53]	0.999	0.018	0.965	1.033	0.001	0.000
competition_mu[54]	0.999	0.018	0.967	1.036	0.001	0.000
competition_mu[55]	1.001	0.018	0.970	1.036	0.001	0.000
competition_mu[56]	1.000	0.018	0.966	1.035	0.001	0.000
competition_mu[57]	1.001	0.019	0.970	1.039	0.001	0.000
competition_mu[58]	1.000	0.018	0.968	1.036	0.001	0.000
competition_mu[59]	1.000	0.019	0.965	1.034	0.001	0.000
competition_mu[60]	1.000	0.018	0.966	1.032	0.001	0.000
competition_mu[61]	1.001	0.018	0.968	1.034	0.001	0.001
competition_mu[62]	0.999	0.019	0.965	1.034	0.001	0.001
competition_mu[63]	1.000	0.018	0.964	1.031	0.001	0.000
competition_mu[64]	1.000	0.019	0.967	1.038	0.001	0.000
competition_mu[65]	1.001	0.018	0.969	1.036	0.001	0.000
competition_mu[66]	1.000	0.018	0.967	1.033	0.001	0.000
competition_mu[67]	0.999	0.018	0.969	1.033	0.001	0.000

competition_mu[68]	1.000	0.018	0.968	1.035	0.001	0.000
competition_mu[69]	1.000	0.018	0.965	1.032	0.001	0.000
competition_mu[70]	1.001	0.018	0.965	1.032	0.001	0.000
competition_mu[71]	0.999	0.018	0.964	1.033	0.001	0.000
competition_mu[72]	1.000	0.018	0.965	1.033	0.001	0.000
competition_mu[73]	1.000	0.018	0.970	1.035	0.001	0.000
competition_mu[74]	1.000	0.020	0.961	1.034	0.001	0.001
competition_mu[75]	1.001	0.018	0.969	1.035	0.001	0.000
competition_mu[76]	0.999	0.018	0.964	1.031	0.001	0.000
competition_mu[77]	1.000	0.017	0.969	1.032	0.001	0.000
competition_mu[78]	0.999	0.019	0.963	1.035	0.001	0.000
competition_mu[79]	1.000	0.018	0.967	1.035	0.001	0.000
competition_mu[80]	0.999	0.018	0.968	1.033	0.001	0.000
competition_mu[81]	1.001	0.018	0.968	1.033	0.001	0.000
competition_mu[82]	1.001	0.018	0.968	1.038	0.001	0.000
competition_mu[83]	1.001	0.017	0.965	1.030	0.001	0.000
competition_mu[84]	1.000	0.019	0.964	1.033	0.001	0.000
competition_mu[85]	1.000	0.018	0.964	1.030	0.001	0.000
competition_mu[86]	1.000	0.019	0.964	1.034	0.001	0.000
competition_mu[87]	0.999	0.019	0.964	1.033	0.001	0.000
competition_mu[88]	0.999	0.018	0.964	1.030	0.001	0.001
competition_mu[89]	1.001	0.018	0.970	1.036	0.001	0.000
competition_mu[90]	1.000	0.018	0.968	1.038	0.001	0.000
competition_mu[91]	0.999	0.018	0.966	1.035	0.001	0.000
competition_mu[92]	1.000	0.019	0.964	1.034	0.001	0.001
competition_mu[93]	0.999	0.019	0.967	1.036	0.001	0.000
competition_mu[94]	1.000	0.018	0.965	1.032	0.001	0.000
competition_mu[95]	1.000	0.019	0.960	1.031	0.001	0.000
competition_mu[96]	0.999	0.018	0.968	1.037	0.001	0.000
competition_mu[97]	1.000	0.018	0.970	1.035	0.001	0.000
competition_mu[98]	1.000	0.018	0.964	1.032	0.001	0.001
competition_mu[99]	1.000	0.019	0.970	1.036	0.001	0.000
competition_mu[100]	1.000	0.018	0.967	1.033	0.001	0.000

competition_mu[101]	1.001	0.018	0.967	1.033	0.001	0.000
competition_mu[102]	1.001	0.018	0.967	1.034	0.001	0.000
competition_mu[103]	1.000	0.017	0.969	1.032	0.001	0.000
tgt_mu[0]	0.998	0.026	0.951	1.047	0.001	0.001
tgt_mu[1]	1.000	0.025	0.954	1.048	0.001	0.001
tgt_mu[2]	0.999	0.027	0.946	1.046	0.001	0.001
tgt_mu[3]	0.999	0.024	0.951	1.041	0.001	0.001
tgt_mu[4]	1.001	0.028	0.947	1.053	0.001	0.001
tgt_mu[5]	1.000	0.027	0.953	1.052	0.001	0.001
tgt_mu[6]	1.001	0.024	0.949	1.042	0.001	0.001
tgt_mu[7]	1.000	0.027	0.950	1.051	0.001	0.001
tgt_mu[8]	1.000	0.026	0.947	1.040	0.001	0.001
tgt_mu[9]	0.999	0.026	0.951	1.047	0.001	0.001
tgt_mu[10]	1.001	0.027	0.955	1.053	0.001	0.001
tgt_mu[11]	1.001	0.028	0.949	1.053	0.001	0.001
tgt_mu[12]	0.999	0.027	0.952	1.050	0.001	0.001
tgt_mu[13]	1.000	0.028	0.948	1.054	0.001	0.001
tgt_mu[14]	1.000	0.027	0.950	1.054	0.001	0.001
tgt_mu[15]	0.999	0.025	0.949	1.043	0.001	0.001
tgt_mu[16]	1.001	0.025	0.954	1.043	0.001	0.001
tgt_mu[17]	1.000	0.025	0.954	1.046	0.001	0.001
tgt_mu[18]	1.001	0.026	0.954	1.047	0.001	0.001
tgt_mu[19]	1.000	0.027	0.947	1.050	0.001	0.001
tgt_mu[20]	1.001	0.026	0.951	1.048	0.001	0.001
tgt_mu[21]	1.001	0.029	0.947	1.054	0.001	0.001
tgt_mu[22]	1.001	0.027	0.946	1.046	0.001	0.001
tgt_mu[23]	1.000	0.025	0.950	1.047	0.001	0.001
tgt_mu[24]	0.999	0.026	0.947	1.046	0.001	0.001
tgt_mu[25]	1.000	0.025	0.952	1.052	0.001	0.001
tgt_mu[26]	1.001	0.026	0.950	1.048	0.001	0.001
tgt_mu[27]	1.001	0.025	0.953	1.045	0.001	0.001
tgt_mu[28]	1.001	0.024	0.954	1.050	0.001	0.001
tgt_mu[29]	1.000	0.028	0.943	1.053	0.001	0.001
tgt_mu[30]	0.999	0.026	0.948	1.047	0.001	0.001

tgt_mu[31]	1.001	0.026	0.957	1.048	0.001	0.001
tgt_mu[32]	1.000	0.025	0.953	1.048	0.001	0.001
tgt_mu[33]	1.000	0.025	0.959	1.052	0.001	0.001
tgt_mu[34]	1.000	0.027	0.951	1.049	0.001	0.001
tgt_mu[35]	1.001	0.026	0.954	1.049	0.001	0.001
tgt_mu[36]	0.999	0.027	0.953	1.054	0.001	0.001
tgt_mu[37]	1.000	0.026	0.949	1.047	0.001	0.001
tgt_mu[38]	0.999	0.028	0.954	1.054	0.001	0.001
tgt_mu[39]	1.000	0.025	0.955	1.043	0.001	0.001
tgt_mu[40]	1.000	0.026	0.955	1.050	0.001	0.001
tgt_mu[41]	1.001	0.027	0.951	1.048	0.001	0.001
tgt_mu[42]	1.000	0.025	0.951	1.046	0.001	0.001
tgt_mu[43]	0.999	0.026	0.952	1.044	0.001	0.001
tgt_mu[44]	1.001	0.025	0.957	1.047	0.001	0.001
tgt_mu[45]	0.999	0.027	0.944	1.047	0.001	0.001
tgt_mu[46]	1.001	0.023	0.957	1.043	0.001	0.001
tgt_mu[47]	0.999	0.026	0.955	1.053	0.001	0.001
tgt_mu[48]	1.001	0.028	0.952	1.052	0.001	0.001
tgt_mu[49]	1.001	0.023	0.956	1.045	0.001	0.001
tgt_mu[50]	1.000	0.026	0.951	1.046	0.001	0.001
tgt_mu[51]	1.000	0.025	0.957	1.050	0.001	0.001
tgt_mu[52]	1.001	0.024	0.958	1.046	0.001	0.001
tgt_mu[53]	0.999	0.026	0.951	1.046	0.001	0.001
tgt_mu[54]	0.999	0.025	0.951	1.043	0.001	0.001
tgt_mu[55]	1.000	0.026	0.953	1.047	0.001	0.001
tgt_mu[56]	1.001	0.025	0.954	1.046	0.001	0.001
tgt_mu[57]	1.000	0.027	0.947	1.047	0.001	0.001
tgt_mu[58]	1.000	0.027	0.943	1.042	0.001	0.001
tgt_mu[59]	1.000	0.027	0.952	1.048	0.001	0.001
tgt_mu[60]	1.000	0.028	0.950	1.055	0.001	0.001
tgt_mu[61]	0.999	0.025	0.950	1.043	0.001	0.001
tgt_mu[62]	1.000	0.025	0.953	1.042	0.001	0.001
tgt_mu[63]	1.000	0.026	0.956	1.055	0.001	0.001
tgt_mu[64]	1.000	0.028	0.948	1.050	0.001	0.001

tgt_mu[65]	0.999	0.025	0.949	1.044	0.001	0.001
tgt_mu[66]	0.999	0.028	0.946	1.050	0.001	0.001
tgt_mu[67]	0.998	0.027	0.947	1.046	0.001	0.001
tgt_mu[68]	0.999	0.028	0.947	1.051	0.001	0.001
tgt_mu[69]	0.999	0.025	0.953	1.046	0.001	0.001
tgt_mu[70]	1.001	0.027	0.950	1.048	0.001	0.001
tgt_mu[71]	0.999	0.026	0.952	1.050	0.001	0.001
tgt_mu[72]	0.999	0.026	0.947	1.044	0.001	0.001
tgt_mu[73]	1.002	0.024	0.955	1.043	0.001	0.001
tgt_mu[74]	0.999	0.026	0.952	1.049	0.001	0.001
tgt_mu[75]	1.000	0.028	0.947	1.051	0.001	0.001
tgt_mu[76]	1.000	0.024	0.956	1.044	0.001	0.001
tgt_mu[77]	0.999	0.028	0.942	1.048	0.001	0.001
tgt_mu[78]	1.000	0.027	0.952	1.048	0.001	0.001
tgt_mu[79]	1.002	0.024	0.954	1.042	0.001	0.001
tgt_mu[80]	0.999	0.028	0.950	1.050	0.001	0.001
tgt_mu[81]	0.999	0.026	0.952	1.048	0.001	0.001
tgt_mu[82]	0.999	0.024	0.955	1.044	0.001	0.001
tgt_mu[83]	0.999	0.028	0.946	1.048	0.001	0.001
tgt_mu[84]	1.000	0.025	0.952	1.046	0.001	0.001
tgt_mu[85]	1.001	0.024	0.959	1.047	0.001	0.001
tgt_mu[86]	1.001	0.026	0.953	1.050	0.001	0.001
tgt_mu[87]	0.999	0.027	0.953	1.049	0.001	0.001
tgt_mu[88]	1.000	0.027	0.952	1.047	0.001	0.001
tgt_mu[89]	1.001	0.025	0.953	1.042	0.001	0.001
tgt_mu[90]	1.000	0.026	0.944	1.048	0.001	0.001
tgt_mu[91]	1.000	0.027	0.945	1.044	0.001	0.001
tgt_mu[92]	1.001	0.028	0.949	1.048	0.001	0.001
tgt_mu[93]	1.000	0.025	0.955	1.049	0.001	0.001
tgt_mu[94]	1.001	0.027	0.949	1.050	0.001	0.001
tgt_mu[95]	1.000	0.028	0.947	1.053	0.001	0.001
tgt_mu[96]	0.999	0.026	0.952	1.049	0.001	0.001
tgt_mu[97]	1.001	0.025	0.958	1.049	0.001	0.001
tgt_mu[98]	0.999	0.024	0.953	1.039	0.001	0.001

tgt_mu[99]	1.000	0.024	0.953	1.043	0.001	0.001
tgt_mu[100]	1.000	0.025	0.956	1.046	0.001	0.001
tgt_mu[101]	0.998	0.025	0.947	1.043	0.001	0.001
tgt_mu[102]	1.001	0.027	0.954	1.051	0.001	0.001
tgt_mu[103]	1.001	0.027	0.946	1.045	0.001	0.001
seasonality_holidays_mu[0]	0.983	0.172	0.683	1.308	0.005	0.003
seasonality_holidays_mu[1]	0.977	0.156	0.677	1.260	0.004	0.003
seasonality_holidays_mu[2]	0.984	0.183	0.629	1.300	0.005	0.004
seasonality_holidays_mu[3]	0.981	0.166	0.672	1.295	0.004	0.003
seasonality_holidays_mu[4]	0.976	0.175	0.627	1.284	0.005	0.003
seasonality_holidays_mu[5]	0.979	0.169	0.631	1.285	0.004	0.003
seasonality_holidays_mu[6]	0.975	0.174	0.615	1.256	0.004	0.003
seasonality_holidays_mu[7]	0.980	0.163	0.686	1.280	0.004	0.003
seasonality_holidays_mu[8]	0.980	0.167	0.653	1.274	0.004	0.003
seasonality_holidays_mu[9]	0.986	0.174	0.645	1.300	0.004	0.003
seasonality_holidays_mu[10]	0.987	0.162	0.710	1.295	0.004	0.003
seasonality_holidays_mu[11]	0.981	0.157	0.717	1.304	0.003	0.002
seasonality_holidays_mu[12]	0.975	0.170	0.707	1.355	0.004	0.003
seasonality_holidays_mu[13]	0.981	0.178	0.633	1.290	0.004	0.003
seasonality_holidays_mu[14]	0.977	0.177	0.656	1.298	0.004	0.003
seasonality_holidays_mu[15]	0.978	0.167	0.679	1.298	0.004	0.003
seasonality_holidays_mu[16]	0.983	0.181	0.646	1.295	0.004	0.003
seasonality_holidays_mu[17]	0.975	0.176	0.623	1.294	0.004	0.003
seasonality_holidays_mu[18]	0.986	0.166	0.679	1.301	0.003	0.002
seasonality_holidays_mu[19]	0.981	0.175	0.666	1.323	0.004	0.003
seasonality_holidays_mu[20]	0.977	0.159	0.678	1.248	0.003	0.002
seasonality_holidays_mu[21]	0.985	0.167	0.653	1.288	0.004	0.003
seasonality_holidays_mu[22]	0.981	0.165	0.652	1.282	0.004	0.003
seasonality_holidays_mu[23]	0.972	0.156	0.701	1.276	0.004	0.003
seasonality_holidays_mu[24]	0.975	0.172	0.658	1.264	0.005	0.003
seasonality_holidays_mu[25]	0.981	0.172	0.664	1.276	0.004	0.003
seasonality_holidays_mu[26]	0.980	0.177	0.670	1.320	0.004	0.003
seasonality_holidays_mu[27]	0.986	0.158	0.711	1.299	0.004	0.003

seasonality_holidays_mu[28]	0.982	0.174	0.647	1.289	0.004	0.003
seasonality_holidays_mu[29]	0.980	0.165	0.661	1.273	0.004	0.004
seasonality_holidays_mu[30]	0.980	0.166	0.669	1.294	0.004	0.003
seasonality_holidays_mu[31]	0.976	0.182	0.649	1.347	0.004	0.003
seasonality_holidays_mu[32]	0.985	0.160	0.680	1.274	0.004	0.003
seasonality_holidays_mu[33]	0.978	0.161	0.666	1.256	0.004	0.003
seasonality_holidays_mu[34]	0.978	0.170	0.681	1.284	0.004	0.003
seasonality_holidays_mu[35]	0.982	0.173	0.699	1.347	0.004	0.003
seasonality_holidays_mu[36]	0.980	0.165	0.626	1.254	0.004	0.003
seasonality_holidays_mu[37]	0.981	0.178	0.653	1.321	0.004	0.003
seasonality_holidays_mu[38]	0.974	0.168	0.696	1.283	0.005	0.003
seasonality_holidays_mu[39]	0.983	0.164	0.683	1.323	0.004	0.003
seasonality_holidays_mu[40]	0.979	0.170	0.681	1.278	0.004	0.003
seasonality_holidays_mu[41]	0.990	0.160	0.687	1.285	0.004	0.003
seasonality_holidays_mu[42]	0.987	0.172	0.674	1.306	0.004	0.003
seasonality_holidays_mu[43]	0.985	0.170	0.682	1.328	0.005	0.003
seasonality_holidays_mu[44]	0.975	0.167	0.631	1.251	0.005	0.003
seasonality_holidays_mu[45]	0.979	0.179	0.660	1.291	0.004	0.003
seasonality_holidays_mu[46]	0.979	0.167	0.661	1.314	0.004	0.003
seasonality_holidays_mu[47]	0.976	0.155	0.702	1.250	0.003	0.002
seasonality_holidays_mu[48]	0.973	0.193	0.583	1.317	0.006	0.004
seasonality_holidays_mu[49]	0.986	0.159	0.677	1.258	0.003	0.002
seasonality_holidays_mu[50]	0.977	0.176	0.689	1.369	0.004	0.003
seasonality_holidays_mu[51]	0.981	0.173	0.669	1.318	0.004	0.003
seasonality_holidays_mu[52]	0.983	0.166	0.687	1.311	0.004	0.003
seasonality_holidays_mu[53]	0.983	0.171	0.658	1.297	0.004	0.003
seasonality_holidays_mu[54]	0.983	0.163	0.722	1.341	0.004	0.003
seasonality_holidays_mu[55]	0.982	0.162	0.686	1.291	0.004	0.003
seasonality_holidays_mu[56]	0.980	0.169	0.693	1.320	0.004	0.003
seasonality_holidays_mu[57]	0.986	0.152	0.710	1.257	0.004	0.003
seasonality_holidays_mu[58]	0.983	0.162	0.709	1.318	0.004	0.003
seasonality_holidays_mu[59]	0.975	0.168	0.664	1.298	0.003	0.003
seasonality_holidays_mu[60]	0.979	0.158	0.667	1.272	0.004	0.003
seasonality_holidays_mu[61]	0.978	0.166	0.690	1.286	0.004	0.003

seasonality_holidays_mu[62]	0.982	0.164	0.672	1.297	0.004	0.003
seasonality_holidays_mu[63]	0.977	0.165	0.695	1.273	0.004	0.003
seasonality_holidays_mu[64]	0.985	0.169	0.689	1.311	0.004	0.003
seasonality_holidays_mu[65]	0.979	0.168	0.665	1.292	0.004	0.003
seasonality_holidays_mu[66]	0.981	0.165	0.665	1.281	0.004	0.003
seasonality_holidays_mu[67]	0.982	0.172	0.669	1.314	0.004	0.003
seasonality_holidays_mu[68]	0.979	0.168	0.693	1.303	0.004	0.003
seasonality_holidays_mu[69]	0.982	0.169	0.670	1.295	0.004	0.003
seasonality_holidays_mu[70]	0.987	0.172	0.651	1.298	0.006	0.005
seasonality_holidays_mu[71]	0.976	0.175	0.672	1.311	0.004	0.003
seasonality_holidays_mu[72]	0.982	0.171	0.603	1.262	0.004	0.003
seasonality_holidays_mu[73]	0.976	0.169	0.674	1.321	0.004	0.003
seasonality_holidays_mu[74]	0.977	0.162	0.653	1.259	0.004	0.003
seasonality_holidays_mu[75]	0.976	0.165	0.680	1.281	0.003	0.002
seasonality_holidays_mu[76]	0.988	0.169	0.699	1.348	0.004	0.003
seasonality_holidays_mu[77]	0.977	0.164	0.597	1.261	0.004	0.003
seasonality_holidays_mu[78]	0.977	0.174	0.632	1.285	0.004	0.003
seasonality_holidays_mu[79]	0.977	0.170	0.675	1.313	0.004	0.003
seasonality_holidays_mu[80]	0.975	0.164	0.686	1.284	0.004	0.003
seasonality_holidays_mu[81]	0.975	0.177	0.672	1.338	0.004	0.003
seasonality_holidays_mu[82]	0.992	0.174	0.640	1.303	0.005	0.003
seasonality_holidays_mu[83]	0.980	0.171	0.679	1.314	0.004	0.003
seasonality_holidays_mu[84]	0.988	0.167	0.662	1.293	0.004	0.003
seasonality_holidays_mu[85]	0.981	0.164	0.658	1.266	0.004	0.003
seasonality_holidays_mu[86]	0.982	0.171	0.633	1.289	0.004	0.003
seasonality_holidays_mu[87]	0.977	0.164	0.665	1.279	0.004	0.003
seasonality_holidays_mu[88]	0.977	0.170	0.631	1.270	0.004	0.003
seasonality_holidays_mu[89]	0.979	0.184	0.607	1.289	0.005	0.004
seasonality_holidays_mu[90]	0.971	0.168	0.637	1.254	0.006	0.004
seasonality_holidays_mu[91]	0.989	0.160	0.708	1.294	0.004	0.003
seasonality_holidays_mu[92]	0.977	0.166	0.652	1.246	0.004	0.003
seasonality_holidays_mu[93]	0.976	0.173	0.644	1.318	0.004	0.003
seasonality_holidays_mu[94]	0.977	0.177	0.646	1.312	0.004	0.003
seasonality_holidays_mu[95]	0.981	0.178	0.671	1.324	0.004	0.003

seasonality_holidays_mu[96]	0.976	0.182	0.615	1.268	0.004	0.003
seasonality_holidays_mu[97]	0.981	0.168	0.697	1.301	0.004	0.003
seasonality_holidays_mu[98]	0.983	0.155	0.679	1.243	0.003	0.002
seasonality_holidays_mu[99]	0.983	0.167	0.664	1.292	0.004	0.003
seasonality_holidays_mu[100]	0.979	0.175	0.666	1.301	0.004	0.003
seasonality_holidays_mu[101]	0.984	0.185	0.677	1.343	0.004	0.003
seasonality_holidays_mu[102]	0.980	0.172	0.677	1.318	0.004	0.003
seasonality_holidays_mu[103]	0.974	0.171	0.640	1.274	0.004	0.003
covid_new_cases_mu[0]	0.293	0.460	-0.499	1.165	0.023	0.017
covid_new_cases_mu[1]	0.289	0.443	-0.529	1.126	0.022	0.016
covid_new_cases_mu[2]	0.266	0.509	-0.567	1.326	0.042	0.030
covid_new_cases_mu[3]	0.301	0.457	-0.600	1.056	0.025	0.022
covid_new_cases_mu[4]	0.236	0.426	-0.490	1.103	0.027	0.019
covid_new_cases_mu[5]	0.308	0.478	-0.594	1.182	0.036	0.025
covid_new_cases_mu[6]	0.283	0.441	-0.621	1.084	0.025	0.018
covid_new_cases_mu[7]	0.250	0.455	-0.563	1.164	0.028	0.020
covid_new_cases_mu[8]	0.272	0.424	-0.492	1.111	0.025	0.017
covid_new_cases_mu[9]	0.317	0.448	-0.567	1.099	0.027	0.019
covid_new_cases_mu[10]	0.274	0.442	-0.588	1.039	0.021	0.015
covid_new_cases_mu[11]	0.280	0.460	-0.568	1.097	0.027	0.019
covid_new_cases_mu[12]	0.259	0.442	-0.551	1.105	0.021	0.015
covid_new_cases_mu[13]	0.308	0.449	-0.588	1.091	0.020	0.014
covid_new_cases_mu[14]	0.291	0.452	-0.504	1.224	0.028	0.020
covid_new_cases_mu[15]	0.309	0.469	-0.570	1.139	0.024	0.017
covid_new_cases_mu[16]	0.289	0.429	-0.498	1.102	0.033	0.023
covid_new_cases_mu[17]	0.261	0.452	-0.535	1.156	0.028	0.020
covid_new_cases_mu[18]	0.336	0.459	-0.498	1.210	0.027	0.019
covid_new_cases_mu[19]	0.249	0.482	-0.659	1.108	0.024	0.017
covid_new_cases_mu[20]	0.318	0.447	-0.448	1.225	0.023	0.016
covid_new_cases_mu[21]	0.253	0.475	-0.650	1.064	0.022	0.016
covid_new_cases_mu[22]	0.274	0.423	-0.482	1.070	0.021	0.015
covid_new_cases_mu[23]	0.281	0.469	-0.572	1.188	0.026	0.018
covid_new_cases_mu[24]	0.266	0.450	-0.610	1.049	0.020	0.014
covid_new_cases_mu[25]	0.273	0.465	-0.664	0.997	0.029	0.021

covid_new_cases_mu[26]	0.313	0.425	-0.517	1.058	0.024	0.017
covid_new_cases_mu[27]	0.292	0.418	-0.533	0.962	0.019	0.014
covid_new_cases_mu[28]	0.314	0.452	-0.450	1.197	0.026	0.019
covid_new_cases_mu[29]	0.251	0.454	-0.685	1.022	0.029	0.021
covid_new_cases_mu[30]	0.273	0.417	-0.573	0.975	0.024	0.018
covid_new_cases_mu[31]	0.316	0.451	-0.521	1.127	0.031	0.022
covid_new_cases_mu[32]	0.261	0.448	-0.496	1.129	0.017	0.013
covid_new_cases_mu[33]	0.232	0.438	-0.649	1.007	0.028	0.020
covid_new_cases_mu[34]	0.236	0.430	-0.529	1.072	0.028	0.020
covid_new_cases_mu[35]	0.292	0.467	-0.487	1.211	0.024	0.017
covid_new_cases_mu[36]	0.278	0.449	-0.540	1.119	0.029	0.021
covid_new_cases_mu[37]	0.238	0.439	-0.632	0.992	0.024	0.017
covid_new_cases_mu[38]	0.274	0.449	-0.543	1.122	0.033	0.024
covid_new_cases_mu[39]	0.326	0.476	-0.609	1.163	0.023	0.019
covid_new_cases_mu[40]	0.318	0.473	-0.628	1.138	0.029	0.021
covid_new_cases_mu[41]	0.265	0.441	-0.480	1.115	0.021	0.015
covid_new_cases_mu[42]	0.265	0.462	-0.569	1.100	0.027	0.019
covid_new_cases_mu[43]	0.284	0.468	-0.582	1.122	0.023	0.018
covid_new_cases_mu[44]	0.300	0.469	-0.519	1.191	0.023	0.016
covid_new_cases_mu[45]	0.253	0.463	-0.615	1.079	0.036	0.026
covid_new_cases_mu[46]	0.288	0.456	-0.572	1.114	0.027	0.019
covid_new_cases_mu[47]	0.243	0.442	-0.565	1.086	0.025	0.017
covid_new_cases_mu[48]	0.293	0.444	-0.621	1.032	0.025	0.018
covid_new_cases_mu[49]	0.313	0.437	-0.526	1.129	0.023	0.017
covid_new_cases_mu[50]	0.280	0.456	-0.535	1.181	0.020	0.016
covid_new_cases_mu[51]	0.301	0.463	-0.580	1.190	0.027	0.019
covid_new_cases_mu[52]	0.300	0.460	-0.536	1.221	0.029	0.021
covid_new_cases_mu[53]	0.323	0.464	-0.529	1.173	0.024	0.017
covid_new_cases_mu[54]	0.288	0.456	-0.472	1.182	0.025	0.018
covid_new_cases_mu[55]	0.346	0.471	-0.587	1.214	0.025	0.018
covid_new_cases_mu[56]	0.234	0.429	-0.509	1.066	0.025	0.017
covid_new_cases_mu[57]	0.279	0.443	-0.520	1.151	0.026	0.018
covid_new_cases_mu[58]	0.267	0.451	-0.538	1.058	0.029	0.020
covid_new_cases_mu[59]	0.234	0.476	-0.574	1.183	0.032	0.023

covid_new_cases_mu[60]	0.319	0.450	-0.518	1.134	0.022	0.015
covid_new_cases_mu[61]	0.296	0.469	-0.517	1.170	0.026	0.019
covid_new_cases_mu[62]	0.262	0.461	-0.617	1.129	0.029	0.021
covid_new_cases_mu[63]	0.286	0.482	-0.625	1.160	0.029	0.021
covid_new_cases_mu[64]	0.248	0.466	-0.667	1.033	0.027	0.019
covid_new_cases_mu[65]	0.336	0.436	-0.464	1.169	0.028	0.020
covid_new_cases_mu[66]	0.258	0.449	-0.540	1.106	0.023	0.016
covid_new_cases_mu[67]	0.254	0.453	-0.522	1.160	0.022	0.016
covid_new_cases_mu[68]	0.314	0.451	-0.481	1.192	0.022	0.016
covid_new_cases_mu[69]	0.309	0.476	-0.517	1.261	0.028	0.020
covid_new_cases_mu[70]	0.295	0.458	-0.533	1.148	0.029	0.021
covid_new_cases_mu[71]	0.255	0.452	-0.522	1.142	0.023	0.017
covid_new_cases_mu[72]	0.289	0.448	-0.431	1.185	0.025	0.017
covid_new_cases_mu[73]	0.265	0.467	-0.625	1.165	0.020	0.014
covid_new_cases_mu[74]	0.288	0.454	-0.581	1.121	0.029	0.020
covid_new_cases_mu[75]	0.317	0.473	-0.431	1.299	0.032	0.023
covid_new_cases_mu[76]	0.233	0.448	-0.626	1.075	0.027	0.019
covid_new_cases_mu[77]	0.240	0.490	-0.693	1.097	0.025	0.017
covid_new_cases_mu[78]	0.245	0.499	-0.663	1.127	0.029	0.021
covid_new_cases_mu[79]	0.315	0.451	-0.469	1.223	0.037	0.027
covid_new_cases_mu[80]	0.261	0.489	-0.622	1.157	0.032	0.023
covid_new_cases_mu[81]	0.314	0.445	-0.474	1.183	0.028	0.020
covid_new_cases_mu[82]	0.275	0.448	-0.521	1.180	0.025	0.018
covid_new_cases_mu[83]	0.288	0.455	-0.465	1.156	0.023	0.016
covid_new_cases_mu[84]	0.300	0.468	-0.544	1.204	0.025	0.018
covid_new_cases_mu[85]	0.215	0.462	-0.655	1.057	0.025	0.018
covid_new_cases_mu[86]	0.269	0.443	-0.501	1.182	0.026	0.018
covid_new_cases_mu[87]	0.304	0.473	-0.566	1.156	0.022	0.017
covid_new_cases_mu[88]	0.293	0.477	-0.636	1.179	0.027	0.020
covid_new_cases_mu[89]	0.294	0.501	-0.636	1.226	0.026	0.019
covid_new_cases_mu[90]	0.279	0.446	-0.502	1.091	0.022	0.015
covid_new_cases_mu[91]	0.287	0.459	-0.484	1.204	0.025	0.018
covid_new_cases_mu[92]	0.292	0.470	-0.648	1.102	0.030	0.021
covid_new_cases_mu[93]	0.301	0.465	-0.495	1.180	0.027	0.019

covid_new_cases_mu[94]	0.241	0.457	-0.590	1.054	0.028	0.020
covid_new_cases_mu[95]	0.294	0.440	-0.505	1.101	0.021	0.015
covid_new_cases_mu[96]	0.277	0.422	-0.529	1.000	0.028	0.020
covid_new_cases_mu[97]	0.260	0.458	-0.656	1.086	0.026	0.018
covid_new_cases_mu[98]	0.260	0.484	-0.649	1.126	0.027	0.020
covid_new_cases_mu[99]	0.279	0.461	-0.563	1.074	0.019	0.014
covid_new_cases_mu[100]	0.267	0.444	-0.610	1.003	0.025	0.018
covid_new_cases_mu[101]	0.307	0.480	-0.636	1.166	0.027	0.019
covid_new_cases_mu[102]	0.273	0.470	-0.624	1.088	0.025	0.018
covid_new_cases_mu[103]	0.249	0.455	-0.557	1.129	0.018	0.013
price[0]	0.999	0.031	0.941	1.055	0.001	0.001
price[1]	1.001	0.032	0.947	1.068	0.001	0.001
price[2]	0.999	0.032	0.936	1.053	0.001	0.001
price[3]	1.000	0.032	0.945	1.063	0.001	0.001
price[4]	1.001	0.032	0.938	1.062	0.001	0.001
price[5]	1.001	0.032	0.939	1.061	0.001	0.001
price[6]	1.000	0.032	0.937	1.057	0.001	0.001
price[7]	0.999	0.033	0.944	1.064	0.001	0.001
price[8]	1.001	0.031	0.943	1.057	0.001	0.001
price[9]	1.000	0.031	0.945	1.058	0.001	0.001
price[10]	0.999	0.031	0.943	1.059	0.001	0.001
price[11]	0.999	0.031	0.937	1.054	0.001	0.001
price[12]	1.002	0.030	0.941	1.052	0.001	0.001
price[13]	0.999	0.032	0.944	1.058	0.001	0.001
price[14]	0.998	0.033	0.936	1.056	0.001	0.001
price[15]	0.999	0.031	0.940	1.058	0.001	0.001
price[16]	1.000	0.031	0.937	1.055	0.001	0.001
price[17]	1.001	0.031	0.939	1.054	0.001	0.001
price[18]	1.000	0.030	0.946	1.057	0.001	0.001
price[19]	1.000	0.029	0.948	1.052	0.001	0.001
price[20]	1.002	0.032	0.934	1.056	0.001	0.001
price[21]	0.999	0.032	0.943	1.061	0.001	0.001
price[22]	0.999	0.032	0.943	1.060	0.001	0.001
price[23]	1.001	0.031	0.944	1.056	0.001	0.001

price[24]	1.001	0.031	0.943	1.056	0.001	0.001
price[25]	1.001	0.031	0.941	1.054	0.001	0.001
price[26]	1.001	0.032	0.944	1.061	0.001	0.001
price[27]	1.000	0.030	0.948	1.061	0.001	0.001
price[28]	1.001	0.031	0.940	1.056	0.001	0.001
price[29]	1.000	0.032	0.941	1.061	0.001	0.001
price[30]	1.001	0.031	0.940	1.059	0.001	0.001
price[31]	1.002	0.030	0.948	1.056	0.001	0.001
price[32]	1.002	0.032	0.945	1.062	0.001	0.001
price[33]	1.000	0.031	0.947	1.067	0.001	0.001
price[34]	1.001	0.032	0.935	1.060	0.001	0.001
price[35]	0.999	0.032	0.942	1.058	0.001	0.001
price[36]	1.000	0.031	0.944	1.060	0.001	0.001
price[37]	1.002	0.030	0.951	1.064	0.001	0.001
price[38]	1.000	0.031	0.937	1.056	0.001	0.001
price[39]	1.000	0.032	0.932	1.054	0.001	0.001
price[40]	1.001	0.032	0.944	1.060	0.001	0.001
price[41]	0.999	0.032	0.943	1.063	0.001	0.001
price[42]	0.999	0.030	0.944	1.053	0.001	0.001
price[43]	1.000	0.031	0.945	1.058	0.001	0.001
price[44]	1.000	0.031	0.942	1.054	0.001	0.001
price[45]	1.002	0.031	0.945	1.059	0.001	0.001
price[46]	0.998	0.032	0.937	1.054	0.001	0.001
price[47]	1.000	0.029	0.947	1.055	0.001	0.001
price[48]	1.000	0.031	0.946	1.056	0.001	0.001
price[49]	0.998	0.030	0.943	1.053	0.001	0.001
price[50]	0.998	0.031	0.936	1.059	0.001	0.001
price[51]	1.000	0.029	0.942	1.051	0.001	0.001
price[52]	0.999	0.032	0.943	1.056	0.001	0.001
price[53]	0.999	0.031	0.943	1.060	0.001	0.001
price[54]	0.999	0.031	0.931	1.050	0.001	0.001
price[55]	0.997	0.032	0.937	1.056	0.001	0.001
price[56]	1.000	0.034	0.943	1.068	0.001	0.001
price[57]	1.002	0.030	0.952	1.062	0.001	0.001

price[58]	1.000	0.031	0.944	1.056	0.001	0.001
price[59]	1.001	0.030	0.945	1.056	0.001	0.001
price[60]	0.999	0.031	0.938	1.055	0.001	0.001
price[61]	1.000	0.032	0.943	1.063	0.001	0.001
price[62]	1.000	0.031	0.940	1.058	0.001	0.001
price[63]	1.001	0.031	0.944	1.064	0.001	0.001
price[64]	0.999	0.032	0.941	1.061	0.001	0.001
price[65]	1.001	0.031	0.939	1.055	0.001	0.001
price[66]	1.000	0.029	0.943	1.050	0.001	0.001
price[67]	1.002	0.032	0.947	1.062	0.001	0.001
price[68]	1.000	0.031	0.945	1.062	0.001	0.001
price[69]	0.999	0.031	0.945	1.062	0.001	0.001
price[70]	0.998	0.030	0.940	1.052	0.001	0.001
price[71]	0.998	0.031	0.946	1.057	0.001	0.001
price[72]	1.001	0.031	0.944	1.059	0.001	0.001
price[73]	1.002	0.030	0.946	1.052	0.001	0.001
price[74]	1.001	0.032	0.942	1.057	0.001	0.001
price[75]	0.998	0.032	0.938	1.055	0.001	0.001
price[76]	1.000	0.031	0.940	1.059	0.001	0.001
price[77]	0.998	0.032	0.936	1.054	0.001	0.001
price[78]	1.000	0.031	0.944	1.055	0.001	0.001
price[79]	1.001	0.031	0.940	1.059	0.001	0.001
price[80]	1.001	0.032	0.938	1.057	0.001	0.001
price[81]	1.000	0.033	0.941	1.062	0.001	0.001
price[82]	0.999	0.031	0.938	1.053	0.001	0.001
price[83]	1.001	0.031	0.945	1.060	0.001	0.001
price[84]	1.001	0.031	0.944	1.060	0.001	0.001
price[85]	1.001	0.031	0.944	1.059	0.001	0.001
price[86]	0.998	0.031	0.943	1.059	0.001	0.001
price[87]	0.999	0.032	0.938	1.059	0.001	0.001
price[88]	1.001	0.030	0.943	1.055	0.001	0.001
price[89]	0.999	0.031	0.939	1.055	0.001	0.001
price[90]	0.999	0.030	0.935	1.048	0.001	0.001

price[91]	1.000	0.032	0.940	1.061	0.001	0.001
price[92]	1.000	0.033	0.935	1.058	0.001	0.001
price[93]	0.999	0.032	0.938	1.053	0.001	0.001
price[94]	1.002	0.033	0.943	1.066	0.001	0.001
price[95]	0.999	0.032	0.941	1.058	0.001	0.001
price[96]	1.000	0.033	0.940	1.059	0.001	0.001
price[97]	0.998	0.031	0.934	1.051	0.001	0.001
price[98]	0.999	0.032	0.939	1.060	0.001	0.001
price[99]	1.001	0.031	0.948	1.063	0.001	0.001
price[100]	0.999	0.032	0.942	1.061	0.001	0.001
price[101]	1.000	0.031	0.948	1.061	0.001	0.001
price[102]	1.000	0.032	0.940	1.060	0.001	0.001
price[103]	0.999	0.030	0.945	1.058	0.001	0.001
promo[0]	-0.136	0.391	-0.757	0.581	0.232	0.185
promo[1]	-0.131	0.388	-0.720	0.609	0.227	0.180
promo[2]	-0.134	0.390	-0.679	0.667	0.229	0.182
promo[3]	-0.132	0.386	-0.726	0.620	0.226	0.179
promo[4]	-0.137	0.390	-0.720	0.617	0.229	0.182
promo[5]	-0.134	0.390	-0.760	0.591	0.230	0.183
promo[6]	-0.137	0.389	-0.704	0.636	0.230	0.183
promo[7]	-0.122	0.380	-0.691	0.593	0.224	0.178
promo[8]	-0.099	0.351	-0.633	0.587	0.202	0.159
promo[9]	-0.106	0.364	-0.710	0.565	0.210	0.166
promo[10]	-0.120	0.374	-0.668	0.590	0.220	0.175
promo[11]	-0.128	0.379	-0.748	0.573	0.223	0.177
promo[12]	-0.128	0.382	-0.702	0.624	0.226	0.179
promo[13]	-0.116	0.374	-0.643	0.614	0.217	0.172
promo[14]	-0.103	0.363	-0.680	0.546	0.210	0.166
promo[15]	-0.104	0.360	-0.642	0.610	0.209	0.166
promo[16]	-0.110	0.366	-0.683	0.577	0.214	0.169
promo[17]	-0.118	0.369	-0.688	0.586	0.215	0.170
promo[18]	-0.108	0.362	-0.642	0.583	0.209	0.166
promo[19]	-0.097	0.357	-0.640	0.579	0.204	0.161
promo[20]	-0.060	0.325	-0.545	0.612	0.174	0.135

promo[21]	0.067	0.333	-0.611	0.614	0.096	0.070
promo[22]	-0.059	0.327	-0.533	0.623	0.178	0.139
promo[23]	-0.068	0.329	-0.553	0.584	0.181	0.142
promo[24]	-0.082	0.339	-0.595	0.596	0.190	0.149
promo[25]	-0.089	0.345	-0.657	0.542	0.195	0.153
promo[26]	-0.079	0.336	-0.619	0.541	0.186	0.145
promo[27]	-0.096	0.350	-0.656	0.567	0.200	0.158
promo[28]	-0.103	0.362	-0.632	0.604	0.210	0.166
promo[29]	-0.105	0.362	-0.679	0.583	0.209	0.165
promo[30]	-0.112	0.365	-0.654	0.593	0.212	0.168
promo[31]	-0.109	0.366	-0.652	0.623	0.212	0.167
promo[32]	-0.109	0.366	-0.652	0.605	0.212	0.168
promo[33]	-0.112	0.367	-0.704	0.573	0.214	0.170
promo[34]	-0.113	0.369	-0.722	0.552	0.215	0.170
promo[35]	-0.109	0.361	-0.670	0.581	0.210	0.166
promo[36]	-0.110	0.368	-0.650	0.605	0.213	0.169
promo[37]	-0.111	0.361	-0.634	0.602	0.210	0.166
promo[38]	-0.108	0.361	-0.701	0.563	0.209	0.166
promo[39]	-0.107	0.366	-0.663	0.595	0.212	0.168
promo[40]	-0.120	0.375	-0.679	0.597	0.220	0.174
promo[41]	-0.127	0.386	-0.713	0.618	0.227	0.181
promo[42]	-0.125	0.384	-0.734	0.581	0.226	0.179
promo[43]	-0.132	0.384	-0.735	0.572	0.225	0.179
promo[44]	-0.129	0.384	-0.688	0.622	0.226	0.179
promo[45]	-0.134	0.382	-0.702	0.614	0.224	0.178
promo[46]	-0.125	0.381	-0.729	0.573	0.224	0.178
promo[47]	-0.129	0.386	-0.732	0.576	0.228	0.181
promo[48]	-0.134	0.392	-0.724	0.619	0.229	0.181
promo[49]	-0.130	0.388	-0.738	0.575	0.229	0.182
promo[50]	-0.132	0.390	-0.739	0.595	0.229	0.181
promo[51]	-0.137	0.391	-0.730	0.613	0.229	0.181
promo[52]	-0.131	0.391	-0.733	0.617	0.230	0.183
promo[53]	-0.129	0.388	-0.746	0.598	0.228	0.181
promo[54]	-0.130	0.391	-0.711	0.642	0.229	0.182

promo[55]	-0.128	0.391	-0.723	0.640	0.230	0.183
promo[56]	-0.138	0.395	-0.692	0.671	0.232	0.184
promo[57]	-0.138	0.390	-0.743	0.608	0.230	0.183
promo[58]	-0.133	0.383	-0.706	0.616	0.226	0.179
promo[59]	-0.113	0.370	-0.657	0.614	0.215	0.170
promo[60]	-0.114	0.374	-0.708	0.588	0.217	0.172
promo[61]	-0.107	0.360	-0.646	0.597	0.207	0.164
promo[62]	-0.117	0.376	-0.712	0.583	0.219	0.173
promo[63]	-0.126	0.385	-0.731	0.578	0.226	0.180
promo[64]	-0.124	0.379	-0.678	0.625	0.222	0.176
promo[65]	-0.123	0.370	-0.687	0.581	0.217	0.172
promo[66]	-0.106	0.364	-0.661	0.597	0.211	0.167
promo[67]	-0.105	0.360	-0.628	0.608	0.209	0.165
promo[68]	-0.110	0.367	-0.671	0.602	0.214	0.169
promo[69]	-0.112	0.367	-0.691	0.581	0.215	0.170
promo[70]	-0.113	0.373	-0.693	0.590	0.216	0.171
promo[71]	-0.087	0.348	-0.595	0.617	0.198	0.156
promo[72]	-0.070	0.328	-0.550	0.603	0.182	0.142
promo[73]	0.153	0.423	-0.612	0.926	0.074	0.053
promo[74]	0.156	0.422	-0.634	0.892	0.074	0.053
promo[75]	-0.156	0.556	-1.029	0.883	0.349	0.282
promo[76]	-0.200	0.607	-1.146	0.950	0.384	0.312
promo[77]	-0.194	0.603	-1.173	0.897	0.383	0.311
promo[78]	-0.178	0.587	-1.074	0.940	0.369	0.299
promo[79]	-0.194	0.580	-1.099	0.921	0.368	0.299
promo[80]	-0.202	0.583	-1.083	0.930	0.372	0.303
promo[81]	-0.193	0.568	-1.084	0.891	0.362	0.294
promo[82]	-0.200	0.569	-1.124	0.889	0.364	0.297
promo[83]	-0.197	0.564	-1.073	0.908	0.361	0.294
promo[84]	-0.195	0.555	-1.017	0.890	0.356	0.291
promo[85]	-0.197	0.551	-0.975	0.921	0.354	0.288
promo[86]	-0.237	0.681	-1.277	1.096	0.431	0.349
promo[87]	-0.202	0.578	-1.077	0.930	0.371	0.302
promo[88]	-0.208	0.583	-1.111	0.923	0.373	0.304

promo[89]	-0.202	0.576	-1.096	0.907	0.369	0.300
promo[90]	-0.203	0.579	-1.063	0.974	0.369	0.301
promo[91]	-0.204	0.583	-1.137	0.852	0.371	0.302
promo[92]	-0.218	0.600	-1.173	0.892	0.385	0.314
promo[93]	-0.222	0.603	-1.117	0.989	0.386	0.315
promo[94]	-0.229	0.614	-1.163	0.995	0.394	0.322
promo[95]	-0.230	0.623	-1.231	0.952	0.399	0.325
promo[96]	-0.240	0.641	-1.273	0.980	0.410	0.334
promo[97]	-0.239	0.649	-1.285	0.996	0.415	0.338
promo[98]	-0.242	0.664	-1.355	0.995	0.423	0.344
promo[99]	-0.252	0.676	-1.320	1.065	0.430	0.349
promo[100]	-0.256	0.693	-1.424	1.012	0.440	0.358
promo[101]	-0.262	0.705	-1.379	1.078	0.448	0.364
promo[102]	-0.267	0.712	-1.529	0.990	0.452	0.367
promo[103]	-0.264	0.711	-1.429	1.035	0.451	0.366
marketing_offline_old[0]	0.207	0.856	-1.429	1.769	0.276	0.202
marketing_offline_old[1]	-0.006	0.924	-1.754	1.736	0.422	0.319
marketing_offline_old[2]	-0.206	0.892	-1.826	1.336	0.427	0.325
marketing_offline_old[3]	0.068	0.808	-1.355	1.631	0.309	0.229
marketing_offline_old[4]	0.161	0.704	-1.031	1.515	0.203	0.147
marketing_offline_old[5]	0.225	0.881	-1.178	1.861	0.254	0.184
marketing_offline_old[6]	0.138	0.764	-1.218	1.702	0.154	0.110
marketing_offline_old[7]	-0.012	0.480	-0.798	0.957	0.050	0.035
marketing_offline_old[8]	-0.079	0.480	-0.998	0.817	0.053	0.038
marketing_offline_old[9]	-0.016	0.445	-0.799	0.786	0.043	0.031
marketing_offline_old[10]	-0.024	0.456	-0.883	0.800	0.054	0.038
marketing_offline_old[11]	-0.057	0.516	-0.962	0.954	0.101	0.072
marketing_offline_old[12]	-0.118	0.454	-0.985	0.712	0.051	0.036
marketing_offline_old[13]	-0.231	0.719	-1.670	1.124	0.242	0.177
marketing_offline_old[14]	0.224	0.734	-1.115	1.686	0.140	0.100
marketing_offline_old[15]	0.116	0.744	-1.297	1.410	0.318	0.238
marketing_offline_old[16]	0.057	0.518	-1.024	0.931	0.082	0.059
marketing_offline_old[17]	-0.048	0.806	-1.485	1.411	0.291	0.214
marketing_offline_old[18]	-0.123	0.827	-1.474	1.556	0.163	0.117

marketing_offline_old[19]	0.032	0.732	-1.422	1.413	0.220	0.160
marketing_offline_old[20]	0.018	0.455	-0.817	0.877	0.050	0.035
marketing_offline_old[21]	0.240	0.778	-1.240	1.571	0.145	0.104
marketing_offline_old[22]	0.059	0.696	-1.181	1.413	0.224	0.163
marketing_offline_old[23]	0.112	0.691	-1.154	1.315	0.247	0.182
marketing_offline_old[24]	-0.003	0.459	-0.891	0.842	0.046	0.032
marketing_offline_old[25]	0.044	0.742	-1.362	1.487	0.153	0.110
marketing_offline_old[26]	0.095	0.840	-1.413	1.718	0.149	0.106
marketing_offline_old[27]	0.020	0.656	-1.228	1.231	0.103	0.073
marketing_offline_old[28]	-0.075	0.525	-1.050	0.882	0.195	0.144
marketing_offline_old[29]	-0.053	0.772	-1.560	1.332	0.229	0.166
marketing_offline_old[30]	-0.013	0.688	-1.305	1.254	0.144	0.103
marketing_offline_old[31]	-0.052	0.787	-1.362	1.548	0.329	0.245
marketing_offline_old[32]	-0.039	0.529	-0.974	0.943	0.082	0.058
marketing_offline_old[33]	-0.095	0.515	-1.027	0.865	0.080	0.057
marketing_offline_old[34]	0.095	0.489	-0.808	0.929	0.058	0.041
marketing_offline_old[35]	0.016	0.512	-0.857	1.054	0.114	0.082
marketing_offline_old[36]	-0.149	0.479	-1.021	0.733	0.042	0.030
marketing_offline_old[37]	-0.110	0.473	-1.021	0.758	0.048	0.034
marketing_offline_old[38]	-0.063	0.478	-1.018	0.832	0.042	0.030
marketing_offline_old[39]	-0.084	0.544	-1.124	0.844	0.074	0.053
marketing_offline_old[40]	-0.011	0.452	-0.921	0.713	0.042	0.030
marketing_offline_old[41]	-0.028	0.452	-0.828	0.908	0.046	0.033
marketing_offline_old[42]	0.055	0.464	-0.888	0.854	0.052	0.037
marketing_offline_old[43]	0.057	0.559	-0.956	1.144	0.086	0.062
marketing_offline_old[44]	0.058	0.504	-0.797	1.024	0.058	0.041
marketing_offline_old[45]	-0.006	0.539	-1.041	0.919	0.060	0.043
marketing_offline_old[46]	-0.012	0.477	-0.911	0.895	0.051	0.036
marketing_offline_old[47]	0.097	0.881	-1.393	1.726	0.330	0.244
marketing_offline_old[48]	0.442	0.941	-1.176	2.138	0.496	0.384
marketing_offline_old[49]	0.222	0.778	-1.165	1.634	0.320	0.239
marketing_offline_old[50]	0.100	0.855	-1.759	1.565	0.279	0.203
marketing_offline_old[51]	0.146	0.706	-1.182	1.418	0.129	0.092
marketing_offline_old[52]	0.149	0.726	-1.328	1.390	0.186	0.134

marketing_offline_old[53]	0.200	0.871	-1.367	1.977	0.394	0.297
marketing_offline_old[54]	0.064	0.796	-1.437	1.433	0.301	0.222
marketing_offline_old[55]	-0.050	0.741	-1.563	1.420	0.097	0.069
marketing_offline_old[56]	-0.131	0.719	-1.538	1.130	0.188	0.136
marketing_offline_old[57]	-0.033	0.663	-1.316	1.113	0.116	0.082
marketing_offline_old[58]	-0.053	0.472	-0.940	0.793	0.040	0.028
marketing_offline_old[59]	0.176	0.458	-0.520	1.112	0.043	0.031
marketing_offline_old[60]	0.106	0.459	-0.751	0.899	0.056	0.040
marketing_offline_old[61]	-0.019	0.456	-0.814	0.840	0.047	0.033
marketing_offline_old[62]	-0.045	0.525	-0.999	0.973	0.112	0.080
marketing_offline_old[63]	0.040	0.472	-0.932	0.880	0.051	0.036
marketing_offline_old[64]	0.072	0.478	-0.787	0.864	0.050	0.035
marketing_offline_old[65]	-0.035	0.792	-1.606	1.408	0.168	0.121
marketing_offline_old[66]	-0.128	0.732	-1.463	1.175	0.152	0.109
marketing_offline_old[67]	-0.222	0.700	-1.623	0.964	0.117	0.083
marketing_offline_old[68]	-0.110	0.477	-0.938	0.850	0.060	0.043
marketing_offline_old[69]	-0.074	0.501	-1.008	0.809	0.066	0.047
marketing_offline_old[70]	0.030	0.477	-0.768	0.979	0.052	0.037
marketing_offline_old[71]	0.160	0.538	-0.838	1.137	0.073	0.052
marketing_offline_old[72]	0.033	0.473	-0.923	0.847	0.039	0.028
marketing_offline_old[73]	0.024	0.473	-0.861	0.926	0.039	0.027
marketing_offline_old[74]	0.063	0.519	-0.883	1.033	0.056	0.040
marketing_offline_old[75]	0.066	0.498	-0.810	0.954	0.044	0.031
marketing_offline_old[76]	-0.031	0.474	-0.858	0.875	0.043	0.031
marketing_offline_old[77]	-0.012	0.505	-1.008	0.855	0.040	0.028
marketing_offline_old[78]	0.018	0.475	-0.868	0.898	0.043	0.030
marketing_offline_old[79]	0.075	0.529	-0.915	1.074	0.121	0.087
marketing_offline_old[80]	0.010	0.520	-0.964	0.966	0.060	0.043
marketing_offline_old[81]	0.052	0.498	-0.831	1.010	0.054	0.039
marketing_offline_old[82]	0.012	0.486	-0.798	1.026	0.101	0.072
marketing_offline_old[83]	-0.001	0.474	-0.797	0.947	0.058	0.041
marketing_offline_old[84]	0.026	0.522	-0.831	1.054	0.127	0.092
marketing_offline_old[85]	-0.056	0.509	-0.939	0.892	0.083	0.059

marketing_offline_old[86]	-0.042	0.483	-0.942	0.843	0.103	0.074
marketing_offline_old[87]	-0.072	0.482	-1.085	0.731	0.049	0.035
marketing_offline_old[88]	-0.032	0.518	-0.996	1.019	0.088	0.063
marketing_offline_old[89]	-0.027	0.499	-0.819	1.099	0.064	0.045
marketing_offline_old[90]	-0.109	0.500	-1.042	0.752	0.110	0.079
marketing_offline_old[91]	-0.018	0.488	-0.887	0.876	0.057	0.040
marketing_offline_old[92]	-0.017	0.479	-0.921	0.834	0.055	0.039
marketing_offline_old[93]	-0.018	0.495	-0.979	0.871	0.104	0.075
marketing_offline_old[94]	-0.005	0.467	-0.941	0.798	0.040	0.028
marketing_offline_old[95]	-0.003	0.492	-0.924	0.878	0.053	0.038
marketing_offline_old[96]	0.042	0.561	-0.936	1.115	0.063	0.045
marketing_offline_old[97]	0.089	0.520	-0.887	1.037	0.066	0.047
marketing_offline_old[98]	0.139	0.495	-0.784	1.010	0.054	0.039
marketing_offline_old[99]	0.097	0.483	-0.827	0.996	0.050	0.036
marketing_offline_old[100]	-0.005	0.509	-1.008	0.876	0.055	0.039
marketing_offline_old[101]	-0.010	0.542	-0.954	1.095	0.076	0.054
marketing_offline_old[102]	-0.034	0.532	-0.961	1.034	0.050	0.036
marketing_offline_old[103]	0.024	0.475	-0.871	0.882	0.037	0.026
distribution[0]	1.307	0.507	0.436	2.160	0.322	0.262
distribution[1]	1.307	0.506	0.417	2.136	0.322	0.262
distribution[2]	1.306	0.504	0.475	2.176	0.320	0.260
distribution[3]	1.304	0.500	0.429	2.129	0.318	0.258
distribution[4]	1.309	0.507	0.450	2.167	0.322	0.262
distribution[5]	1.311	0.509	0.428	2.150	0.323	0.263
distribution[6]	1.309	0.506	0.442	2.136	0.322	0.262
distribution[7]	1.298	0.489	0.499	2.161	0.311	0.253
distribution[8]	1.267	0.438	0.445	1.930	0.278	0.226
distribution[9]	1.278	0.460	0.523	2.069	0.292	0.237
distribution[10]	1.293	0.480	0.451	2.078	0.305	0.248
distribution[11]	1.299	0.491	0.440	2.101	0.312	0.254
distribution[12]	1.297	0.490	0.444	2.101	0.311	0.253
distribution[13]	1.290	0.475	0.519	2.108	0.302	0.246
distribution[14]	1.278	0.458	0.484	2.022	0.291	0.237
distribution[15]	1.277	0.453	0.494	2.017	0.288	0.234

distribution[16]	1.284	0.465	0.493	2.067	0.296	0.240
distribution[17]	1.288	0.472	0.456	2.074	0.300	0.244
distribution[18]	1.279	0.457	0.535	2.076	0.290	0.236
distribution[19]	1.267	0.439	0.478	1.967	0.279	0.227
distribution[20]	1.226	0.372	0.624	1.864	0.236	0.192
distribution[21]	1.092	0.152	0.823	1.329	0.096	0.078
distribution[22]	1.230	0.377	0.582	1.857	0.240	0.195
distribution[23]	1.237	0.389	0.555	1.892	0.247	0.201
distribution[24]	1.248	0.409	0.532	1.918	0.260	0.211
distribution[25]	1.260	0.429	0.481	1.940	0.273	0.222
distribution[26]	1.245	0.405	0.528	1.890	0.257	0.209
distribution[27]	1.266	0.440	0.457	1.940	0.279	0.227
distribution[28]	1.277	0.454	0.500	2.038	0.288	0.234
distribution[29]	1.277	0.453	0.503	2.044	0.288	0.235
distribution[30]	1.283	0.466	0.466	2.030	0.296	0.240
distribution[31]	1.282	0.462	0.391	1.948	0.294	0.239
distribution[32]	1.281	0.462	0.501	2.069	0.293	0.238
distribution[33]	1.284	0.466	0.479	2.064	0.296	0.241
distribution[34]	1.286	0.471	0.418	1.998	0.299	0.243
distribution[35]	1.282	0.463	0.503	2.063	0.294	0.239
distribution[36]	1.285	0.467	0.462	2.053	0.297	0.241
distribution[37]	1.280	0.460	0.500	2.048	0.292	0.237
distribution[38]	1.278	0.457	0.495	2.039	0.291	0.236
distribution[39]	1.278	0.458	0.484	2.043	0.291	0.237
distribution[40]	1.295	0.482	0.508	2.141	0.306	0.249
distribution[41]	1.300	0.494	0.449	2.109	0.314	0.255
distribution[42]	1.300	0.494	0.415	2.055	0.314	0.255
distribution[43]	1.304	0.499	0.441	2.138	0.317	0.258
distribution[44]	1.301	0.495	0.444	2.097	0.315	0.256
distribution[45]	1.300	0.493	0.395	2.053	0.314	0.255
distribution[46]	1.300	0.494	0.480	2.165	0.314	0.255
distribution[47]	1.303	0.498	0.487	2.163	0.316	0.257
distribution[48]	1.305	0.502	0.449	2.142	0.319	0.259
distribution[49]	1.307	0.505	0.419	2.132	0.321	0.261

distribution[50]	1.308	0.507	0.450	2.166	0.322	0.262
distribution[51]	1.308	0.507	0.374	2.086	0.322	0.262
distribution[52]	1.308	0.506	0.458	2.175	0.322	0.262
distribution[53]	1.307	0.504	0.410	2.112	0.320	0.260
distribution[54]	1.308	0.503	0.478	2.181	0.320	0.260
distribution[55]	1.306	0.504	0.435	2.125	0.320	0.260
distribution[56]	1.310	0.509	0.455	2.177	0.324	0.263
distribution[57]	1.310	0.508	0.447	2.152	0.323	0.263
distribution[58]	1.302	0.498	0.439	2.116	0.316	0.257
distribution[59]	1.286	0.470	0.460	2.025	0.298	0.242
distribution[60]	1.291	0.479	0.497	2.117	0.304	0.248
distribution[61]	1.276	0.455	0.489	2.019	0.289	0.235
distribution[62]	1.290	0.476	0.471	2.087	0.303	0.246
distribution[63]	1.298	0.491	0.464	2.117	0.312	0.254
distribution[64]	1.299	0.491	0.420	2.069	0.312	0.254
distribution[65]	1.292	0.478	0.514	2.132	0.304	0.247
distribution[66]	1.280	0.461	0.423	1.998	0.293	0.238
distribution[67]	1.275	0.454	0.525	2.079	0.288	0.234
distribution[68]	1.282	0.464	0.450	2.006	0.295	0.240
distribution[69]	1.287	0.473	0.472	2.079	0.301	0.244
distribution[70]	1.285	0.467	0.498	2.090	0.297	0.242
distribution[71]	1.261	0.430	0.472	1.922	0.274	0.222
distribution[72]	1.236	0.389	0.485	1.806	0.247	0.201
distribution[73]	0.999	0.016	0.970	1.031	0.001	0.000
distribution[74]	1.001	0.016	0.972	1.028	0.001	0.000
distribution[75]	0.986	0.449	0.138	1.687	0.165	0.121
distribution[76]	0.986	0.505	0.046	1.798	0.187	0.138
distribution[77]	0.988	0.501	0.041	1.781	0.188	0.139
distribution[78]	0.980	0.482	0.070	1.754	0.173	0.127
distribution[79]	1.012	0.484	0.084	1.757	0.197	0.147
distribution[80]	1.026	0.487	0.113	1.790	0.209	0.157
distribution[81]	1.038	0.474	0.187	1.797	0.212	0.159
distribution[82]	1.051	0.480	0.151	1.791	0.223	0.169
distribution[83]	1.054	0.474	0.160	1.781	0.223	0.169

distribution[84]	1.058	0.469	0.175	1.769	0.223	0.170
distribution[85]	1.064	0.466	0.152	1.742	0.227	0.173
distribution[86]	0.967	0.575	-0.122	1.898	0.198	0.145
distribution[87]	1.043	0.483	0.139	1.791	0.220	0.166
distribution[88]	1.041	0.491	0.139	1.820	0.221	0.166
distribution[89]	1.038	0.485	0.147	1.792	0.218	0.164
distribution[90]	1.033	0.485	0.115	1.791	0.213	0.160
distribution[91]	1.027	0.489	0.098	1.790	0.211	0.158
distribution[92]	1.036	0.507	0.124	1.869	0.224	0.169
distribution[93]	1.047	0.513	0.107	1.854	0.233	0.176
distribution[94]	1.046	0.521	0.049	1.826	0.237	0.179
distribution[95]	1.033	0.529	0.029	1.843	0.230	0.173
distribution[96]	1.019	0.543	-0.002	1.862	0.227	0.169
distribution[97]	1.014	0.547	-0.010	1.871	0.224	0.167
distribution[98]	1.002	0.561	-0.071	1.874	0.220	0.163
distribution[99]	0.989	0.577	-0.088	1.914	0.218	0.161
distribution[100]	0.982	0.590	-0.126	1.933	0.216	0.160
distribution[101]	0.981	0.597	-0.134	1.935	0.217	0.160
distribution[102]	0.975	0.605	-0.173	1.953	0.217	0.159
distribution[103]	0.974	0.605	-0.181	1.940	0.217	0.160
marketing_online_old[0]	0.313	0.577	-0.684	1.248	0.296	0.228
marketing_online_old[1]	0.265	0.505	-0.609	1.210	0.229	0.173
marketing_online_old[2]	0.182	0.485	-0.667	1.073	0.226	0.171
marketing_online_old[3]	0.183	0.495	-0.877	0.925	0.242	0.185
marketing_online_old[4]	0.242	0.570	-0.788	1.281	0.283	0.217
marketing_online_old[5]	0.336	0.571	-0.734	1.287	0.272	0.207
marketing_online_old[6]	0.390	0.584	-0.696	1.400	0.252	0.189
marketing_online_old[7]	0.350	0.580	-0.693	1.425	0.289	0.221
marketing_online_old[8]	0.325	0.483	-0.614	1.130	0.244	0.188
marketing_online_old[9]	0.312	0.514	-0.613	1.129	0.291	0.229
marketing_online_old[10]	0.319	0.565	-0.634	1.357	0.300	0.233
marketing_online_old[11]	0.197	0.557	-0.735	1.254	0.308	0.241
marketing_online_old[12]	0.206	0.566	-0.854	1.104	0.320	0.251
marketing_online_old[13]	0.165	0.566	-0.911	1.129	0.286	0.220

marketing_online_old[14]	0.198	0.505	-0.703	1.064	0.243	0.185
marketing_online_old[15]	0.330	0.534	-0.589	1.239	0.275	0.212
marketing_online_old[16]	0.355	0.548	-0.651	1.434	0.288	0.223
marketing_online_old[17]	0.308	0.610	-0.751	1.448	0.340	0.266
marketing_online_old[18]	0.217	0.588	-0.721	1.406	0.313	0.243
marketing_online_old[19]	0.240	0.508	-0.620	1.217	0.250	0.191
marketing_online_old[20]	0.392	0.441	-0.384	1.202	0.197	0.148
marketing_online_old[21]	0.852	0.375	0.187	1.673	0.049	0.042
marketing_online_old[22]	0.521	0.554	-0.544	1.448	0.231	0.172
marketing_online_old[23]	0.479	0.466	-0.435	1.236	0.203	0.153
marketing_online_old[24]	0.420	0.478	-0.455	1.179	0.220	0.167
marketing_online_old[25]	0.336	0.484	-0.468	1.199	0.226	0.171
marketing_online_old[26]	0.384	0.502	-0.555	1.250	0.207	0.154
marketing_online_old[27]	0.349	0.505	-0.516	1.271	0.237	0.180
marketing_online_old[28]	0.339	0.541	-0.688	1.211	0.276	0.212
marketing_online_old[29]	0.340	0.543	-0.779	1.205	0.232	0.174
marketing_online_old[30]	0.306	0.531	-0.686	1.248	0.202	0.149
marketing_online_old[31]	0.274	0.458	-0.551	1.122	0.214	0.162
marketing_online_old[32]	0.265	0.508	-0.728	1.069	0.228	0.172
marketing_online_old[33]	0.294	0.502	-0.621	1.144	0.248	0.189
marketing_online_old[34]	0.312	0.500	-0.660	1.106	0.261	0.202
marketing_online_old[35]	0.348	0.531	-0.593	1.248	0.268	0.206
marketing_online_old[36]	0.252	0.539	-0.661	1.197	0.298	0.233
marketing_online_old[37]	0.243	0.539	-0.789	1.097	0.292	0.227
marketing_online_old[38]	0.254	0.562	-0.755	1.220	0.316	0.248
marketing_online_old[39]	0.271	0.553	-0.747	1.159	0.299	0.233
marketing_online_old[40]	0.261	0.538	-0.807	1.143	0.287	0.223
marketing_online_old[41]	0.266	0.577	-0.654	1.256	0.318	0.249
marketing_online_old[42]	0.259	0.572	-0.755	1.196	0.327	0.258
marketing_online_old[43]	0.281	0.565	-0.731	1.207	0.322	0.253
marketing_online_old[44]	0.277	0.591	-0.837	1.163	0.316	0.245
marketing_online_old[45]	0.241	0.598	-0.825	1.269	0.327	0.255
marketing_online_old[46]	0.240	0.593	-0.820	1.279	0.320	0.249
marketing_online_old[47]	0.227	0.542	-0.901	1.069	0.288	0.223

marketing_online_old[48]	0.300	0.640	-0.722	1.602	0.373	0.296
marketing_online_old[49]	0.375	0.692	-0.994	1.512	0.383	0.300
marketing_online_old[50]	0.275	0.660	-0.985	1.602	0.346	0.267
marketing_online_old[51]	0.298	0.648	-0.840	1.578	0.340	0.263
marketing_online_old[52]	0.357	0.669	-0.826	1.546	0.347	0.267
marketing_online_old[53]	0.373	0.650	-0.820	1.448	0.323	0.247
marketing_online_old[54]	0.288	0.558	-0.651	1.293	0.263	0.200
marketing_online_old[55]	0.239	0.559	-0.788	1.211	0.256	0.194
marketing_online_old[56]	0.185	0.583	-0.804	1.259	0.314	0.244
marketing_online_old[57]	0.158	0.584	-0.896	1.140	0.315	0.245
marketing_online_old[58]	0.193	0.528	-0.704	1.054	0.303	0.239
marketing_online_old[59]	0.335	0.540	-0.630	1.271	0.288	0.224
marketing_online_old[60]	0.411	0.547	-0.583	1.389	0.275	0.211
marketing_online_old[61]	0.400	0.533	-0.514	1.401	0.272	0.209
marketing_online_old[62]	0.294	0.511	-0.647	1.231	0.264	0.204
marketing_online_old[63]	0.278	0.550	-0.873	1.130	0.268	0.204
marketing_online_old[64]	0.284	0.543	-0.682	1.203	0.292	0.227
marketing_online_old[65]	0.291	0.589	-0.728	1.248	0.317	0.247
marketing_online_old[66]	0.278	0.598	-0.805	1.285	0.305	0.235
marketing_online_old[67]	0.262	0.532	-0.724	1.138	0.281	0.218
marketing_online_old[68]	0.223	0.527	-0.675	1.140	0.282	0.219
marketing_online_old[69]	0.181	0.562	-0.764	1.195	0.307	0.240
marketing_online_old[70]	0.253	0.551	-0.725	1.123	0.299	0.233
marketing_online_old[71]	0.427	0.521	-0.520	1.332	0.278	0.216
marketing_online_old[72]	0.537	0.507	-0.382	1.458	0.259	0.199
marketing_online_old[73]	1.033	0.283	0.486	1.561	0.018	0.013
marketing_online_old[74]	1.000	0.282	0.453	1.495	0.020	0.014
marketing_online_old[75]	-0.162	0.723	-1.564	1.002	0.369	0.284
marketing_online_old[76]	-0.286	0.839	-2.093	1.018	0.428	0.329
marketing_online_old[77]	-0.265	0.807	-1.829	1.054	0.409	0.314
marketing_online_old[78]	-0.228	0.755	-1.741	1.010	0.370	0.283
marketing_online_old[79]	-0.234	0.800	-1.800	0.967	0.392	0.299
marketing_online_old[80]	-0.273	0.808	-1.887	0.949	0.407	0.312
marketing_online_old[81]	-0.284	0.792	-1.788	1.054	0.413	0.319

marketing_online_old[82]	-0.270	0.797	-1.793	1.125	0.416	0.321
marketing_online_old[83]	-0.251	0.813	-1.817	1.232	0.419	0.323
marketing_online_old[84]	-0.235	0.756	-1.671	1.110	0.402	0.312
marketing_online_old[85]	-0.233	0.785	-1.912	0.908	0.415	0.321
marketing_online_old[86]	-0.500	0.957	-2.353	0.987	0.493	0.379
marketing_online_old[87]	-0.296	0.847	-1.938	1.042	0.446	0.345
marketing_online_old[88]	-0.308	0.812	-1.918	0.964	0.410	0.315
marketing_online_old[89]	-0.279	0.782	-1.861	0.965	0.378	0.288
marketing_online_old[90]	-0.301	0.751	-1.759	0.908	0.365	0.278
marketing_online_old[91]	-0.362	0.736	-1.774	0.796	0.364	0.279
marketing_online_old[92]	-0.413	0.759	-1.770	0.854	0.373	0.285
marketing_online_old[93]	-0.352	0.815	-1.961	0.904	0.380	0.288
marketing_online_old[94]	-0.330	0.840	-1.984	1.062	0.419	0.321
marketing_online_old[95]	-0.381	0.910	-2.155	1.167	0.450	0.344
marketing_online_old[96]	-0.379	0.939	-2.064	1.319	0.475	0.365
marketing_online_old[97]	-0.368	0.932	-2.292	1.083	0.462	0.353
marketing_online_old[98]	-0.374	0.945	-2.334	1.175	0.467	0.357
marketing_online_old[99]	-0.419	0.981	-2.490	1.178	0.498	0.383
marketing_online_old[100]	-0.473	1.013	-2.418	1.306	0.511	0.392
marketing_online_old[101]	-0.526	1.018	-2.682	1.023	0.497	0.379
marketing_online_old[102]	-0.538	1.013	-2.408	1.381	0.513	0.394
marketing_online_old[103]	-0.495	1.025	-2.532	1.283	0.522	0.402
other_products[0]	0.891	0.405	0.174	1.622	0.109	0.079
other_products[1]	0.988	0.428	0.096	1.738	0.083	0.060
other_products[2]	0.796	0.655	-0.336	1.999	0.230	0.169
other_products[3]	0.805	0.628	-0.547	1.873	0.245	0.182
other_products[4]	0.866	0.574	-0.453	1.878	0.218	0.161
other_products[5]	0.889	0.682	-0.331	2.262	0.211	0.154
other_products[6]	0.917	0.595	-0.168	2.016	0.163	0.118
other_products[7]	0.890	0.534	-0.179	1.777	0.163	0.118
other_products[8]	0.771	0.524	-0.167	1.826	0.216	0.161
other_products[9]	0.791	0.507	-0.191	1.717	0.213	0.159
other_products[10]	0.869	0.459	0.058	1.696	0.162	0.119

other_products[11]	0.923	0.397	0.119	1.589	0.092	0.066
other_products[12]	0.857	0.402	0.112	1.574	0.102	0.073
other_products[13]	0.789	0.484	-0.003	1.776	0.185	0.137
other_products[14]	0.855	0.441	-0.028	1.623	0.134	0.102
other_products[15]	0.916	0.425	0.136	1.665	0.086	0.061
other_products[16]	0.894	0.489	-0.031	1.697	0.112	0.080
other_products[17]	0.914	0.413	0.057	1.643	0.090	0.065
other_products[18]	0.948	0.469	0.002	1.722	0.075	0.053
other_products[19]	0.889	0.444	0.058	1.675	0.072	0.051
other_products[20]	0.747	0.482	-0.268	1.491	0.186	0.137
other_products[21]	0.518	0.690	-0.687	1.758	0.219	0.160
other_products[22]	0.669	0.619	-0.388	1.781	0.219	0.161
other_products[23]	0.724	0.658	-0.606	1.713	0.238	0.175
other_products[24]	0.742	0.575	-0.425	1.642	0.194	0.142
other_products[25]	0.754	0.558	-0.248	1.681	0.182	0.133
other_products[26]	0.745	0.513	-0.435	1.626	0.165	0.121
other_products[27]	0.762	0.584	-0.458	1.814	0.186	0.136
other_products[28]	0.740	0.636	-0.804	1.644	0.295	0.223
other_products[29]	0.761	0.556	-0.357	1.660	0.271	0.207
other_products[30]	0.753	0.580	-0.337	1.787	0.268	0.203
other_products[31]	0.721	0.616	-0.384	1.875	0.262	0.196
other_products[32]	0.688	0.728	-0.627	1.825	0.289	0.214
other_products[33]	0.713	0.730	-0.912	1.809	0.282	0.209
other_products[34]	0.774	0.595	-0.333	1.692	0.197	0.144
other_products[35]	0.816	0.475	-0.011	1.665	0.109	0.078
other_products[36]	0.809	0.426	-0.040	1.562	0.127	0.092
other_products[37]	0.779	0.477	-0.259	1.564	0.195	0.145
other_products[38]	0.788	0.507	-0.275	1.723	0.202	0.150
other_products[39]	0.753	0.604	-0.709	1.702	0.226	0.167
other_products[40]	0.768	0.521	-0.243	1.680	0.195	0.144
other_products[41]	0.834	0.489	-0.190	1.610	0.173	0.127
other_products[42]	0.872	0.471	-0.031	1.670	0.163	0.120
other_products[43]	0.907	0.423	0.151	1.732	0.120	0.087
other_products[44]	0.904	0.404	0.097	1.607	0.091	0.066

other_products[45]	0.875	0.440	0.073	1.688	0.099	0.071
other_products[46]	0.873	0.466	0.025	1.723	0.127	0.092
other_products[47]	0.928	0.462	-0.095	1.659	0.127	0.092
other_products[48]	1.125	0.582	0.051	2.352	0.260	0.196
other_products[49]	1.241	0.622	0.259	2.844	0.298	0.227
other_products[50]	1.115	0.493	0.126	1.933	0.118	0.087
other_products[51]	0.946	0.586	-0.178	1.985	0.138	0.099
other_products[52]	0.946	0.529	-0.146	1.832	0.128	0.092
other_products[53]	1.009	0.435	0.113	1.684	0.091	0.065
other_products[54]	0.986	0.455	0.060	1.737	0.094	0.068
other_products[55]	0.899	0.476	-0.047	1.705	0.106	0.076
other_products[56]	0.908	0.469	0.044	1.780	0.107	0.077
other_products[57]	0.933	0.443	0.101	1.752	0.094	0.068
other_products[58]	0.865	0.476	-0.194	1.599	0.170	0.125
other_products[59]	0.840	0.482	-0.103	1.673	0.145	0.106
other_products[60]	0.841	0.517	-0.211	1.658	0.133	0.096
other_products[61]	0.783	0.521	-0.095	1.653	0.138	0.099
other_products[62]	0.761	0.538	-0.425	1.640	0.196	0.144
other_products[63]	0.777	0.564	-0.353	1.738	0.226	0.168
other_products[64]	0.860	0.465	-0.009	1.669	0.161	0.118
other_products[65]	0.958	0.433	0.147	1.772	0.108	0.078
other_products[66]	0.861	0.593	-0.505	1.762	0.237	0.176
other_products[67]	0.698	0.845	-0.930	2.300	0.346	0.258
other_products[68]	0.717	0.621	-0.817	1.713	0.242	0.180
other_products[69]	0.773	0.531	-0.251	1.624	0.209	0.155
other_products[70]	0.760	0.564	-0.580	1.536	0.207	0.153
other_products[71]	0.756	0.505	-0.183	1.646	0.137	0.099
other_products[72]	0.752	0.518	-0.169	1.587	0.148	0.107
other_products[73]	0.485	0.815	-1.102	1.898	0.155	0.111
other_products[74]	0.459	0.851	-1.154	1.994	0.167	0.120
other_products[75]	0.052	0.656	-1.357	1.203	0.244	0.180
other_products[76]	0.046	0.716	-1.250	1.446	0.378	0.293
other_products[77]	0.035	0.736	-1.279	1.472	0.377	0.290
other_products[78]	0.016	0.696	-0.979	1.587	0.364	0.281

other_products[79]	0.143	0.658	-0.916	1.543	0.335	0.258
other_products[80]	0.203	0.674	-0.842	1.607	0.350	0.270
other_products[81]	0.210	0.658	-0.839	1.587	0.343	0.265
other_products[82]	0.240	0.666	-0.744	1.655	0.343	0.264
other_products[83]	0.251	0.647	-0.762	1.515	0.312	0.237
other_products[84]	0.274	0.605	-0.785	1.386	0.292	0.222
other_products[85]	0.291	0.544	-0.746	1.316	0.255	0.193
other_products[86]	-0.040	0.766	-1.401	1.465	0.396	0.306
other_products[87]	0.099	0.674	-1.106	1.391	0.365	0.284
other_products[88]	0.030	0.783	-1.633	1.458	0.423	0.330
other_products[89]	0.066	0.690	-1.184	1.311	0.379	0.296
other_products[90]	0.091	0.695	-1.128	1.422	0.362	0.279
other_products[91]	0.116	0.708	-1.129	1.518	0.368	0.284
other_products[92]	0.119	0.712	-0.976	1.605	0.386	0.300
other_products[93]	0.084	0.707	-0.996	1.599	0.388	0.303
other_products[94]	0.059	0.732	-1.079	1.557	0.393	0.306
other_products[95]	0.055	0.767	-1.248	1.481	0.407	0.315
other_products[96]	0.040	0.806	-1.369	1.585	0.429	0.333
other_products[97]	0.041	0.805	-1.263	1.770	0.423	0.327
other_products[98]	-0.006	0.822	-1.515	1.579	0.450	0.351
other_products[99]	0.001	0.845	-1.402	1.683	0.470	0.368
other_products[100]	0.008	0.850	-1.344	1.722	0.464	0.362
other_products[101]	-0.078	0.858	-1.438	1.656	0.466	0.363
other_products[102]	-0.113	0.891	-1.499	1.686	0.484	0.377
other_products[103]	-0.029	0.857	-1.599	1.530	0.474	0.370
competition[0]	0.267	0.598	-0.782	1.506	0.276	0.209
competition[1]	0.255	0.626	-0.855	1.503	0.226	0.166
competition[2]	0.576	0.930	-0.828	2.432	0.506	0.394
competition[3]	0.611	1.016	-1.072	2.784	0.533	0.412
competition[4]	0.412	0.789	-0.816	1.992	0.395	0.303
competition[5]	0.226	0.728	-0.803	1.895	0.385	0.298
competition[6]	0.113	0.756	-1.042	1.765	0.413	0.322
competition[7]	0.169	0.801	-1.096	1.915	0.415	0.320
competition[8]	0.276	0.776	-0.948	1.713	0.464	0.370

competition[9]	0.295	0.686	-0.822	1.578	0.386	0.303
competition[10]	0.276	0.622	-0.648	1.603	0.295	0.224
competition[11]	0.337	0.641	-0.662	1.437	0.215	0.158
competition[12]	0.432	0.705	-0.641	1.983	0.313	0.236
competition[13]	0.514	0.708	-0.609	1.840	0.325	0.246
competition[14]	0.383	0.632	-0.591	1.619	0.229	0.171
competition[15]	0.149	0.585	-0.946	1.236	0.146	0.127
competition[16]	0.053	0.561	-0.843	1.222	0.129	0.093
competition[17]	0.115	0.540	-0.754	1.354	0.125	0.090
competition[18]	0.290	0.608	-0.792	1.409	0.129	0.093
competition[19]	0.391	0.794	-0.837	1.972	0.270	0.224
competition[20]	0.298	0.981	-1.187	2.550	0.495	0.380
competition[21]	-0.223	0.985	-2.096	1.712	0.468	0.356
competition[22]	-0.080	0.856	-1.448	1.767	0.469	0.366
competition[23]	0.091	0.832	-1.055	1.928	0.479	0.378
competition[24]	0.157	0.805	-1.215	1.642	0.466	0.369
competition[25]	0.250	0.769	-0.919	1.873	0.421	0.329
competition[26]	0.227	0.815	-1.174	1.888	0.425	0.328
competition[27]	0.261	0.891	-0.979	2.297	0.503	0.395
competition[28]	0.321	0.980	-1.104	2.416	0.610	0.492
competition[29]	0.362	1.120	-1.019	3.016	0.672	0.537
competition[30]	0.452	1.148	-1.055	3.158	0.670	0.531
competition[31]	0.463	0.933	-0.888	2.327	0.542	0.429
competition[32]	0.423	0.854	-0.708	2.332	0.481	0.378
competition[33]	0.380	0.788	-0.657	2.245	0.424	0.330
competition[34]	0.286	0.662	-0.806	1.647	0.337	0.259
competition[35]	0.177	0.633	-0.963	1.414	0.303	0.230
competition[36]	0.266	0.601	-0.939	1.310	0.310	0.239
competition[37]	0.347	0.644	-0.737	1.643	0.348	0.271
competition[38]	0.359	0.661	-0.727	1.614	0.358	0.278
competition[39]	0.364	0.751	-0.844	1.908	0.408	0.318
competition[40]	0.355	0.700	-0.783	1.788	0.389	0.305
competition[41]	0.336	0.711	-0.684	1.989	0.391	0.305
competition[42]	0.314	0.713	-0.727	1.771	0.407	0.321

competition[43]	0.246	0.708	-0.809	1.841	0.369	0.285
competition[44]	0.228	0.741	-1.134	1.705	0.342	0.259
competition[45]	0.295	0.735	-0.913	1.942	0.346	0.263
competition[46]	0.353	0.736	-0.753	2.000	0.343	0.259
competition[47]	0.260	0.595	-0.796	1.341	0.156	0.113
competition[48]	-0.042	0.623	-1.198	1.113	0.266	0.199
competition[49]	-0.233	0.777	-1.965	1.120	0.427	0.333
competition[50]	0.010	0.575	-0.944	1.264	0.199	0.146
competition[51]	0.210	0.590	-0.787	1.357	0.142	0.117
competition[52]	0.123	0.539	-0.797	1.296	0.123	0.138
competition[53]	-0.005	0.524	-1.057	0.958	0.143	0.104
competition[54]	0.081	0.572	-0.956	1.160	0.235	0.175
competition[55]	0.286	0.626	-0.692	1.569	0.221	0.162
competition[56]	0.425	0.654	-0.632	1.792	0.206	0.150
competition[57]	0.483	0.707	-0.590	1.944	0.231	0.169
competition[58]	0.442	0.600	-0.563	1.530	0.305	0.235
competition[59]	0.216	0.500	-0.592	1.200	0.258	0.199
competition[60]	0.070	0.543	-0.834	1.174	0.259	0.197
competition[61]	0.116	0.589	-0.869	1.304	0.306	0.236
competition[62]	0.299	0.755	-0.777	1.823	0.458	0.367
competition[63]	0.364	0.793	-0.720	2.015	0.479	0.383
competition[64]	0.249	0.594	-0.672	1.354	0.318	0.247
competition[65]	0.199	0.513	-0.708	1.181	0.198	0.146
competition[66]	0.327	0.633	-0.693	1.697	0.324	0.249
competition[67]	0.491	0.904	-0.841	2.581	0.477	0.369
competition[68]	0.499	0.839	-0.711	2.176	0.473	0.371
competition[69]	0.455	0.719	-0.650	1.928	0.407	0.320
competition[70]	0.345	0.648	-0.705	1.675	0.361	0.283
competition[71]	0.098	0.537	-0.952	1.040	0.204	0.151
competition[72]	-0.089	0.555	-1.136	0.898	0.170	0.124
competition[73]	-0.545	1.050	-2.627	1.532	0.244	0.175
competition[74]	-0.632	1.152	-2.598	1.771	0.275	0.198
competition[75]	0.297	0.632	-0.872	1.467	0.183	0.132
competition[76]	0.762	0.701	-0.471	2.026	0.200	0.157

competition[77]	0.807	0.720	-0.485	2.191	0.202	0.161
competition[78]	0.758	0.580	-0.276	1.792	0.211	0.155
competition[79]	0.682	0.554	-0.305	1.713	0.223	0.166
competition[80]	0.689	0.595	-0.342	1.819	0.231	0.171
competition[81]	0.720	0.616	-0.596	1.792	0.239	0.177
competition[82]	0.724	0.595	-0.381	1.932	0.214	0.157
competition[83]	0.736	0.595	-0.410	1.811	0.188	0.137
competition[84]	0.683	0.565	-0.299	1.793	0.195	0.143
competition[85]	0.699	0.533	-0.322	1.737	0.177	0.137
competition[86]	0.921	0.809	-0.533	2.644	0.298	0.242
competition[87]	0.923	0.729	-0.387	2.448	0.299	0.223
competition[88]	0.924	0.773	-0.480	2.499	0.274	0.202
competition[89]	0.899	0.680	-0.343	2.250	0.221	0.161
competition[90]	0.924	0.644	-0.258	2.284	0.254	0.189
competition[91]	0.958	0.653	-0.135	2.196	0.232	0.171
competition[92]	1.005	0.633	-0.243	2.177	0.180	0.137
competition[93]	0.949	0.673	-0.295	2.240	0.247	0.182
competition[94]	0.895	0.776	-0.547	2.267	0.288	0.212
competition[95]	0.930	0.854	-0.764	2.451	0.245	0.193
competition[96]	0.944	0.901	-0.790	2.525	0.244	0.176
competition[97]	0.886	0.914	-0.804	2.525	0.251	0.182
competition[98]	0.804	0.938	-0.953	2.492	0.305	0.223
competition[99]	0.814	1.013	-1.229	2.699	0.340	0.249
competition[100]	0.888	1.024	-1.184	2.881	0.344	0.252
competition[101]	1.011	0.994	-0.988	2.879	0.263	0.215
competition[102]	1.044	1.025	-0.969	2.999	0.283	0.226
competition[103]	0.989	0.973	-0.802	2.955	0.332	0.256
tgt_pred[0]	1.036	1.446	-2.700	3.255	0.638	0.480
tgt_pred[1]	1.292	1.331	-1.348	4.027	0.325	0.234
tgt_pred[2]	0.437	2.118	-3.623	4.653	1.201	0.945
tgt_pred[3]	0.409	2.283	-4.946	4.164	1.264	0.988
tgt_pred[4]	0.792	1.794	-2.842	3.931	0.891	0.682
tgt_pred[5]	1.295	1.934	-2.693	5.366	0.933	0.710
tgt_pred[6]	1.534	1.892	-2.147	4.813	0.976	0.752

tgt_pred[7]	1.338	1.974	-2.167	5.776	1.027	0.793
tgt_pred[8]	0.907	1.842	-2.831	4.407	1.123	0.901
tgt_pred[9]	0.877	1.649	-2.555	3.770	0.946	0.746
tgt_pred[10]	1.048	1.457	-1.490	4.348	0.762	0.589
tgt_pred[11]	0.887	1.454	-1.568	4.170	0.469	0.343
tgt_pred[12]	0.549	1.707	-3.126	3.424	0.799	0.606
tgt_pred[13]	0.429	1.550	-2.585	2.873	0.746	0.568
tgt_pred[14]	0.718	1.399	-1.865	3.061	0.442	0.322
tgt_pred[15]	1.289	1.215	-1.528	3.063	0.247	0.177
tgt_pred[16]	1.553	1.178	-0.970	4.030	0.242	0.192
tgt_pred[17]	1.429	1.182	-0.989	3.708	0.322	0.281
tgt_pred[18]	0.986	1.374	-2.298	3.313	0.263	0.188
tgt_pred[19]	0.836	1.977	-2.418	4.156	0.590	0.428
tgt_pred[20]	0.995	2.335	-6.066	3.803	1.177	0.903
tgt_pred[21]	2.033	1.978	-1.881	5.633	1.014	0.780
tgt_pred[22]	1.707	2.054	-2.777	5.124	1.064	0.821
tgt_pred[23]	1.507	1.983	-2.725	4.737	1.130	0.890
tgt_pred[24]	1.314	1.815	-2.297	4.395	1.058	0.839
tgt_pred[25]	1.166	1.759	-2.760	4.146	0.970	0.758
tgt_pred[26]	1.110	1.970	-2.920	4.977	1.002	0.770
tgt_pred[27]	0.931	2.249	-4.684	4.380	1.179	0.911
tgt_pred[28]	0.816	2.536	-4.856	5.072	1.574	1.269
tgt_pred[29]	0.655	2.830	-6.570	4.518	1.691	1.348
tgt_pred[30]	0.465	2.797	-5.655	5.683	1.621	1.282
tgt_pred[31]	0.509	2.068	-3.992	3.017	1.263	1.013
tgt_pred[32]	0.589	1.941	-4.007	3.058	1.148	0.913
tgt_pred[33]	0.643	1.893	-4.172	3.051	1.004	0.778
tgt_pred[34]	0.847	1.495	-2.885	2.969	0.750	0.575
tgt_pred[35]	1.123	1.483	-2.306	3.554	0.600	0.446
tgt_pred[36]	0.863	1.467	-1.446	4.010	0.766	0.592
tgt_pred[37]	0.568	1.597	-2.459	3.326	0.886	0.694
tgt_pred[38]	0.629	1.531	-2.130	2.975	0.926	0.741
tgt_pred[39]	0.527	1.734	-2.479	3.524	1.015	0.805

tgt_pred[40]	0.619	1.618	-2.648	2.990	0.960	0.764
tgt_pred[41]	0.750	1.566	-2.194	3.617	0.913	0.723
tgt_pred[42]	0.916	1.841	-2.980	4.104	1.077	0.854
tgt_pred[43]	1.083	1.836	-2.931	4.153	0.983	0.763
tgt_pred[44]	1.068	1.908	-3.290	4.271	0.887	0.672
tgt_pred[45]	0.889	1.689	-2.880	3.638	0.787	0.596
tgt_pred[46]	0.794	1.740	-3.123	3.482	0.818	0.620
tgt_pred[47]	1.016	1.351	-1.707	3.487	0.422	0.307
tgt_pred[48]	1.797	1.831	-1.100	6.158	0.946	0.729
tgt_pred[49]	2.538	2.189	-0.184	7.860	1.326	1.062
tgt_pred[50]	1.889	1.464	-0.653	5.374	0.523	0.399
tgt_pred[51]	1.316	1.515	-2.013	4.228	0.340	0.244
tgt_pred[52]	1.518	1.373	-1.321	4.290	0.306	0.220
tgt_pred[53]	1.667	1.163	-0.763	3.762	0.366	0.267
tgt_pred[54]	1.456	1.231	-0.854	3.946	0.322	0.232
tgt_pred[55]	1.109	1.452	-1.581	3.993	0.336	0.242
tgt_pred[56]	0.727	1.260	-1.821	2.894	0.363	0.263
tgt_pred[57]	0.492	1.380	-2.552	2.383	0.388	0.281
tgt_pred[58]	0.592	1.416	-2.424	2.787	0.764	0.595
tgt_pred[59]	1.163	1.251	-1.770	3.087	0.669	0.519
tgt_pred[60]	1.542	1.344	-1.259	3.836	0.563	0.420
tgt_pred[61]	1.258	1.404	-1.420	3.786	0.646	0.488
tgt_pred[62]	0.819	1.788	-2.733	3.833	1.060	0.844
tgt_pred[63]	0.740	1.906	-3.117	3.519	1.157	0.927
tgt_pred[64]	0.995	1.289	-1.542	2.804	0.710	0.555
tgt_pred[65]	1.232	1.333	-1.341	3.403	0.597	0.450
tgt_pred[66]	0.982	1.660	-2.412	4.006	0.916	0.716
tgt_pred[67]	0.434	2.359	-6.535	3.312	1.242	0.961
tgt_pred[68]	0.329	2.042	-3.686	3.895	1.157	0.910
tgt_pred[69]	0.466	1.763	-3.151	3.395	1.036	0.822
tgt_pred[70]	0.625	1.728	-2.304	3.514	0.971	0.762
tgt_pred[71]	1.279	1.238	-1.068	3.882	0.482	0.357
tgt_pred[72]	1.725	1.356	-1.056	4.173	0.467	0.342
tgt_pred[73]	2.876	1.812	0.066	6.459	0.383	0.275

tgt_pred[74]	3.008	1.922	-0.239	6.983	0.415	0.297
tgt_pred[75]	-0.149	1.545	-3.060	2.046	0.602	0.446
tgt_pred[76]	-1.178	1.580	-4.162	1.875	0.599	0.442
tgt_pred[77]	-1.275	1.728	-5.049	1.401	0.677	0.502
tgt_pred[78]	-1.232	1.396	-4.007	0.884	0.537	0.397
tgt_pred[79]	-0.983	1.255	-3.513	1.120	0.353	0.300
tgt_pred[80]	-0.875	1.311	-3.233	1.586	0.315	0.270
tgt_pred[81]	-0.936	1.309	-3.510	1.262	0.389	0.282
tgt_pred[82]	-0.947	1.236	-3.395	0.979	0.270	0.193
tgt_pred[83]	-0.935	1.388	-3.347	1.613	0.334	0.297
tgt_pred[84]	-0.801	1.324	-3.264	1.539	0.428	0.313
tgt_pred[85]	-0.919	1.454	-4.265	1.761	0.516	0.379
tgt_pred[86]	-1.917	1.720	-5.809	1.096	0.762	0.573
tgt_pred[87]	-1.579	1.846	-5.330	1.602	0.969	0.749
tgt_pred[88]	-1.598	1.914	-5.566	1.743	0.902	0.684
tgt_pred[89]	-1.452	1.693	-4.760	1.157	0.732	0.549
tgt_pred[90]	-1.471	1.647	-4.810	1.133	0.814	0.623
tgt_pred[91]	-1.618	1.717	-5.304	1.176	0.788	0.596
tgt_pred[92]	-1.676	1.471	-4.422	0.873	0.630	0.472
tgt_pred[93]	-1.609	1.602	-4.570	1.071	0.736	0.556
tgt_pred[94]	-1.555	1.775	-4.854	1.420	0.886	0.678
tgt_pred[95]	-1.621	1.842	-5.471	1.134	0.786	0.617
tgt_pred[96]	-1.655	1.921	-4.963	2.540	0.588	0.534
tgt_pred[97]	-1.551	1.896	-5.206	2.002	0.559	0.439
tgt_pred[98]	-1.480	1.893	-5.558	1.300	0.512	0.579
tgt_pred[99]	-1.559	1.997	-6.282	1.997	0.558	0.502
tgt_pred[100]	-1.688	2.133	-5.977	2.099	0.660	0.519
tgt_pred[101]	-2.069	2.210	-5.875	2.554	0.595	0.519
tgt_pred[102]	-2.212	2.309	-6.904	1.884	0.654	0.534
tgt_pred[103]	-1.973	2.265	-6.679	1.728	0.785	0.576
tgt_sigma	0.407	0.274	0.016	0.893	0.075	0.054
beta_price_to_promo	-0.845	0.418	-1.615	-0.124	0.074	0.053
beta_offline_to_online	0.495	0.408	0.004	1.228	0.086	0.061
beta_seasonality_holidays_to_online	-0.697	0.454	-1.372	-0.036	0.284	0.229

beta_covid_new_cases_to_online	-0.647	0.504	-1.576	-0.003	0.190	0.147
beta_promo_to_competition	-0.771	0.560	-1.686	-0.028	0.077	0.055
beta_online_to_competition	-0.754	0.553	-1.728	-0.008	0.110	0.085
beta_distribution_to_competition	-0.626	0.428	-1.402	-0.001	0.076	0.064
beta_seasonality_holidays_to_tgt	-0.766	0.486	-1.609	-0.011	0.053	0.038
beta_covid_new_cases_to_tgt	-0.601	0.536	-1.533	-0.003	0.085	0.061
beta_distribution_to_tgt	0.753	0.491	0.013	1.634	0.055	0.039
beta_competition_to_tgt	-0.849	0.632	-1.857	-0.007	0.184	0.133
beta_online_to_tgt	0.794	0.657	0.001	1.959	0.215	0.157
beta_price_to_tgt	-0.660	0.483	-1.558	-0.022	0.076	0.070
beta_promo_to_tgt	0.771	0.558	0.009	1.772	0.065	0.046
beta_otherprod_to_tgt	0.935	0.541	0.004	1.831	0.118	0.085
beta_offline_to_tgt	0.972	0.693	0.011	2.290	0.129	0.092
beta_online_spend[0]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[1]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[2]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[3]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[4]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[5]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[6]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[7]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[8]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[9]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[10]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[11]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[12]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[13]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[14]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[15]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[16]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[17]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[18]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[19]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[20]	1.000	0.000	1.000	1.000	0.000	0.000

beta_offline_spend[86]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[87]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[88]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[89]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[90]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[91]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[92]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[93]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[94]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[95]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[96]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[97]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[98]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[99]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[100]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[101]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[102]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[103]	0.000	0.000	0.000	0.000	0.000	0.000
alpha_offline	0.492	0.122	0.247	0.685	0.017	0.012
theta_offline	0.659	0.386	0.063	1.323	0.093	0.067
alpha_online	0.470	0.192	0.132	0.818	0.016	0.011
theta_online	0.242	0.141	0.001	0.462	0.015	0.010
marketing_offline[0]	0.099	0.336	-0.516	0.711	0.079	0.057
marketing_offline[1]	0.083	0.586	-1.009	1.234	0.294	0.225
marketing_offline[2]	-0.068	0.701	-1.226	1.334	0.395	0.310
marketing_offline[3]	-0.067	0.675	-1.133	1.275	0.365	0.284
marketing_offline[4]	0.040	0.558	-0.986	1.071	0.274	0.210
marketing_offline[5]	0.146	0.540	-0.738	1.256	0.240	0.181
marketing_offline[6]	0.204	0.585	-0.827	1.484	0.194	0.142
marketing_offline[7]	0.112	0.442	-0.631	1.017	0.100	0.072
marketing_offline[8]	-0.009	0.310	-0.621	0.486	0.061	0.043
marketing_offline[9]	-0.031	0.287	-0.517	0.608	0.030	0.021
marketing_offline[10]	-0.018	0.283	-0.568	0.518	0.035	0.025
marketing_offline[11]	-0.025	0.289	-0.479	0.623	0.053	0.038

marketing_offline[12]	-0.093	0.289	-0.598	0.480	0.044	0.032
marketing_offline[13]	-0.169	0.386	-0.941	0.517	0.096	0.070
marketing_offline[14]	-0.056	0.459	-0.949	0.805	0.166	0.122
marketing_offline[15]	0.101	0.484	-0.947	0.850	0.209	0.157
marketing_offline[16]	0.112	0.430	-0.647	0.844	0.194	0.146
marketing_offline[17]	0.041	0.439	-0.695	0.868	0.219	0.167
marketing_offline[18]	-0.056	0.592	-1.344	0.919	0.229	0.170
marketing_offline[19]	-0.039	0.547	-1.041	0.955	0.150	0.108
marketing_offline[20]	0.003	0.451	-0.853	0.918	0.147	0.107
marketing_offline[21]	0.099	0.447	-0.683	0.910	0.141	0.103
marketing_offline[22]	0.113	0.445	-0.726	0.890	0.121	0.087
marketing_offline[23]	0.105	0.462	-0.736	0.940	0.196	0.147
marketing_offline[24]	0.075	0.392	-0.655	0.721	0.172	0.129
marketing_offline[25]	0.033	0.394	-0.712	0.730	0.141	0.104
marketing_offline[26]	0.046	0.502	-0.839	0.965	0.108	0.078
marketing_offline[27]	0.058	0.493	-0.806	0.912	0.110	0.079
marketing_offline[28]	0.020	0.430	-0.767	0.866	0.169	0.125
marketing_offline[29]	-0.004	0.460	-0.919	0.711	0.170	0.126
marketing_offline[30]	-0.057	0.500	-0.985	0.819	0.190	0.141
marketing_offline[31]	-0.070	0.488	-0.798	0.962	0.220	0.166
marketing_offline[32]	-0.054	0.487	-0.938	0.846	0.226	0.171
marketing_offline[33]	-0.063	0.393	-0.791	0.668	0.137	0.101
marketing_offline[34]	-0.007	0.317	-0.606	0.563	0.060	0.043
marketing_offline[35]	0.062	0.321	-0.529	0.664	0.049	0.035
marketing_offline[36]	-0.038	0.290	-0.559	0.530	0.035	0.025
marketing_offline[37]	-0.113	0.267	-0.592	0.428	0.030	0.021
marketing_offline[38]	-0.102	0.286	-0.648	0.421	0.032	0.023
marketing_offline[39]	-0.082	0.334	-0.732	0.562	0.046	0.032
marketing_offline[40]	-0.045	0.320	-0.673	0.507	0.041	0.029
marketing_offline[41]	-0.031	0.279	-0.553	0.473	0.032	0.023
marketing_offline[42]	0.012	0.279	-0.501	0.512	0.043	0.031
marketing_offline[43]	0.060	0.305	-0.425	0.724	0.053	0.038
marketing_offline[44]	0.058	0.356	-0.523	0.767	0.059	0.042
marketing_offline[45]	0.014	0.346	-0.554	0.689	0.049	0.035

marketing_offline[46]	-0.010	0.333	-0.685	0.544	0.048	0.034
marketing_offline[47]	0.029	0.403	-0.730	0.806	0.111	0.081
marketing_offline[48]	0.196	0.601	-0.881	1.235	0.340	0.267
marketing_offline[49]	0.317	0.664	-0.627	1.614	0.396	0.315
marketing_offline[50]	0.190	0.604	-0.994	1.124	0.319	0.247
marketing_offline[51]	0.125	0.542	-0.919	1.114	0.228	0.170
marketing_offline[52]	0.154	0.478	-0.692	1.200	0.181	0.133
marketing_offline[53]	0.197	0.534	-0.921	1.123	0.233	0.175
marketing_offline[54]	0.126	0.591	-1.198	1.004	0.312	0.242
marketing_offline[55]	0.035	0.553	-0.979	1.122	0.248	0.187
marketing_offline[56]	-0.055	0.483	-0.902	0.848	0.215	0.162
marketing_offline[57]	-0.084	0.496	-0.899	0.856	0.162	0.118
marketing_offline[58]	-0.069	0.367	-0.709	0.648	0.078	0.056
marketing_offline[59]	0.050	0.271	-0.425	0.554	0.028	0.020
marketing_offline[60]	0.121	0.280	-0.456	0.572	0.045	0.032
marketing_offline[61]	0.076	0.291	-0.465	0.622	0.043	0.030
marketing_offline[62]	-0.008	0.291	-0.512	0.571	0.047	0.034
marketing_offline[63]	-0.010	0.304	-0.609	0.514	0.076	0.055
marketing_offline[64]	0.040	0.257	-0.478	0.483	0.030	0.021
marketing_offline[65]	0.032	0.409	-0.651	0.941	0.089	0.064
marketing_offline[66]	-0.069	0.453	-0.962	0.723	0.109	0.078
marketing_offline[67]	-0.162	0.494	-1.179	0.701	0.116	0.084
marketing_offline[68]	-0.152	0.382	-0.911	0.521	0.061	0.043
marketing_offline[69]	-0.128	0.284	-0.667	0.411	0.039	0.028
marketing_offline[70]	-0.053	0.304	-0.626	0.533	0.040	0.029
marketing_offline[71]	0.065	0.324	-0.538	0.678	0.041	0.029
marketing_offline[72]	0.112	0.306	-0.425	0.710	0.046	0.033
marketing_offline[73]	0.056	0.278	-0.446	0.580	0.025	0.018
marketing_offline[74]	0.045	0.296	-0.521	0.575	0.028	0.020
marketing_offline[75]	0.059	0.316	-0.453	0.774	0.038	0.027
marketing_offline[76]	0.018	0.306	-0.512	0.583	0.035	0.025
marketing_offline[77]	-0.006	0.285	-0.554	0.475	0.027	0.019
marketing_offline[78]	0.008	0.295	-0.540	0.592	0.029	0.021

marketing_offline[79]	0.056	0.329	-0.575	0.627	0.065	0.046
marketing_offline[80]	0.040	0.342	-0.590	0.658	0.081	0.058
marketing_offline[81]	0.013	0.338	-0.551	0.663	0.074	0.053
marketing_offline[82]	0.024	0.314	-0.586	0.576	0.096	0.069
marketing_offline[83]	0.011	0.311	-0.563	0.612	0.093	0.067
marketing_offline[84]	0.031	0.326	-0.587	0.656	0.121	0.089
marketing_offline[85]	-0.006	0.326	-0.563	0.614	0.105	0.077
marketing_offline[86]	-0.047	0.327	-0.681	0.509	0.089	0.064
marketing_offline[87]	-0.069	0.322	-0.653	0.548	0.085	0.062
marketing_offline[88]	-0.064	0.322	-0.723	0.515	0.070	0.050
marketing_offline[89]	-0.020	0.312	-0.614	0.595	0.061	0.044
marketing_offline[90]	-0.043	0.311	-0.622	0.517	0.068	0.049
marketing_offline[91]	-0.057	0.326	-0.682	0.495	0.066	0.048
marketing_offline[92]	-0.047	0.317	-0.625	0.531	0.065	0.046
marketing_offline[93]	-0.019	0.313	-0.530	0.618	0.064	0.046
marketing_offline[94]	-0.008	0.306	-0.568	0.577	0.050	0.036
marketing_offline[95]	-0.007	0.303	-0.636	0.488	0.044	0.031
marketing_offline[96]	0.009	0.332	-0.578	0.624	0.045	0.032
marketing_offline[97]	0.038	0.358	-0.623	0.681	0.053	0.039
marketing_offline[98]	0.101	0.334	-0.487	0.710	0.047	0.033
marketing_offline[99]	0.106	0.327	-0.504	0.729	0.055	0.039
marketing_offline[100]	0.060	0.330	-0.550	0.685	0.076	0.055
marketing_offline[101]	0.012	0.332	-0.502	0.735	0.053	0.038
marketing_offline[102]	-0.004	0.340	-0.647	0.564	0.060	0.043
marketing_offline[103]	0.011	0.329	-0.600	0.627	0.076	0.055
marketing_online[0]	0.187	0.361	-0.455	0.793	0.181	0.138
marketing_online[1]	0.280	0.488	-0.558	1.106	0.249	0.191
marketing_online[2]	0.215	0.443	-0.519	1.048	0.225	0.173
marketing_online[3]	0.181	0.457	-0.649	0.974	0.235	0.181
marketing_online[4]	0.220	0.503	-0.696	1.092	0.262	0.202
marketing_online[5]	0.299	0.526	-0.592	1.216	0.275	0.212
marketing_online[6]	0.368	0.545	-0.604	1.272	0.259	0.197
marketing_online[7]	0.369	0.550	-0.617	1.232	0.275	0.211
marketing_online[8]	0.338	0.478	-0.530	1.168	0.260	0.202

marketing_online[9]	0.313	0.461	-0.575	1.002	0.268	0.212
marketing_online[10]	0.314	0.514	-0.576	1.198	0.297	0.235
marketing_online[11]	0.246	0.524	-0.672	1.144	0.301	0.237
marketing_online[12]	0.208	0.524	-0.662	1.129	0.313	0.250
marketing_online[13]	0.180	0.525	-0.866	0.976	0.296	0.233
marketing_online[14]	0.182	0.492	-0.759	0.955	0.256	0.198
marketing_online[15]	0.278	0.488	-0.554	1.103	0.257	0.199
marketing_online[16]	0.341	0.497	-0.465	1.302	0.280	0.220
marketing_online[17]	0.330	0.552	-0.687	1.240	0.316	0.249
marketing_online[18]	0.252	0.559	-0.583	1.443	0.323	0.255
marketing_online[19]	0.237	0.492	-0.605	1.116	0.271	0.211
marketing_online[20]	0.335	0.429	-0.423	1.065	0.215	0.165
marketing_online[21]	0.674	0.334	0.042	1.268	0.123	0.091
marketing_online[22]	0.644	0.428	-0.125	1.383	0.163	0.120
marketing_online[23]	0.491	0.461	-0.353	1.335	0.219	0.166
marketing_online[24]	0.445	0.433	-0.362	1.128	0.212	0.162
marketing_online[25]	0.366	0.444	-0.409	1.093	0.221	0.169
marketing_online[26]	0.370	0.457	-0.362	1.235	0.211	0.160
marketing_online[27]	0.365	0.463	-0.359	1.288	0.226	0.172
marketing_online[28]	0.342	0.497	-0.464	1.267	0.262	0.202
marketing_online[29]	0.341	0.492	-0.629	1.113	0.241	0.184
marketing_online[30]	0.314	0.495	-0.650	1.117	0.210	0.157
marketing_online[31]	0.288	0.422	-0.499	1.001	0.202	0.154
marketing_online[32]	0.270	0.445	-0.437	1.073	0.222	0.170
marketing_online[33]	0.280	0.461	-0.506	1.061	0.239	0.184
marketing_online[34]	0.306	0.460	-0.469	1.097	0.254	0.199
marketing_online[35]	0.334	0.479	-0.519	1.090	0.260	0.203
marketing_online[36]	0.294	0.490	-0.567	1.040	0.283	0.224
marketing_online[37]	0.247	0.508	-0.637	1.101	0.291	0.230
marketing_online[38]	0.246	0.516	-0.688	1.074	0.304	0.242
marketing_online[39]	0.268	0.530	-0.669	1.070	0.307	0.242
marketing_online[40]	0.264	0.507	-0.683	1.087	0.287	0.225
marketing_online[41]	0.264	0.535	-0.703	1.098	0.305	0.240
marketing_online[42]	0.261	0.538	-0.682	1.121	0.322	0.257

marketing_online[43]	0.272	0.533	-0.662	1.116	0.321	0.257
marketing_online[44]	0.278	0.547	-0.686	1.113	0.316	0.250
marketing_online[45]	0.257	0.561	-0.665	1.252	0.321	0.253
marketing_online[46]	0.238	0.566	-0.853	1.096	0.321	0.253
marketing_online[47]	0.230	0.529	-0.657	1.126	0.301	0.237
marketing_online[48]	0.268	0.558	-0.624	1.312	0.330	0.263
marketing_online[49]	0.345	0.639	-0.908	1.437	0.378	0.301
marketing_online[50]	0.316	0.636	-0.938	1.340	0.359	0.282
marketing_online[51]	0.289	0.623	-0.864	1.539	0.340	0.266
marketing_online[52]	0.333	0.626	-0.850	1.381	0.343	0.267
marketing_online[53]	0.368	0.622	-0.883	1.275	0.327	0.253
marketing_online[54]	0.323	0.553	-0.673	1.331	0.286	0.221
marketing_online[55]	0.261	0.518	-0.654	1.186	0.257	0.196
marketing_online[56]	0.205	0.520	-0.680	1.175	0.291	0.228
marketing_online[57]	0.169	0.551	-0.836	1.026	0.312	0.246
marketing_online[58]	0.180	0.518	-0.677	1.050	0.306	0.244
marketing_online[59]	0.280	0.499	-0.610	1.062	0.291	0.230
marketing_online[60]	0.378	0.511	-0.483	1.295	0.280	0.219
marketing_online[61]	0.407	0.510	-0.491	1.314	0.270	0.209
marketing_online[62]	0.339	0.481	-0.481	1.285	0.262	0.204
marketing_online[63]	0.282	0.501	-0.645	1.112	0.267	0.207
marketing_online[64]	0.282	0.513	-0.688	1.105	0.281	0.219
marketing_online[65]	0.288	0.532	-0.581	1.098	0.302	0.238
marketing_online[66]	0.282	0.568	-0.664	1.161	0.310	0.242
marketing_online[67]	0.272	0.520	-0.654	1.072	0.289	0.226
marketing_online[68]	0.240	0.489	-0.606	1.063	0.280	0.221
marketing_online[69]	0.197	0.511	-0.734	0.988	0.295	0.233
marketing_online[70]	0.226	0.524	-0.613	1.091	0.299	0.236
marketing_online[71]	0.354	0.489	-0.417	1.195	0.284	0.225
marketing_online[72]	0.494	0.475	-0.368	1.368	0.262	0.205
marketing_online[73]	0.845	0.286	0.268	1.321	0.109	0.081
marketing_online[74]	1.011	0.219	0.578	1.405	0.016	0.011
marketing_online[75]	0.292	0.464	-0.614	1.109	0.214	0.162
marketing_online[76]	-0.241	0.766	-1.873	0.988	0.402	0.311

marketing_online[77]	-0.270	0.799	-2.006	0.871	0.415	0.320
marketing_online[78]	-0.241	0.749	-1.804	0.849	0.383	0.295
marketing_online[79]	-0.233	0.763	-1.771	0.851	0.381	0.292
marketing_online[80]	-0.258	0.788	-1.822	0.884	0.402	0.309
marketing_online[81]	-0.281	0.779	-1.725	0.973	0.410	0.317
marketing_online[82]	-0.273	0.774	-1.688	1.077	0.413	0.320
marketing_online[83]	-0.261	0.785	-1.735	1.110	0.417	0.323
marketing_online[84]	-0.242	0.758	-1.768	1.022	0.408	0.317
marketing_online[85]	-0.234	0.749	-1.732	0.954	0.407	0.317
marketing_online[86]	-0.394	0.865	-2.116	0.894	0.457	0.354
marketing_online[87]	-0.375	0.874	-2.023	1.006	0.465	0.361
marketing_online[88]	-0.303	0.802	-1.817	0.978	0.423	0.327
marketing_online[89]	-0.288	0.774	-1.809	0.897	0.391	0.300
marketing_online[90]	-0.292	0.742	-1.824	0.761	0.371	0.284
marketing_online[91]	-0.339	0.716	-1.770	0.682	0.363	0.279
marketing_online[92]	-0.392	0.722	-1.746	0.709	0.365	0.280
marketing_online[93]	-0.377	0.770	-1.805	0.880	0.376	0.287
marketing_online[94]	-0.337	0.809	-1.792	1.036	0.404	0.310
marketing_online[95]	-0.365	0.859	-1.888	1.149	0.436	0.335
marketing_online[96]	-0.385	0.904	-2.096	1.114	0.462	0.355
marketing_online[97]	-0.371	0.912	-2.192	1.083	0.466	0.358
marketing_online[98]	-0.371	0.922	-2.224	1.128	0.464	0.356
marketing_online[99]	-0.400	0.949	-2.234	1.298	0.485	0.373
marketing_online[100]	-0.453	0.981	-2.516	1.059	0.503	0.387
marketing_online[101]	-0.503	0.998	-2.420	1.241	0.502	0.385
marketing_online[102]	-0.531	0.995	-2.518	1.132	0.506	0.389
marketing_online[103]	-0.513	1.003	-2.507	1.280	0.518	0.398

5.2.4 Change mu and sigma of distribution of coefficients in the model according to the pm.summary result above, and then change distribution of variables in the model according to the true distribution of variables in the dataset.

In [37]:

```
%%time
with pm.Model() as model_change_priors:
```

```

#####
##### Defining Mean & Sigma #####
len_df = len(data_dict['tgt'])
seasonality_holidays_mean = mean_dict['seasonality_holidays_mean']
covid_new_cases_mean = mean_dict['covid_new_cases_mean']
seasonality_holidays_sigma = sigma_dict['seasonality_holidays_sigma']
covid_new_cases_sigma = sigma_dict['covid_new_cases_sigma']
price_mean = mean_dict['price_mean']
price_sigma = sigma_dict['price_sigma']
marketing_offline_sigma = sigma_dict['marketing_offline_sigma']
marketing_offline_mean = mean_dict['marketing_offline_mean']
promo_sigma = sigma_dict['promo_sigma']
promo_mean = mean_dict['promo_mean']
distribution_sigma = sigma_dict['distribution_sigma']
distribution_mean = mean_dict['distribution_mean']
competition_sigma = sigma_dict['competition_sigma']
competition_mean = mean_dict['competition_mean']
other_products_sigma = sigma_dict['other_products_sigma']
other_products_mean = mean_dict['other_products_mean']
marketing_online_sigma = sigma_dict['marketing_online_sigma']
marketing_online_mean = mean_dict['marketing_online_mean']
tgt_mean = mean_dict['tgt_mean']

tgt_sigma = pm.HalfNormal('tgt_sigma', 1)
#####
##### Defining Beta's #####
BoundedNormal = pm.Bound(pm.Normal, upper=0)
beta_price_to_promo = BoundedNormal('beta_price_to_promo', -0.8, 0.5)
beta_seasonality_holidays_to_promo = pm.Normal(
    'beta_seasonality_holidays_to_promo', -0.3, 0.5)
beta_covid_new_cases_to_promo = pm.Normal('beta_covid_new_cases_to_promo',
    0, 0.5)
beta_offline_to_online = pm.HalfNormal('beta_offline_to_online', 0.5)
beta_seasonality_holidays_to_online = BoundedNormal(
    'beta_seasonality_holidays_to_online', -0.7, 0.5)
beta_covid_new_cases_to_online = BoundedNormal(
    'beta_covid_new_cases_to_online', -0.6, 0.5)
beta_seasonality_holidays_to_distribution = pm.Normal(
    'beta_seasonality_holidays_to_distribution', 0.3, 0.5)
beta_covid_new_cases_to_distribution = pm.Normal(
    'beta_covid_new_cases_to_distribution', -0.3, 0.5)
beta_price_to_competition = pm.Normal('beta_price_to_competition', 0, 0.8)
beta_seasonality_holidays_to_competition = pm.Normal(
    'beta_seasonality_holidays_to_competition', 0.3, 0.85)
beta_covid_new_cases_to_competition = pm.Normal(
    'beta_covid_new_cases_to_competition', 0, 0.83)
beta_promo_to_competition = BoundedNormal('beta_promo_to_competition',
    -0.8, 0.6)
beta_online_to_competition = BoundedNormal('beta_online_to_competition',
    -0.75, 0.6)
beta_distribution_to_competition = BoundedNormal(
    'beta_distribution_to_competition', -0.6, 0.5)
beta_offline_to_competition = pm.Normal('beta_offline_to_competition',
    -0.8, 0.8)
beta_price_to_otherprod = pm.Normal('beta_price_to_otherprod', -0.4, 0.7)
beta_seasonality_holidays_to_otherprod = pm.Normal(
    'beta_seasonality_holidays_to_otherprod', 0, 0.7)
beta_covid_new_cases_to_otherprod = pm.Normal(

```

```

        'beta_covid_new_cases_to_otherprod', -0.8, 0.8)
beta_promo_to_otherprod = pm.Normal('beta_promo_to_otherprod', -0.4, 0.8)
beta_online_to_otherprod = pm.Normal('beta_online_to_otherprod', 0, 0.7)
beta_offline_to_otherprod = pm.Normal('beta_offline_to_otherprod', 0.2,
                                         0.8)
beta_seasonality_holidays_to_offline = pm.Normal(
    'beta_seasonality_holidays_to_offline', -0.15, 0.7)
beta_covid_new_cases_to_offline = pm.Normal(
    'beta_covid_new_cases_to_offline', 0, 1)
beta_promo_to_offline = pm.Normal('beta_promo_to_offline', -0.2, 0.9)
beta_price_to_offline = pm.Normal('beta_price_to_offline', -0.2, 0.6)
beta_seasonality_holidays_to_tgt = BoundedNormal(
    'beta_seasonality_holidays_to_tgt', -0.8, 0.5)
beta_covid_new_cases_to_tgt = BoundedNormal('beta_covid_new_cases_to_tgt'
                                             -0.6, 0.55)
beta_distribution_to_tgt = pm.HalfNormal('beta_distribution_to_tgt', 0.5)
beta_competition_to_tgt = BoundedNormal('beta_competition_to_tgt', -0.85,
                                         0.65)
beta_online_to_tgt = pm.HalfNormal('beta_online_to_tgt', 0.7)
beta_price_to_tgt = BoundedNormal('beta_price_to_tgt', -0.7, 0.5)
beta_promo_to_tgt = pm.HalfNormal('beta_promo_to_tgt', 0.6)
beta_otherprod_to_tgt = pm.HalfNormal('beta_otherprod_to_tgt', 0.6)
beta_offline_to_tgt = pm.HalfNormal('beta_offline_to_tgt', 0.7)

seasonality_holidays_alpha = pm.Normal('seasonality_holidays_alpha', 0,
                                         1.5)
covid_new_cases_alpha = pm.Normal('covid_new_cases_alpha', 0, 1)
promo_mu = pm.Normal('promo_mu',
                     promo_mean,
                     sigma=promo_sigma,
                     shape=len_df)
price_mu = pm.Normal('price_mu',
                     price_mean,
                     sigma=price_sigma,
                     shape=len_df)
marketing_online_mu = pm.Normal('marketing_online_mu',
                                 marketing_online_mean,
                                 sigma=2 * marketing_online_sigma,
                                 shape=len_df)
distribution_mu = pm.Normal('distribution_mu',
                            distribution_mean,
                            sigma=distribution_sigma,
                            shape=len_df)
marketing_offline_mu = pm.Normal('marketing_offline_mu',
                                 marketing_offline_mean,
                                 sigma=marketing_offline_sigma,
                                 shape=len_df)
other_products_mu = pm.Normal('other_products_mu',
                               other_products_mean,
                               sigma=other_products_sigma,
                               shape=len_df)
competition_mu = pm.Normal('competition_mu',
                           competition_mean,
                           sigma=competition_sigma,
                           shape=len_df)
tgt_mu = pm.Normal('tgt_mu',
                   tgt_mean,

```

```

        sigma=sigma_dict['tgt_sigma'],
        shape=len_df)

beta_online = pm.Deterministic(
    f'beta_online_spend',
    tt.switch(tt.eq(data2['MARKETING_ONLINE_SP'].values, 0), 0, 1))
beta_offline = pm.Deterministic(
    f'beta_offline_spend',
    tt.switch(tt.eq(data2['MARKETING_OFFLINE_SP'].values, 0), 0, 1))
##### Defining Adstock media #####
#Offline Adstock
alpha_offline = pm.Beta('alpha_offline', 6, 6) # retain rate in adstock
# alpha_offline = pm.Beta('alpha_offline', 3, 3) # retain
theta_offline = pm.Uniform('theta_offline', 0, 1.5) # delay in adstock
"""marketing_offline_adstock=pm.Deterministic('marketing_offline_adstock'
                                              theta=theta_offline,alpha=alpha)

#Online Adstock
alpha_online = pm.Beta('alpha_online', 3, 3) # retain rate in adstock
theta_online = pm.Uniform('theta_online', 0, 0.5) # delay in adstock
"""marketing_online_adstock=pm.Deterministic('marketing_online_adstock',
                                              theta=theta_online,alpha=alpha)

##### parent nodes #####
seasonality_holidays_mu = pm.Normal('seasonality_holidays_mu',
                                      seasonality_holidays_mean,
                                      sigma=seasonality_holidays_sigma,
                                      shape=len_df)

covid_new_cases_mu = pm.Normal('covid_new_cases_mu',
                               covid_new_cases_mean,
                               sigma=covid_new_cases_sigma,
                               shape=len_df)

seasonality_holidays = pm.SkewNormal(
    'seasonality_holidays',
    mu=seasonality_holidays_alpha + seasonality_holidays_mu,
    sigma=seasonality_holidays_sigma,
    alpha=1,
    shape=len_df,
    observed=data_dict['seasonality_holidays'])

covid_new_cases = pm.Bernoulli('covid_new_cases',
                               p=logistic(covid_new_cases_alpha +
                                           covid_new_cases_mu),
                               shape=len_df,
                               observed=data_dict['covid_new_cases'])

price = pm.Normal('price',
                  price_mu,
                  sigma=price_sigma,
                  shape=len_df,
                  observed=data_dict['price'])

##### Child nodes #####
promo = pm.SkewNormal(
    'promo',

```

```

        mu=promo_mu + beta_price_to_promo * price +
        beta_seasonality_holidays_to_promo * seasonality_holidays +
        beta_covid_new_cases_to_promo * covid_new_cases,
        sigma=promo_sigma,
        alpha=1,
        shape=len_df,
        observed=data_dict['promo'])

marketing_offline_old = pm.Normal(
    'marketing_offline_old',
    beta_offline *
    (marketing_offline_mu +
     beta_seasonality_holidays_to_offline * seasonality_holidays +
     beta_covid_new_cases_to_offline * covid_new_cases +
     beta_promo_to_offline * promo + beta_price_to_offline * price),
    sigma=marketing_offline_sigma,
    shape=len_df,
    observed=data_dict['marketing_offline'])

marketing_offline = pm.Deterministic(
    'marketing_offline',
    geometric_adstock(x=marketing_offline_old,
                       theta=theta_offline,
                       alpha=alpha_offline,
                       L=4))

distribution = pm.SkewNormal(
    'distribution',
    mu=distribution_mu +
    beta_seasonality_holidays_to_distribution * seasonality_holidays +
    beta_covid_new_cases_to_distribution * covid_new_cases,
    sigma=distribution_sigma,
    alpha=-1,
    shape=len_df,
    observed=data_dict['distribution'])

marketing_online_old = pm.Normal(
    'marketing_online_old',
    beta_online *
    (marketing_online_mu + beta_offline_to_online * marketing_offline +
     beta_seasonality_holidays_to_online * seasonality_holidays +
     beta_covid_new_cases_to_online * covid_new_cases),
    sigma=marketing_online_sigma,
    shape=len_df,
    observed=data_dict['marketing_online'])

marketing_online = pm.Deterministic(
    'marketing_online',
    geometric_adstock(x=marketing_online_old,
                       theta=theta_online,
                       alpha=alpha_online,
                       L=2))

other_products = pm.Normal(
    'other_products',
    other_products_mu + beta_price_to_otherprod * price +
    beta_seasonality_holidays_to_otherprod * seasonality_holidays +
    beta_covid_new_cases_to_otherprod * covid_new_cases +

```

```

beta_promo_to_otherprod * promo +
beta_offline_to_otherprod * marketing_offline +
beta_online_to_otherprod * marketing_online,
sigma=other_products_sigma,
shape=len_df,
observed=data_dict['other_products'])

competition = pm.SkewNormal(
    'competition',
    mu=competition_mu + beta_price_to_competition * price +
    beta_seasonality_holidays_to_competition * seasonality_holidays +
    beta_covid_new_cases_to_competition * covid_new_cases +
    beta_promo_to_competition * promo +
    beta_online_to_competition * marketing_online +
    beta_distribution_to_competition * distribution +
    beta_offline_to_competition * marketing_offline,
    sigma=competition_sigma,
    alpha=1,
    shape=len_df,
    observed=data_dict['competition'])

#####
# Prediction #####
y = pm.SkewNormal(
    'tgt_pred',
    tgt_mu + beta_seasonality_holidays_to_tgt * seasonality_holidays +
    beta_covid_new_cases_to_tgt * covid_new_cases +
    beta_distribution_to_tgt * distribution +
    beta_competition_to_tgt * competition +
    beta_offline_to_tgt * marketing_offline + beta_price_to_tgt * price +
    beta_promo_to_tgt * promo + beta_otherprod_to_tgt * other_products +
    beta_online_to_tgt * marketing_online,
    sigma=tgt_sigma,
    alpha=1,
    observed=data_dict['tgt'])

```

CPU times: user 5.42 s, sys: 223 ms, total: 5.64 s
Wall time: 7.31 s

5.2.5 Prior Predictive Check

In [25]:

```
sim_from_modified_model = pm.sample_prior_predictive(samples=400,
                                                    model=model_change_prior
                                                    random_seed=101)
```

In [26]:

```
tgt_pred_sim_from_modified_model = []
for i in sim_from_modified_model['tgt_pred'][0]:
    for j in i:
        tgt_pred_sim_from_modified_model.append(j)

c = {"simulated tgt_pred": tgt_pred_sim_from_modified_model}
df_sim1 = pd.DataFrame(c)
df_sim1.describe()
```

```
Out[26]: simulated tgt_pred
```

	simulated tgt_pred
count	41600.000000
mean	-0.979022
std	3.082514
min	-16.674121
25%	-2.604502
50%	-0.803343
75%	0.906976
max	23.459498

```
In [27]: df_transformed[ 'TGT' ].describe()
```

```
Out[27]: count    104.000000
mean      1.000000
std       0.026095
min       0.939898
25%       0.980606
50%       1.006009
75%       1.021171
max       1.038779
Name: TGT, dtype: float64
```

5.2.6 Sampling

```
In [38]:
```

```
%%time
with model_change_priors:
    # sample using the model
    step = pm.NUTS(target_accept=0.9)
    trace_model_change_priors = pm.sample(400,
                                           tune=100,
                                           step=step,
                                           chains=2,
                                           return_inferencedata=False,
                                           random_seed=101,
                                           cores=4)
```

```
Only 400 samples in chain.  
Multiprocess sampling (2 chains in 4 jobs)  
NUTS: [covid_new_cases_mu, seasonality_holidays_mu, theta_online, alpha_online  
, theta_offline, alpha_offline, tgt_mu, competition_mu, other_products_mu, mar  
keting_offline_mu, distribution_mu, marketing_online_mu, price_mu, promo_mu, c  
ovid_new_cases_alpha, seasonality_holidays_alpha, beta_offline_to_tgt, beta_ot  
herprod_to_tgt, beta_promo_to_tgt, beta_price_to_tgt, beta_online_to_tgt, beta  
_competition_to_tgt, beta_distribution_to_tgt, beta_covid_new_cases_to_tgt, be  
ta_seasonality_holidays_to_tgt, beta_price_to_offline, beta_promo_to_offline,  
beta_covid_new_cases_to_offline, beta_seasonality_holidays_to_offline, beta_of  
fline_to_otherprod, beta_online_to_otherprod, beta_promo_to_otherprod, beta_co  
vid_new_cases_to_otherprod, beta_seasonality_holidays_to_otherprod, beta_price  
_to_otherprod, beta_offline_to_competition, beta_distribution_to_competition,  
beta_online_to_competition, beta_promo_to_competition, beta_covid_new_cases_to  
_competition, beta_seasonality_holidays_to_competition, beta_price_to_competit  
ion, beta_covid_new_cases_to_distribution, beta_seasonality_holidays_to_distri  
bution, beta_covid_new_cases_to_online, beta_seasonality_holidays_to_online, b  
eta_offline_to_online, beta_covid_new_cases_to_promo, beta_seasonality_holiday  
s_to_promo, beta_price_to_promo, tgt_sigma]  
100.00% [1000/1000 06:44<00:00 Sampling
```

2 chains, 176 divergences]

```
Sampling 2 chains for 100 tune and 400 draw iterations (200 + 800 draws total)  
took 414 seconds.  
There were 31 divergences after tuning. Increase `target_accept` or reparamete  
rize.  
The chain reached the maximum tree depth. Increase max_treedepth, increase tar  
get_accept or reparameterize.  
There were 145 divergences after tuning. Increase `target_accept` or reparamet  
erize.  
The acceptance probability does not match the target. It is 0.7701501323008421  
, but should be close to 0.9. Try to increase the number of tuning steps.  
The chain reached the maximum tree depth. Increase max_treedepth, increase tar  
get_accept or reparameterize.  
The rhat statistic is larger than 1.4 for some parameters. The sampler did not  
converge.  
The estimated number of effective samples is smaller than 200 for some paramet  
ers.  
CPU times: user 1min 13s, sys: 3.86 s, total: 1min 17s  
Wall time: 8min 6s
```

5.2.7 View Summary Statistics

In [39]:

```
pm.summary(trace_model_change_priors)
```

```
Got error No model on context stack. trying to find log_likelihood in translat  
ion.  
//anaconda3/lib/python3.7/site-packages/arviz/data/io_pymc3_3x.py:102: FutureW  
arning: Using `from_pymc3` without the model will be deprecated in a future re  
lease. Not using the model will return less accurate and less useful results.  
Make sure you use the model argument or call from_pymc3 within a model context  
. FutureWarning,  
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim  
eWarning: invalid value encountered in double_scalars
```

```

(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim
eWarning: invalid value encountered in double_scalars
(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim
eWarning: invalid value encountered in double_scalars
(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim
eWarning: invalid value encountered in double_scalars
(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim
eWarning: invalid value encountered in double_scalars
(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)
//anaconda3/lib/python3.7/site-packages/arviz/stats/diagnostics.py:561: Runtim
eWarning: invalid value encountered in double_scalars
(between_chain_variance / within_chain_variance + num_samples - 1) / (num_sa
mple)

```

Out[39]:

	mean	sd	hdi_3%	hdi_97%	mcse_mean	mcse_sd
beta_seasonality_holidays_to_promo	0.108	0.027	0.064	0.161	0.003	0.002
beta_covid_new_cases_to_promo	-0.037	0.016	-0.065	-0.010	0.005	0.003
beta_seasonality_holidays_to_distribution	0.008	0.002	0.005	0.011	0.000	0.000
beta_covid_new_cases_to_distribution	-0.010	0.004	-0.020	-0.002	0.000	0.000
beta_price_to_competition	0.104	0.070	-0.010	0.238	0.011	0.008
beta_seasonality_holidays_to_competition	0.059	0.015	0.035	0.088	0.002	0.002
beta_covid_new_cases_to_competition	-0.001	0.009	-0.017	0.014	0.003	0.002
beta_offline_to_competition	0.005	0.005	-0.006	0.014	0.000	0.000
beta_price_to_otherprod	-0.172	0.177	-0.522	0.165	0.029	0.020
beta_seasonality_holidays_to_otherprod	0.096	0.055	-0.011	0.201	0.004	0.003
beta_covid_new_cases_to_otherprod	-0.012	0.031	-0.065	0.057	0.002	0.003
beta_promo_to_otherprod	0.213	0.227	-0.262	0.597	0.047	0.034
beta_online_to_otherprod	-0.136	0.080	-0.272	0.008	0.018	0.013
beta_offline_to_otherprod	0.002	0.022	-0.039	0.038	0.006	0.004
beta_seasonality_holidays_to_offline	0.232	0.555	-0.727	1.126	0.241	0.181
beta_covid_new_cases_to_offline	0.724	0.806	-0.854	2.006	0.325	0.242
beta_promo_to_offline	0.549	0.447	-0.434	1.290	0.082	0.065
beta_price_to_offline	-0.103	0.442	-0.897	0.673	0.106	0.076
seasonality_holidays_alpha	-0.088	0.020	-0.125	-0.049	0.002	0.001
covid_new_cases_alpha	-2.388	0.332	-2.869	-1.823	0.109	0.084
promo_mu[0]	1.001	0.021	0.964	1.045	0.003	0.002
promo_mu[1]	1.000	0.025	0.959	1.046	0.005	0.004

promo_mu[2]	1.009	0.022	0.966	1.049	0.001	0.001
promo_mu[3]	1.018	0.023	0.971	1.057	0.001	0.001
promo_mu[4]	1.013	0.024	0.966	1.056	0.001	0.001
promo_mu[5]	1.012	0.022	0.970	1.050	0.001	0.001
promo_mu[6]	1.022	0.030	0.977	1.081	0.011	0.008
promo_mu[7]	0.994	0.022	0.949	1.033	0.001	0.001
promo_mu[8]	1.002	0.025	0.952	1.045	0.001	0.001
promo_mu[9]	1.017	0.022	0.978	1.061	0.001	0.001
promo_mu[10]	1.017	0.023	0.968	1.055	0.003	0.002
promo_mu[11]	1.008	0.026	0.965	1.059	0.005	0.004
promo_mu[12]	1.009	0.021	0.963	1.047	0.001	0.001
promo_mu[13]	1.013	0.025	0.971	1.065	0.002	0.001
promo_mu[14]	1.009	0.023	0.968	1.052	0.004	0.003
promo_mu[15]	1.013	0.028	0.965	1.056	0.009	0.006
promo_mu[16]	1.021	0.023	0.979	1.063	0.002	0.001
promo_mu[17]	1.001	0.024	0.961	1.044	0.005	0.004
promo_mu[18]	1.006	0.029	0.961	1.055	0.009	0.007
promo_mu[19]	1.005	0.024	0.967	1.051	0.004	0.003
promo_mu[20]	1.008	0.023	0.965	1.050	0.003	0.002
promo_mu[21]	1.030	0.026	0.990	1.079	0.007	0.005
promo_mu[22]	1.014	0.025	0.971	1.065	0.001	0.001
promo_mu[23]	1.013	0.025	0.962	1.049	0.005	0.003
promo_mu[24]	1.005	0.021	0.962	1.044	0.001	0.001
promo_mu[25]	1.013	0.025	0.963	1.049	0.005	0.003
promo_mu[26]	1.001	0.023	0.963	1.043	0.003	0.002
promo_mu[27]	1.000	0.020	0.965	1.040	0.001	0.001
promo_mu[28]	1.006	0.020	0.971	1.047	0.001	0.001
promo_mu[29]	1.006	0.023	0.966	1.051	0.002	0.001
promo_mu[30]	1.011	0.022	0.973	1.057	0.001	0.001
promo_mu[31]	1.013	0.025	0.968	1.054	0.007	0.005
promo_mu[32]	0.997	0.022	0.954	1.039	0.001	0.001
promo_mu[33]	1.013	0.023	0.966	1.053	0.001	0.001
promo_mu[34]	1.020	0.022	0.976	1.058	0.004	0.003
promo_mu[35]	1.008	0.022	0.968	1.052	0.002	0.002

promo_mu[36]	1.004	0.021	0.958	1.041	0.001	0.001
promo_mu[37]	1.008	0.022	0.962	1.047	0.001	0.001
promo_mu[38]	1.011	0.027	0.961	1.051	0.006	0.005
promo_mu[39]	1.007	0.022	0.964	1.049	0.001	0.001
promo_mu[40]	1.016	0.021	0.978	1.059	0.001	0.001
promo_mu[41]	1.016	0.024	0.971	1.059	0.001	0.001
promo_mu[42]	1.025	0.030	0.973	1.074	0.010	0.007
promo_mu[43]	1.014	0.023	0.967	1.055	0.003	0.002
promo_mu[44]	1.004	0.021	0.966	1.046	0.001	0.001
promo_mu[45]	1.006	0.023	0.959	1.047	0.001	0.001
promo_mu[46]	1.017	0.025	0.970	1.054	0.004	0.003
promo_mu[47]	1.012	0.023	0.966	1.053	0.001	0.001
promo_mu[48]	1.015	0.023	0.972	1.061	0.001	0.001
promo_mu[49]	1.010	0.021	0.970	1.050	0.001	0.001
promo_mu[50]	1.016	0.024	0.971	1.066	0.001	0.001
promo_mu[51]	1.021	0.020	0.978	1.057	0.001	0.001
promo_mu[52]	1.011	0.023	0.973	1.057	0.001	0.001
promo_mu[53]	1.003	0.021	0.971	1.046	0.002	0.002
promo_mu[54]	1.005	0.023	0.964	1.047	0.005	0.004
promo_mu[55]	1.010	0.022	0.973	1.057	0.001	0.001
promo_mu[56]	1.015	0.024	0.976	1.063	0.001	0.001
promo_mu[57]	1.015	0.027	0.972	1.064	0.006	0.004
promo_mu[58]	1.019	0.022	0.976	1.063	0.001	0.001
promo_mu[59]	1.015	0.022	0.971	1.054	0.002	0.002
promo_mu[60]	0.934	0.025	0.886	0.969	0.006	0.005
promo_mu[61]	0.989	0.022	0.943	1.025	0.002	0.001
promo_mu[62]	0.990	0.021	0.945	1.024	0.001	0.001
promo_mu[63]	1.015	0.022	0.974	1.056	0.001	0.001
promo_mu[64]	1.016	0.023	0.972	1.054	0.002	0.002
promo_mu[65]	1.018	0.021	0.975	1.051	0.003	0.002
promo_mu[66]	0.993	0.022	0.954	1.038	0.002	0.001
promo_mu[67]	0.984	0.021	0.945	1.023	0.001	0.001
promo_mu[68]	0.978	0.023	0.937	1.026	0.001	0.001
promo_mu[69]	0.986	0.022	0.947	1.031	0.001	0.001

promo_mu[70]	0.997	0.026	0.955	1.041	0.006	0.004
promo_mu[71]	0.985	0.027	0.937	1.027	0.008	0.006
promo_mu[72]	0.966	0.020	0.929	1.007	0.001	0.001
promo_mu[73]	1.017	0.026	0.960	1.064	0.001	0.001
promo_mu[74]	1.003	0.030	0.952	1.054	0.006	0.004
promo_mu[75]	0.964	0.022	0.925	1.006	0.001	0.001
promo_mu[76]	0.970	0.022	0.927	1.013	0.001	0.001
promo_mu[77]	0.976	0.025	0.937	1.017	0.006	0.005
promo_mu[78]	0.965	0.023	0.923	1.008	0.001	0.001
promo_mu[79]	0.970	0.021	0.933	1.012	0.001	0.001
promo_mu[80]	0.973	0.020	0.937	1.014	0.001	0.001
promo_mu[81]	0.974	0.022	0.930	1.016	0.001	0.001
promo_mu[82]	0.977	0.023	0.936	1.022	0.002	0.001
promo_mu[83]	0.981	0.023	0.940	1.023	0.001	0.001
promo_mu[84]	0.970	0.021	0.923	1.006	0.001	0.001
promo_mu[85]	0.956	0.022	0.910	0.994	0.001	0.001
promo_mu[86]	0.990	0.030	0.938	1.038	0.009	0.006
promo_mu[87]	0.973	0.027	0.928	1.013	0.009	0.007
promo_mu[88]	0.977	0.022	0.931	1.017	0.001	0.001
promo_mu[89]	0.978	0.022	0.934	1.016	0.002	0.002
promo_mu[90]	0.980	0.024	0.934	1.020	0.002	0.001
promo_mu[91]	0.965	0.021	0.920	1.002	0.001	0.001
promo_mu[92]	0.971	0.024	0.930	1.011	0.007	0.005
promo_mu[93]	0.966	0.029	0.911	1.008	0.012	0.009
promo_mu[94]	0.979	0.023	0.942	1.021	0.004	0.003
promo_mu[95]	0.991	0.024	0.944	1.030	0.002	0.001
promo_mu[96]	0.995	0.025	0.956	1.046	0.006	0.005
promo_mu[97]	0.987	0.030	0.931	1.034	0.011	0.008
promo_mu[98]	0.995	0.023	0.953	1.043	0.001	0.001
promo_mu[99]	1.000	0.024	0.961	1.048	0.004	0.003
promo_mu[100]	1.005	0.024	0.966	1.059	0.001	0.001
promo_mu[101]	0.999	0.029	0.952	1.047	0.010	0.007
promo_mu[102]	1.013	0.024	0.975	1.062	0.002	0.001
promo_mu[103]	1.016	0.031	0.964	1.063	0.011	0.008

price_mu[0]	1.003	0.015	0.974	1.031	0.001	0.001
price_mu[1]	0.994	0.018	0.967	1.027	0.005	0.004
price_mu[2]	0.997	0.016	0.964	1.027	0.001	0.001
price_mu[3]	1.000	0.015	0.972	1.026	0.001	0.001
price_mu[4]	1.005	0.015	0.975	1.030	0.003	0.002
price_mu[5]	1.005	0.015	0.974	1.032	0.002	0.001
price_mu[6]	1.004	0.016	0.978	1.036	0.003	0.002
price_mu[7]	1.001	0.014	0.975	1.029	0.001	0.001
price_mu[8]	1.015	0.019	0.986	1.049	0.007	0.005
price_mu[9]	0.998	0.016	0.969	1.029	0.004	0.003
price_mu[10]	0.984	0.015	0.960	1.014	0.003	0.002
price_mu[11]	0.981	0.015	0.953	1.006	0.003	0.002
price_mu[12]	0.996	0.016	0.965	1.027	0.001	0.000
price_mu[13]	0.988	0.015	0.966	1.019	0.003	0.002
price_mu[14]	1.003	0.014	0.974	1.028	0.001	0.000
price_mu[15]	1.008	0.014	0.981	1.033	0.001	0.001
price_mu[16]	1.003	0.015	0.975	1.032	0.001	0.001
price_mu[17]	0.998	0.017	0.970	1.026	0.005	0.004
price_mu[18]	1.005	0.014	0.981	1.035	0.001	0.000
price_mu[19]	1.003	0.014	0.976	1.030	0.001	0.001
price_mu[20]	1.004	0.018	0.977	1.035	0.007	0.005
price_mu[21]	1.004	0.015	0.974	1.029	0.001	0.000
price_mu[22]	1.012	0.020	0.981	1.047	0.008	0.006
price_mu[23]	1.002	0.015	0.975	1.031	0.001	0.001
price_mu[24]	0.997	0.015	0.971	1.025	0.001	0.000
price_mu[25]	1.010	0.014	0.984	1.036	0.001	0.000
price_mu[26]	1.009	0.016	0.980	1.036	0.005	0.003
price_mu[27]	0.996	0.014	0.971	1.024	0.003	0.002
price_mu[28]	1.003	0.015	0.975	1.032	0.001	0.000
price_mu[29]	0.996	0.016	0.969	1.024	0.004	0.003
price_mu[30]	0.997	0.016	0.969	1.027	0.001	0.001
price_mu[31]	1.005	0.015	0.976	1.035	0.001	0.000
price_mu[32]	0.997	0.015	0.972	1.027	0.001	0.000
price_mu[33]	0.992	0.017	0.964	1.020	0.005	0.004

price_mu[34]	0.979	0.015	0.951	1.008	0.001	0.000
price_mu[35]	0.986	0.015	0.957	1.018	0.001	0.000
price_mu[36]	0.987	0.016	0.958	1.015	0.004	0.003
price_mu[37]	0.986	0.015	0.957	1.017	0.001	0.001
price_mu[38]	0.986	0.014	0.961	1.016	0.001	0.001
price_mu[39]	0.993	0.018	0.961	1.022	0.005	0.004
price_mu[40]	1.007	0.014	0.981	1.035	0.001	0.001
price_mu[41]	0.994	0.014	0.968	1.021	0.001	0.000
price_mu[42]	0.988	0.014	0.960	1.014	0.001	0.000
price_mu[43]	0.996	0.024	0.964	1.043	0.011	0.008
price_mu[44]	0.986	0.015	0.963	1.017	0.002	0.001
price_mu[45]	0.992	0.015	0.960	1.017	0.001	0.000
price_mu[46]	1.004	0.016	0.976	1.028	0.004	0.003
price_mu[47]	1.006	0.015	0.978	1.032	0.002	0.001
price_mu[48]	0.999	0.017	0.970	1.025	0.006	0.004
price_mu[49]	0.993	0.017	0.964	1.022	0.005	0.004
price_mu[50]	0.985	0.020	0.946	1.015	0.008	0.006
price_mu[51]	0.991	0.014	0.962	1.018	0.001	0.000
price_mu[52]	1.005	0.018	0.971	1.030	0.004	0.003
price_mu[53]	1.001	0.013	0.975	1.026	0.001	0.001
price_mu[54]	1.008	0.016	0.979	1.034	0.003	0.002
price_mu[55]	1.002	0.014	0.974	1.029	0.000	0.000
price_mu[56]	1.003	0.019	0.967	1.031	0.006	0.005
price_mu[57]	0.988	0.015	0.962	1.015	0.004	0.003
price_mu[58]	0.984	0.018	0.956	1.014	0.005	0.004
price_mu[59]	0.992	0.015	0.965	1.023	0.001	0.000
price_mu[60]	0.968	0.014	0.942	0.995	0.001	0.000
price_mu[61]	0.996	0.016	0.967	1.025	0.003	0.002
price_mu[62]	0.979	0.015	0.948	1.005	0.002	0.002
price_mu[63]	0.994	0.021	0.965	1.036	0.009	0.007
price_mu[64]	0.984	0.017	0.958	1.015	0.005	0.004
price_mu[65]	0.986	0.016	0.957	1.011	0.005	0.003
price_mu[66]	0.988	0.015	0.955	1.015	0.001	0.000
price_mu[67]	0.987	0.015	0.960	1.014	0.002	0.001

price_mu[68]	0.987	0.015	0.956	1.015	0.001	0.001
price_mu[69]	0.992	0.015	0.963	1.018	0.001	0.001
price_mu[70]	0.994	0.015	0.968	1.023	0.003	0.002
price_mu[71]	1.004	0.013	0.982	1.031	0.000	0.000
price_mu[72]	1.016	0.013	0.990	1.041	0.000	0.000
price_mu[73]	1.027	0.014	0.997	1.049	0.003	0.002
price_mu[74]	1.028	0.017	0.996	1.055	0.003	0.002
price_mu[75]	1.008	0.015	0.979	1.033	0.002	0.001
price_mu[76]	0.989	0.015	0.965	1.020	0.003	0.002
price_mu[77]	0.993	0.016	0.961	1.018	0.002	0.001
price_mu[78]	1.004	0.015	0.975	1.031	0.001	0.000
price_mu[79]	1.012	0.017	0.987	1.045	0.004	0.003
price_mu[80]	1.019	0.015	0.992	1.049	0.001	0.000
price_mu[81]	1.011	0.016	0.982	1.039	0.002	0.002
price_mu[82]	1.006	0.016	0.976	1.037	0.002	0.002
price_mu[83]	1.003	0.015	0.971	1.029	0.002	0.002
price_mu[84]	1.000	0.015	0.974	1.030	0.002	0.001
price_mu[85]	1.001	0.015	0.971	1.028	0.002	0.002
price_mu[86]	1.008	0.015	0.978	1.030	0.004	0.003
price_mu[87]	1.019	0.015	0.987	1.046	0.001	0.000
price_mu[88]	1.014	0.015	0.984	1.041	0.001	0.000
price_mu[89]	1.010	0.017	0.977	1.039	0.004	0.003
price_mu[90]	1.021	0.015	0.992	1.043	0.003	0.002
price_mu[91]	1.010	0.014	0.979	1.035	0.001	0.000
price_mu[92]	0.991	0.013	0.964	1.017	0.000	0.000
price_mu[93]	0.988	0.017	0.958	1.016	0.005	0.004
price_mu[94]	1.006	0.015	0.979	1.033	0.001	0.000
price_mu[95]	1.017	0.015	0.991	1.044	0.001	0.001
price_mu[96]	1.022	0.014	0.996	1.049	0.001	0.000
price_mu[97]	1.011	0.014	0.984	1.039	0.000	0.000
price_mu[98]	1.012	0.017	0.986	1.046	0.006	0.004
price_mu[99]	1.024	0.015	0.995	1.052	0.003	0.002
price_mu[100]	1.014	0.014	0.987	1.042	0.001	0.000
price_mu[101]	1.009	0.015	0.980	1.038	0.001	0.000

price_mu[102]	1.007	0.015	0.979	1.033	0.001	0.000
price_mu[103]	1.008	0.014	0.981	1.037	0.001	0.000
marketing_online_mu[0]	1.144	0.097	0.996	1.335	0.020	0.014
marketing_online_mu[1]	1.153	0.097	0.969	1.331	0.005	0.003
marketing_online_mu[2]	1.100	0.106	0.918	1.315	0.012	0.009
marketing_online_mu[3]	0.983	0.124	0.807	1.218	0.042	0.031
marketing_online_mu[4]	1.138	0.114	0.924	1.293	0.034	0.026
marketing_online_mu[5]	1.070	0.094	0.898	1.250	0.016	0.012
marketing_online_mu[6]	0.852	0.104	0.669	1.015	0.025	0.019
marketing_online_mu[7]	0.818	0.121	0.638	1.019	0.040	0.030
marketing_online_mu[8]	0.873	0.099	0.699	1.060	0.006	0.004
marketing_online_mu[9]	0.877	0.101	0.715	1.088	0.018	0.013
marketing_online_mu[10]	0.891	0.090	0.710	1.053	0.010	0.007
marketing_online_mu[11]	0.878	0.096	0.707	1.078	0.004	0.003
marketing_online_mu[12]	0.880	0.109	0.700	1.085	0.021	0.015
marketing_online_mu[13]	0.886	0.098	0.710	1.077	0.004	0.003
marketing_online_mu[14]	0.835	0.097	0.665	1.014	0.009	0.006
marketing_online_mu[15]	0.839	0.097	0.633	1.006	0.008	0.006
marketing_online_mu[16]	0.856	0.102	0.670	1.055	0.007	0.005
marketing_online_mu[17]	0.867	0.095	0.689	1.054	0.004	0.003
marketing_online_mu[18]	0.844	0.091	0.645	1.000	0.005	0.004
marketing_online_mu[19]	0.838	0.101	0.661	1.045	0.006	0.004
marketing_online_mu[20]	0.867	0.103	0.657	1.030	0.013	0.009
marketing_online_mu[21]	0.855	0.091	0.680	1.021	0.005	0.003
marketing_online_mu[22]	1.050	0.102	0.829	1.233	0.007	0.005
marketing_online_mu[23]	1.069	0.097	0.877	1.225	0.015	0.011
marketing_online_mu[24]	1.143	0.090	0.970	1.310	0.005	0.003
marketing_online_mu[25]	1.087	0.103	0.934	1.305	0.016	0.012
marketing_online_mu[26]	1.079	0.101	0.883	1.258	0.006	0.005
marketing_online_mu[27]	1.118	0.122	0.933	1.314	0.045	0.034
marketing_online_mu[28]	1.007	0.113	0.842	1.197	0.041	0.030
marketing_online_mu[29]	1.138	0.097	0.962	1.322	0.008	0.006
marketing_online_mu[30]	1.093	0.110	0.894	1.297	0.008	0.006
marketing_online_mu[31]	1.125	0.092	0.944	1.289	0.005	0.004

marketing_online_mu[32]	1.076	0.093	0.883	1.248	0.005	0.003
marketing_online_mu[33]	1.044	0.095	0.842	1.224	0.004	0.003
marketing_online_mu[34]	1.057	0.092	0.895	1.226	0.007	0.006
marketing_online_mu[35]	1.044	0.107	0.886	1.246	0.025	0.018
marketing_online_mu[36]	1.050	0.096	0.865	1.208	0.010	0.007
marketing_online_mu[37]	1.015	0.103	0.846	1.219	0.020	0.014
marketing_online_mu[38]	1.047	0.095	0.868	1.216	0.004	0.003
marketing_online_mu[39]	1.033	0.090	0.872	1.203	0.014	0.010
marketing_online_mu[40]	1.040	0.102	0.877	1.240	0.018	0.013
marketing_online_mu[41]	1.061	0.090	0.911	1.264	0.004	0.003
marketing_online_mu[42]	1.048	0.097	0.866	1.228	0.016	0.011
marketing_online_mu[43]	1.063	0.090	0.907	1.236	0.004	0.003
marketing_online_mu[44]	1.069	0.097	0.895	1.257	0.018	0.014
marketing_online_mu[45]	1.100	0.126	0.922	1.322	0.050	0.039
marketing_online_mu[46]	1.048	0.102	0.864	1.243	0.012	0.009
marketing_online_mu[47]	1.053	0.094	0.901	1.227	0.022	0.016
marketing_online_mu[48]	0.997	0.094	0.828	1.183	0.007	0.005
marketing_online_mu[49]	1.005	0.100	0.829	1.191	0.010	0.007
marketing_online_mu[50]	0.991	0.091	0.806	1.148	0.006	0.004
marketing_online_mu[51]	0.953	0.120	0.768	1.201	0.019	0.013
marketing_online_mu[52]	0.967	0.107	0.785	1.176	0.013	0.009
marketing_online_mu[53]	0.963	0.097	0.823	1.169	0.024	0.017
marketing_online_mu[54]	0.993	0.100	0.791	1.170	0.008	0.005
marketing_online_mu[55]	0.990	0.094	0.802	1.161	0.005	0.004
marketing_online_mu[56]	1.032	0.107	0.860	1.232	0.028	0.020
marketing_online_mu[57]	1.065	0.094	0.889	1.260	0.006	0.004
marketing_online_mu[58]	1.068	0.091	0.888	1.242	0.007	0.005
marketing_online_mu[59]	1.111	0.101	0.951	1.324	0.013	0.009
marketing_online_mu[60]	1.164	0.108	0.979	1.319	0.032	0.024
marketing_online_mu[61]	1.037	0.091	0.895	1.247	0.005	0.003
marketing_online_mu[62]	1.046	0.097	0.838	1.210	0.004	0.003
marketing_online_mu[63]	1.080	0.117	0.874	1.264	0.026	0.019
marketing_online_mu[64]	1.069	0.101	0.898	1.269	0.021	0.015
marketing_online_mu[65]	1.065	0.100	0.842	1.234	0.007	0.005

marketing_online_mu[66]	0.994	0.106	0.824	1.184	0.031	0.022
marketing_online_mu[67]	1.001	0.105	0.804	1.191	0.006	0.004
marketing_online_mu[68]	1.002	0.095	0.816	1.169	0.006	0.004
marketing_online_mu[69]	1.084	0.097	0.857	1.236	0.004	0.003
marketing_online_mu[70]	1.096	0.094	0.916	1.275	0.006	0.004
marketing_online_mu[71]	1.079	0.101	0.893	1.253	0.014	0.010
marketing_online_mu[72]	1.011	0.105	0.855	1.211	0.021	0.015
marketing_online_mu[73]	0.999	0.092	0.841	1.177	0.009	0.007
marketing_online_mu[74]	0.994	0.093	0.817	1.164	0.004	0.003
marketing_online_mu[75]	1.026	0.087	0.868	1.185	0.006	0.004
marketing_online_mu[76]	1.075	0.099	0.853	1.244	0.006	0.004
marketing_online_mu[77]	1.074	0.097	0.898	1.264	0.007	0.005
marketing_online_mu[78]	1.013	0.099	0.820	1.206	0.018	0.013
marketing_online_mu[79]	1.016	0.096	0.850	1.211	0.005	0.003
marketing_online_mu[80]	0.998	0.097	0.846	1.176	0.018	0.013
marketing_online_mu[81]	1.000	0.088	0.834	1.166	0.003	0.002
marketing_online_mu[82]	0.889	0.106	0.674	1.043	0.026	0.020
marketing_online_mu[83]	0.915	0.095	0.735	1.106	0.008	0.006
marketing_online_mu[84]	0.929	0.101	0.734	1.067	0.023	0.017
marketing_online_mu[85]	0.854	0.091	0.699	1.044	0.004	0.003
marketing_online_mu[86]	1.004	0.102	0.821	1.222	0.009	0.006
marketing_online_mu[87]	0.898	0.106	0.728	1.098	0.021	0.015
marketing_online_mu[88]	0.928	0.094	0.755	1.105	0.004	0.003
marketing_online_mu[89]	0.894	0.097	0.704	1.060	0.015	0.010
marketing_online_mu[90]	0.908	0.096	0.701	1.059	0.007	0.005
marketing_online_mu[91]	0.974	0.097	0.780	1.154	0.005	0.004
marketing_online_mu[92]	1.003	0.093	0.826	1.177	0.006	0.004
marketing_online_mu[93]	1.002	0.094	0.815	1.170	0.006	0.004
marketing_online_mu[94]	0.992	0.096	0.797	1.184	0.004	0.003
marketing_online_mu[95]	0.971	0.114	0.822	1.186	0.030	0.022
marketing_online_mu[96]	1.030	0.097	0.859	1.218	0.005	0.004
marketing_online_mu[97]	1.002	0.102	0.835	1.203	0.013	0.010
marketing_online_mu[98]	0.987	0.106	0.803	1.199	0.021	0.015
marketing_online_mu[99]	1.037	0.114	0.879	1.254	0.029	0.021

marketing_online_mu[100]	1.053	0.104	0.830	1.238	0.007	0.005
marketing_online_mu[101]	1.123	0.098	0.928	1.318	0.006	0.005
marketing_online_mu[102]	1.077	0.099	0.902	1.284	0.010	0.007
marketing_online_mu[103]	1.087	0.108	0.904	1.252	0.029	0.022
distribution_mu[0]	0.999	0.006	0.988	1.011	0.000	0.000
distribution_mu[1]	0.999	0.007	0.987	1.013	0.001	0.000
distribution_mu[2]	1.004	0.007	0.991	1.016	0.001	0.001
distribution_mu[3]	1.002	0.007	0.989	1.016	0.001	0.001
distribution_mu[4]	1.001	0.007	0.990	1.015	0.000	0.000
distribution_mu[5]	1.005	0.007	0.992	1.018	0.000	0.000
distribution_mu[6]	1.009	0.007	0.997	1.022	0.001	0.001
distribution_mu[7]	1.009	0.007	0.995	1.021	0.000	0.000
distribution_mu[8]	1.011	0.007	0.999	1.023	0.001	0.001
distribution_mu[9]	1.010	0.007	0.997	1.022	0.000	0.000
distribution_mu[10]	1.008	0.007	0.995	1.021	0.000	0.000
distribution_mu[11]	1.009	0.008	0.997	1.023	0.002	0.001
distribution_mu[12]	1.005	0.007	0.992	1.019	0.000	0.000
distribution_mu[13]	1.008	0.007	0.997	1.023	0.000	0.000
distribution_mu[14]	1.006	0.007	0.992	1.019	0.001	0.001
distribution_mu[15]	1.013	0.007	1.000	1.025	0.002	0.001
distribution_mu[16]	1.012	0.006	1.001	1.025	0.001	0.000
distribution_mu[17]	1.013	0.006	1.002	1.027	0.000	0.000
distribution_mu[18]	1.011	0.009	0.996	1.026	0.003	0.002
distribution_mu[19]	1.014	0.007	1.002	1.030	0.002	0.002
distribution_mu[20]	1.007	0.007	0.995	1.022	0.001	0.001
distribution_mu[21]	1.008	0.007	0.995	1.021	0.001	0.001
distribution_mu[22]	1.006	0.006	0.995	1.019	0.000	0.000
distribution_mu[23]	1.007	0.007	0.995	1.019	0.000	0.000
distribution_mu[24]	1.010	0.007	0.998	1.022	0.000	0.000
distribution_mu[25]	1.010	0.007	0.997	1.022	0.000	0.000
distribution_mu[26]	1.011	0.007	0.998	1.024	0.000	0.000
distribution_mu[27]	1.001	0.007	0.988	1.012	0.002	0.001
distribution_mu[28]	1.002	0.007	0.989	1.014	0.001	0.001
distribution_mu[29]	1.000	0.008	0.987	1.015	0.001	0.001

distribution_mu[30]	1.003	0.007	0.990	1.018	0.000	0.000
distribution_mu[31]	1.004	0.007	0.991	1.017	0.001	0.001
distribution_mu[32]	1.006	0.008	0.992	1.018	0.002	0.002
distribution_mu[33]	1.003	0.007	0.989	1.015	0.000	0.000
distribution_mu[34]	0.999	0.007	0.987	1.013	0.001	0.001
distribution_mu[35]	1.002	0.009	0.988	1.021	0.003	0.002
distribution_mu[36]	1.002	0.007	0.991	1.016	0.002	0.001
distribution_mu[37]	1.000	0.007	0.989	1.014	0.001	0.001
distribution_mu[38]	1.003	0.007	0.991	1.016	0.000	0.000
distribution_mu[39]	1.002	0.007	0.988	1.016	0.001	0.000
distribution_mu[40]	1.001	0.007	0.986	1.014	0.000	0.000
distribution_mu[41]	1.003	0.008	0.988	1.015	0.001	0.001
distribution_mu[42]	0.996	0.007	0.984	1.010	0.001	0.001
distribution_mu[43]	1.000	0.008	0.987	1.014	0.002	0.002
distribution_mu[44]	0.997	0.008	0.983	1.010	0.002	0.001
distribution_mu[45]	1.002	0.007	0.988	1.013	0.001	0.000
distribution_mu[46]	1.002	0.007	0.990	1.014	0.002	0.001
distribution_mu[47]	1.005	0.007	0.991	1.017	0.000	0.000
distribution_mu[48]	0.999	0.007	0.987	1.012	0.000	0.000
distribution_mu[49]	0.995	0.008	0.981	1.010	0.001	0.001
distribution_mu[50]	1.000	0.007	0.987	1.011	0.000	0.000
distribution_mu[51]	0.998	0.007	0.985	1.011	0.001	0.001
distribution_mu[52]	1.001	0.007	0.988	1.014	0.000	0.000
distribution_mu[53]	1.001	0.007	0.989	1.013	0.000	0.000
distribution_mu[54]	0.997	0.007	0.984	1.010	0.000	0.000
distribution_mu[55]	0.998	0.007	0.985	1.011	0.000	0.000
distribution_mu[56]	0.993	0.007	0.979	1.006	0.000	0.000
distribution_mu[57]	0.994	0.008	0.981	1.007	0.002	0.002
distribution_mu[58]	0.995	0.007	0.983	1.010	0.001	0.001
distribution_mu[59]	0.997	0.007	0.983	1.011	0.000	0.000
distribution_mu[60]	0.997	0.007	0.985	1.012	0.000	0.000
distribution_mu[61]	0.995	0.007	0.982	1.009	0.000	0.000
distribution_mu[62]	0.996	0.007	0.985	1.009	0.000	0.000
distribution_mu[63]	0.991	0.007	0.978	1.005	0.000	0.000

distribution_mu[64]	0.990	0.008	0.977	1.004	0.001	0.001
distribution_mu[65]	0.992	0.007	0.977	1.003	0.001	0.001
distribution_mu[66]	0.994	0.007	0.981	1.006	0.000	0.000
distribution_mu[67]	0.992	0.007	0.981	1.007	0.000	0.000
distribution_mu[68]	0.993	0.007	0.979	1.005	0.001	0.000
distribution_mu[69]	0.996	0.007	0.983	1.010	0.000	0.000
distribution_mu[70]	0.995	0.007	0.983	1.010	0.000	0.000
distribution_mu[71]	0.995	0.007	0.983	1.010	0.000	0.000
distribution_mu[72]	0.994	0.007	0.981	1.008	0.000	0.000
distribution_mu[73]	0.997	0.007	0.985	1.010	0.000	0.000
distribution_mu[74]	0.996	0.008	0.983	1.010	0.002	0.002
distribution_mu[75]	0.994	0.007	0.981	1.008	0.000	0.000
distribution_mu[76]	0.999	0.008	0.985	1.012	0.001	0.001
distribution_mu[77]	0.998	0.009	0.980	1.012	0.002	0.002
distribution_mu[78]	0.989	0.007	0.975	1.001	0.001	0.001
distribution_mu[79]	0.989	0.008	0.976	1.002	0.002	0.002
distribution_mu[80]	0.991	0.008	0.976	1.003	0.001	0.000
distribution_mu[81]	0.995	0.007	0.980	1.008	0.001	0.000
distribution_mu[82]	0.997	0.007	0.983	1.009	0.001	0.001
distribution_mu[83]	0.998	0.007	0.985	1.011	0.000	0.000
distribution_mu[84]	0.995	0.007	0.982	1.007	0.001	0.001
distribution_mu[85]	0.994	0.007	0.980	1.006	0.000	0.000
distribution_mu[86]	1.000	0.008	0.986	1.016	0.001	0.000
distribution_mu[87]	0.989	0.007	0.975	1.001	0.000	0.000
distribution_mu[88]	0.994	0.007	0.981	1.006	0.001	0.000
distribution_mu[89]	0.995	0.008	0.981	1.009	0.002	0.001
distribution_mu[90]	0.988	0.008	0.974	1.002	0.001	0.001
distribution_mu[91]	0.988	0.007	0.976	1.002	0.001	0.001
distribution_mu[92]	0.987	0.007	0.976	1.002	0.000	0.000
distribution_mu[93]	0.988	0.008	0.974	1.002	0.002	0.001
distribution_mu[94]	0.991	0.007	0.977	1.005	0.000	0.000
distribution_mu[95]	0.992	0.007	0.978	1.006	0.000	0.000
distribution_mu[96]	0.999	0.008	0.984	1.012	0.000	0.000
distribution_mu[97]	0.997	0.008	0.984	1.013	0.002	0.001

distribution_mu[98]	0.998	0.007	0.984	1.012	0.000	0.000
distribution_mu[99]	1.002	0.007	0.988	1.014	0.000	0.000
distribution_mu[100]	0.998	0.008	0.985	1.011	0.002	0.002
distribution_mu[101]	1.004	0.008	0.989	1.018	0.001	0.000
distribution_mu[102]	1.005	0.008	0.991	1.019	0.000	0.000
distribution_mu[103]	1.003	0.007	0.991	1.019	0.000	0.000
marketing_offline_mu[0]	0.082	0.382	-0.465	0.822	0.150	0.111
marketing_offline_mu[1]	0.270	0.340	-0.391	0.922	0.047	0.033
marketing_offline_mu[2]	0.153	0.415	-0.495	0.838	0.159	0.117
marketing_offline_mu[3]	0.329	0.362	-0.357	1.070	0.082	0.059
marketing_offline_mu[4]	0.283	0.361	-0.340	0.921	0.105	0.076
marketing_offline_mu[5]	0.233	0.418	-0.375	0.977	0.156	0.115
marketing_offline_mu[6]	0.336	0.356	-0.375	0.919	0.132	0.105
marketing_offline_mu[7]	0.358	0.326	-0.256	0.862	0.049	0.035
marketing_offline_mu[8]	0.394	0.533	-0.485	1.484	0.211	0.157
marketing_offline_mu[9]	0.422	0.399	-0.542	1.046	0.063	0.045
marketing_offline_mu[10]	0.297	0.383	-0.392	1.029	0.137	0.100
marketing_offline_mu[11]	0.484	0.426	-0.277	1.283	0.129	0.094
marketing_offline_mu[12]	0.264	0.428	-0.344	1.101	0.140	0.103
marketing_offline_mu[13]	0.311	0.316	-0.300	0.944	0.046	0.033
marketing_offline_mu[14]	0.186	0.305	-0.383	0.769	0.058	0.042
marketing_offline_mu[15]	0.130	0.366	-0.411	0.719	0.178	0.136
marketing_offline_mu[16]	0.294	0.372	-0.360	1.006	0.079	0.068
marketing_offline_mu[17]	0.332	0.391	-0.347	0.994	0.140	0.103
marketing_offline_mu[18]	0.338	0.349	-0.289	1.108	0.044	0.035
marketing_offline_mu[19]	0.081	0.365	-0.542	0.675	0.129	0.094
marketing_offline_mu[20]	0.379	0.388	-0.292	1.150	0.055	0.042
marketing_offline_mu[21]	0.500	0.364	-0.268	1.100	0.080	0.057
marketing_offline_mu[22]	0.359	0.372	-0.166	1.121	0.096	0.069
marketing_offline_mu[23]	0.225	0.333	-0.358	0.910	0.051	0.036
marketing_offline_mu[24]	0.269	0.421	-0.400	1.011	0.101	0.073
marketing_offline_mu[25]	0.096	0.399	-0.435	0.914	0.157	0.116
marketing_offline_mu[26]	0.390	0.508	-0.319	1.276	0.220	0.201

marketing_offline_mu[27]	0.126	0.324	-0.370	0.805	0.054	0.039
marketing_offline_mu[28]	0.383	0.402	-0.353	1.207	0.158	0.117
marketing_offline_mu[29]	0.273	0.374	-0.347	0.963	0.089	0.064
marketing_offline_mu[30]	0.261	0.325	-0.387	0.853	0.055	0.045
marketing_offline_mu[31]	0.340	0.506	-0.365	1.089	0.237	0.196
marketing_offline_mu[32]	0.148	0.415	-0.624	0.904	0.075	0.054
marketing_offline_mu[33]	0.239	0.542	-0.522	1.297	0.139	0.100
marketing_offline_mu[34]	0.137	0.460	-0.695	0.944	0.099	0.071
marketing_offline_mu[35]	0.179	0.405	-0.530	1.014	0.063	0.045
marketing_offline_mu[36]	0.174	0.475	-0.740	1.076	0.145	0.106
marketing_offline_mu[37]	0.217	0.481	-0.680	1.064	0.154	0.113
marketing_offline_mu[38]	0.353	0.579	-0.699	1.260	0.192	0.140
marketing_offline_mu[39]	0.238	0.530	-0.605	1.077	0.244	0.184
marketing_offline_mu[40]	0.605	0.560	-0.497	1.347	0.195	0.143
marketing_offline_mu[41]	0.571	0.600	-0.413	1.497	0.222	0.184
marketing_offline_mu[42]	0.447	0.355	-0.237	1.085	0.060	0.043
marketing_offline_mu[43]	0.313	0.539	-0.513	1.299	0.183	0.134
marketing_offline_mu[44]	0.093	0.464	-0.773	0.992	0.136	0.099
marketing_offline_mu[45]	0.471	0.562	-0.493	1.753	0.180	0.131
marketing_offline_mu[46]	0.429	0.400	-0.188	1.403	0.065	0.061
marketing_offline_mu[47]	0.482	0.334	-0.186	1.128	0.053	0.041
marketing_offline_mu[48]	0.348	0.306	-0.203	0.919	0.081	0.058
marketing_offline_mu[49]	0.495	0.326	-0.012	1.291	0.052	0.040
marketing_offline_mu[50]	0.296	0.325	-0.352	0.831	0.048	0.034
marketing_offline_mu[51]	0.476	0.359	-0.123	1.162	0.075	0.065
marketing_offline_mu[52]	0.553	0.323	-0.026	1.125	0.039	0.028
marketing_offline_mu[53]	0.463	0.348	-0.125	1.273	0.083	0.071
marketing_offline_mu[54]	0.263	0.358	-0.373	0.914	0.056	0.041
marketing_offline_mu[55]	0.566	0.368	-0.135	1.208	0.091	0.073
marketing_offline_mu[56]	0.408	0.362	-0.136	1.138	0.055	0.044
marketing_offline_mu[57]	0.628	0.349	-0.158	1.114	0.056	0.040
marketing_offline_mu[58]	0.314	0.496	-0.577	1.096	0.136	0.112
marketing_offline_mu[59]	0.498	0.559	-0.243	1.631	0.107	0.077
marketing_offline_mu[60]	0.403	0.435	-0.323	1.304	0.132	0.096

marketing_offline_mu[61]	0.100	0.512	-0.549	1.048	0.129	0.093
marketing_offline_mu[62]	0.483	0.420	-0.328	1.233	0.075	0.053
marketing_offline_mu[63]	0.171	0.470	-0.701	1.068	0.123	0.088
marketing_offline_mu[64]	0.445	0.501	-0.579	1.346	0.153	0.111
marketing_offline_mu[65]	0.222	0.346	-0.376	0.922	0.057	0.041
marketing_offline_mu[66]	0.226	0.328	-0.345	0.817	0.096	0.070
marketing_offline_mu[67]	0.339	0.324	-0.281	1.033	0.054	0.039
marketing_offline_mu[68]	0.356	0.457	-0.481	1.158	0.087	0.062
marketing_offline_mu[69]	0.513	0.518	-0.651	1.337	0.121	0.087
marketing_offline_mu[70]	0.259	0.473	-0.573	1.142	0.099	0.071
marketing_offline_mu[71]	0.245	0.433	-0.569	0.960	0.082	0.059
marketing_offline_mu[72]	0.379	0.479	-0.308	1.209	0.225	0.197
marketing_offline_mu[73]	0.198	0.506	-0.511	1.347	0.118	0.085
marketing_offline_mu[74]	0.336	0.588	-0.507	1.314	0.284	0.216
marketing_offline_mu[75]	0.190	0.419	-0.527	1.067	0.089	0.077
marketing_offline_mu[76]	0.464	0.469	-0.304	1.221	0.154	0.131
marketing_offline_mu[77]	0.489	0.468	-0.250	1.464	0.150	0.110
marketing_offline_mu[78]	0.288	0.466	-0.397	1.199	0.083	0.059
marketing_offline_mu[79]	0.698	0.432	-0.031	1.373	0.194	0.146
marketing_offline_mu[80]	0.239	0.472	-0.800	0.954	0.134	0.097
marketing_offline_mu[81]	0.265	0.491	-0.353	1.338	0.163	0.119
marketing_offline_mu[82]	0.250	0.497	-0.468	1.201	0.205	0.153
marketing_offline_mu[83]	0.103	0.432	-0.601	0.920	0.114	0.082
marketing_offline_mu[84]	0.422	0.385	-0.388	1.025	0.071	0.050
marketing_offline_mu[85]	0.486	0.417	-0.228	1.093	0.173	0.135
marketing_offline_mu[86]	0.642	0.496	-0.302	1.434	0.109	0.078
marketing_offline_mu[87]	0.349	0.532	-0.711	1.285	0.132	0.095
marketing_offline_mu[88]	0.206	0.484	-0.651	1.240	0.211	0.159
marketing_offline_mu[89]	0.162	0.471	-0.703	1.109	0.100	0.072
marketing_offline_mu[90]	0.207	0.534	-0.673	1.276	0.141	0.102
marketing_offline_mu[91]	0.308	0.497	-0.552	1.121	0.160	0.117
marketing_offline_mu[92]	0.227	0.525	-0.643	1.166	0.141	0.108
marketing_offline_mu[93]	0.386	0.539	-0.547	1.276	0.207	0.153
marketing_offline_mu[94]	0.433	0.577	-0.328	1.469	0.239	0.178

marketing_offline_mu[95]	0.215	0.676	-0.801	1.218	0.322	0.244
marketing_offline_mu[96]	0.638	0.445	-0.236	1.414	0.076	0.054
marketing_offline_mu[97]	0.237	0.461	-0.599	1.136	0.101	0.072
marketing_offline_mu[98]	0.431	0.472	-0.463	1.404	0.078	0.058
marketing_offline_mu[99]	0.486	0.353	-0.274	1.090	0.055	0.039
marketing_offline_mu[100]	0.453	0.468	-0.175	1.374	0.191	0.142
marketing_offline_mu[101]	0.167	0.529	-0.847	1.292	0.086	0.125
marketing_offline_mu[102]	0.359	0.489	-0.543	1.083	0.205	0.153
marketing_offline_mu[103]	0.145	0.461	-0.714	1.103	0.143	0.104
other_products_mu[0]	0.974	0.046	0.896	1.068	0.002	0.001
other_products_mu[1]	1.016	0.046	0.936	1.087	0.011	0.008
other_products_mu[2]	0.976	0.042	0.893	1.053	0.002	0.001
other_products_mu[3]	1.014	0.043	0.924	1.093	0.002	0.001
other_products_mu[4]	1.056	0.048	0.967	1.133	0.009	0.006
other_products_mu[5]	1.040	0.043	0.966	1.123	0.007	0.005
other_products_mu[6]	1.000	0.048	0.918	1.082	0.013	0.010
other_products_mu[7]	0.966	0.045	0.877	1.056	0.002	0.001
other_products_mu[8]	0.984	0.047	0.909	1.078	0.008	0.005
other_products_mu[9]	0.987	0.043	0.911	1.080	0.002	0.001
other_products_mu[10]	0.985	0.042	0.898	1.066	0.002	0.001
other_products_mu[11]	0.986	0.053	0.911	1.085	0.017	0.013
other_products_mu[12]	0.993	0.048	0.917	1.095	0.008	0.006
other_products_mu[13]	0.980	0.053	0.901	1.080	0.013	0.010
other_products_mu[14]	0.990	0.044	0.906	1.072	0.006	0.004
other_products_mu[15]	0.988	0.044	0.913	1.080	0.002	0.001
other_products_mu[16]	0.994	0.050	0.907	1.089	0.006	0.004
other_products_mu[17]	0.980	0.043	0.898	1.066	0.002	0.001
other_products_mu[18]	1.035	0.041	0.958	1.123	0.002	0.001
other_products_mu[19]	1.033	0.044	0.949	1.123	0.002	0.001
other_products_mu[20]	0.998	0.042	0.919	1.071	0.002	0.001
other_products_mu[21]	1.038	0.046	0.959	1.125	0.002	0.001
other_products_mu[22]	0.999	0.046	0.919	1.086	0.009	0.006
other_products_mu[23]	0.991	0.047	0.903	1.073	0.006	0.004
other_products_mu[24]	1.007	0.047	0.917	1.088	0.004	0.003

other_products_mu[25]	1.028	0.049	0.944	1.110	0.013	0.009
other_products_mu[26]	1.027	0.050	0.937	1.099	0.012	0.009
other_products_mu[27]	0.982	0.047	0.887	1.064	0.003	0.002
other_products_mu[28]	1.021	0.044	0.941	1.108	0.002	0.002
other_products_mu[29]	1.022	0.043	0.943	1.099	0.005	0.003
other_products_mu[30]	0.995	0.054	0.909	1.081	0.019	0.014
other_products_mu[31]	0.961	0.045	0.880	1.045	0.004	0.003
other_products_mu[32]	0.956	0.048	0.866	1.043	0.003	0.002
other_products_mu[33]	1.032	0.070	0.940	1.161	0.027	0.020
other_products_mu[34]	1.000	0.047	0.909	1.088	0.002	0.002
other_products_mu[35]	0.937	0.043	0.863	1.026	0.002	0.001
other_products_mu[36]	0.982	0.050	0.911	1.072	0.014	0.010
other_products_mu[37]	0.997	0.048	0.918	1.075	0.012	0.009
other_products_mu[38]	0.985	0.050	0.911	1.074	0.013	0.009
other_products_mu[39]	1.006	0.049	0.927	1.081	0.016	0.012
other_products_mu[40]	0.991	0.043	0.906	1.071	0.002	0.001
other_products_mu[41]	0.939	0.052	0.858	1.029	0.016	0.012
other_products_mu[42]	0.976	0.045	0.896	1.065	0.002	0.002
other_products_mu[43]	1.007	0.047	0.928	1.095	0.009	0.006
other_products_mu[44]	1.012	0.042	0.932	1.096	0.002	0.001
other_products_mu[45]	1.014	0.041	0.934	1.090	0.002	0.001
other_products_mu[46]	0.967	0.043	0.885	1.046	0.004	0.003
other_products_mu[47]	0.963	0.042	0.884	1.049	0.002	0.001
other_products_mu[48]	0.994	0.041	0.915	1.065	0.002	0.001
other_products_mu[49]	0.983	0.051	0.895	1.084	0.007	0.005
other_products_mu[50]	0.991	0.048	0.897	1.067	0.005	0.004
other_products_mu[51]	0.969	0.054	0.886	1.060	0.017	0.012
other_products_mu[52]	0.989	0.042	0.901	1.064	0.001	0.001
other_products_mu[53]	0.997	0.047	0.907	1.082	0.003	0.002
other_products_mu[54]	0.992	0.044	0.920	1.080	0.003	0.002
other_products_mu[55]	1.002	0.050	0.909	1.073	0.012	0.009
other_products_mu[56]	0.997	0.045	0.904	1.084	0.002	0.001
other_products_mu[57]	1.006	0.042	0.914	1.078	0.001	0.001
other_products_mu[58]	1.004	0.043	0.923	1.082	0.003	0.002

other_products_mu[59]	1.026	0.067	0.934	1.150	0.028	0.021
other_products_mu[60]	0.996	0.041	0.917	1.074	0.002	0.002
other_products_mu[61]	1.024	0.043	0.943	1.099	0.007	0.005
other_products_mu[62]	1.046	0.055	0.955	1.130	0.017	0.013
other_products_mu[63]	1.025	0.050	0.957	1.123	0.013	0.010
other_products_mu[64]	1.021	0.040	0.938	1.091	0.001	0.001
other_products_mu[65]	1.004	0.043	0.916	1.077	0.002	0.001
other_products_mu[66]	0.992	0.064	0.878	1.084	0.025	0.018
other_products_mu[67]	1.023	0.045	0.941	1.106	0.008	0.006
other_products_mu[68]	1.033	0.039	0.957	1.104	0.002	0.001
other_products_mu[69]	1.044	0.044	0.938	1.111	0.004	0.003
other_products_mu[70]	1.024	0.053	0.937	1.099	0.017	0.012
other_products_mu[71]	1.032	0.044	0.967	1.109	0.013	0.009
other_products_mu[72]	0.985	0.055	0.883	1.062	0.017	0.013
other_products_mu[73]	1.023	0.044	0.944	1.107	0.004	0.003
other_products_mu[74]	0.998	0.049	0.918	1.089	0.005	0.004
other_products_mu[75]	0.967	0.045	0.860	1.038	0.003	0.002
other_products_mu[76]	0.941	0.049	0.871	1.038	0.011	0.008
other_products_mu[77]	0.954	0.049	0.850	1.018	0.012	0.008
other_products_mu[78]	0.930	0.045	0.867	1.029	0.008	0.006
other_products_mu[79]	0.932	0.046	0.837	1.020	0.002	0.001
other_products_mu[80]	0.922	0.052	0.852	1.026	0.011	0.008
other_products_mu[81]	0.943	0.044	0.864	1.023	0.002	0.002
other_products_mu[82]	0.985	0.042	0.915	1.064	0.005	0.004
other_products_mu[83]	1.035	0.044	0.928	1.108	0.002	0.001
other_products_mu[84]	1.040	0.042	0.963	1.126	0.002	0.001
other_products_mu[85]	1.035	0.047	0.938	1.119	0.007	0.005
other_products_mu[86]	1.034	0.043	0.958	1.123	0.002	0.001
other_products_mu[87]	0.982	0.045	0.897	1.076	0.002	0.001
other_products_mu[88]	1.001	0.052	0.910	1.082	0.015	0.011
other_products_mu[89]	0.988	0.045	0.899	1.074	0.002	0.001
other_products_mu[90]	0.988	0.043	0.894	1.056	0.005	0.004
other_products_mu[91]	0.991	0.047	0.889	1.067	0.004	0.003
other_products_mu[92]	1.058	0.045	0.979	1.151	0.002	0.001

other_products_mu[93]	1.073	0.042	0.996	1.151	0.002	0.002
other_products_mu[94]	1.072	0.045	0.981	1.146	0.004	0.003
other_products_mu[95]	1.071	0.038	1.000	1.148	0.001	0.001
other_products_mu[96]	0.993	0.049	0.904	1.089	0.006	0.004
other_products_mu[97]	0.950	0.045	0.867	1.041	0.003	0.002
other_products_mu[98]	1.009	0.046	0.916	1.095	0.002	0.001
other_products_mu[99]	1.021	0.047	0.944	1.121	0.004	0.003
other_products_mu[100]	1.030	0.045	0.944	1.117	0.002	0.001
other_products_mu[101]	1.041	0.046	0.960	1.139	0.002	0.001
other_products_mu[102]	1.013	0.044	0.927	1.095	0.002	0.001
other_products_mu[103]	0.994	0.046	0.903	1.084	0.002	0.001
competition_mu[0]	0.992	0.014	0.969	1.017	0.005	0.004
competition_mu[1]	0.994	0.011	0.975	1.015	0.001	0.000
competition_mu[2]	0.997	0.012	0.976	1.018	0.004	0.003
competition_mu[3]	1.002	0.012	0.979	1.023	0.001	0.000
competition_mu[4]	1.000	0.011	0.979	1.023	0.001	0.001
competition_mu[5]	1.002	0.011	0.980	1.022	0.002	0.001
competition_mu[6]	1.001	0.011	0.980	1.020	0.001	0.001
competition_mu[7]	0.979	0.012	0.960	1.000	0.003	0.002
competition_mu[8]	0.994	0.011	0.975	1.016	0.001	0.000
competition_mu[9]	1.003	0.011	0.981	1.024	0.000	0.000
competition_mu[10]	1.004	0.012	0.985	1.027	0.003	0.002
competition_mu[11]	1.002	0.011	0.982	1.024	0.000	0.000
competition_mu[12]	0.987	0.010	0.967	1.006	0.000	0.000
competition_mu[13]	0.982	0.011	0.962	1.005	0.000	0.000
competition_mu[14]	0.976	0.010	0.956	0.995	0.000	0.000
competition_mu[15]	1.001	0.011	0.977	1.020	0.001	0.001
competition_mu[16]	1.010	0.012	0.991	1.035	0.001	0.001
competition_mu[17]	1.010	0.011	0.990	1.031	0.000	0.000
competition_mu[18]	0.997	0.012	0.974	1.018	0.003	0.002
competition_mu[19]	0.996	0.011	0.975	1.016	0.001	0.000
competition_mu[20]	0.997	0.011	0.977	1.020	0.000	0.000
competition_mu[21]	1.011	0.016	0.984	1.036	0.005	0.004

competition_mu[22]	1.001	0.012	0.976	1.021	0.001	0.000
competition_mu[23]	1.000	0.013	0.980	1.026	0.003	0.003
competition_mu[24]	0.990	0.011	0.968	1.010	0.000	0.000
competition_mu[25]	0.991	0.011	0.971	1.010	0.001	0.001
competition_mu[26]	0.999	0.013	0.978	1.022	0.004	0.003
competition_mu[27]	1.000	0.011	0.980	1.021	0.001	0.001
competition_mu[28]	1.006	0.011	0.982	1.024	0.001	0.000
competition_mu[29]	1.006	0.012	0.983	1.029	0.000	0.000
competition_mu[30]	0.995	0.012	0.971	1.018	0.002	0.002
competition_mu[31]	0.986	0.011	0.965	1.005	0.000	0.000
competition_mu[32]	0.990	0.013	0.968	1.013	0.003	0.002
competition_mu[33]	1.007	0.015	0.984	1.035	0.004	0.003
competition_mu[34]	1.010	0.013	0.988	1.037	0.000	0.000
competition_mu[35]	1.008	0.010	0.988	1.026	0.000	0.000
competition_mu[36]	1.001	0.014	0.978	1.026	0.003	0.002
competition_mu[37]	0.988	0.013	0.967	1.012	0.003	0.002
competition_mu[38]	0.997	0.016	0.974	1.028	0.006	0.005
competition_mu[39]	0.999	0.012	0.978	1.021	0.001	0.001
competition_mu[40]	1.007	0.012	0.981	1.025	0.002	0.002
competition_mu[41]	1.003	0.012	0.980	1.026	0.000	0.000
competition_mu[42]	0.990	0.012	0.967	1.010	0.001	0.001
competition_mu[43]	0.985	0.013	0.964	1.009	0.004	0.003
competition_mu[44]	0.998	0.011	0.977	1.017	0.000	0.000
competition_mu[45]	1.011	0.013	0.990	1.033	0.002	0.002
competition_mu[46]	1.019	0.013	0.998	1.043	0.003	0.002
competition_mu[47]	1.018	0.012	0.997	1.043	0.000	0.000
competition_mu[48]	1.007	0.012	0.983	1.029	0.002	0.001
competition_mu[49]	0.996	0.012	0.973	1.018	0.001	0.001
competition_mu[50]	1.001	0.013	0.979	1.028	0.004	0.003
competition_mu[51]	1.015	0.013	0.991	1.034	0.003	0.002
competition_mu[52]	1.016	0.015	0.992	1.042	0.005	0.004
competition_mu[53]	1.007	0.013	0.983	1.028	0.002	0.001
competition_mu[54]	0.995	0.012	0.975	1.019	0.001	0.001
competition_mu[55]	0.993	0.011	0.970	1.012	0.001	0.000

competition_mu[56]	0.993	0.012	0.969	1.011	0.002	0.001
competition_mu[57]	1.010	0.013	0.987	1.032	0.002	0.002
competition_mu[58]	1.017	0.011	0.998	1.040	0.000	0.000
competition_mu[59]	1.005	0.011	0.987	1.029	0.000	0.000
competition_mu[60]	0.997	0.012	0.972	1.014	0.002	0.001
competition_mu[61]	1.000	0.014	0.979	1.024	0.004	0.003
competition_mu[62]	1.002	0.014	0.980	1.028	0.004	0.003
competition_mu[63]	1.012	0.012	0.987	1.029	0.002	0.002
competition_mu[64]	1.021	0.013	1.000	1.043	0.004	0.003
competition_mu[65]	1.019	0.012	0.994	1.035	0.003	0.002
competition_mu[66]	1.005	0.011	0.981	1.026	0.000	0.000
competition_mu[67]	1.002	0.011	0.982	1.024	0.000	0.000
competition_mu[68]	1.003	0.012	0.983	1.026	0.001	0.001
competition_mu[69]	1.012	0.012	0.988	1.031	0.001	0.001
competition_mu[70]	1.011	0.012	0.989	1.035	0.002	0.001
competition_mu[71]	1.001	0.011	0.982	1.023	0.001	0.000
competition_mu[72]	0.972	0.013	0.952	0.997	0.002	0.002
competition_mu[73]	1.000	0.017	0.967	1.026	0.005	0.004
competition_mu[74]	1.005	0.015	0.982	1.033	0.004	0.003
competition_mu[75]	0.993	0.014	0.968	1.014	0.005	0.003
competition_mu[76]	0.998	0.012	0.977	1.020	0.001	0.001
competition_mu[77]	1.004	0.014	0.982	1.027	0.005	0.004
competition_mu[78]	0.985	0.013	0.961	1.006	0.003	0.002
competition_mu[79]	0.981	0.011	0.959	0.999	0.000	0.000
competition_mu[80]	0.990	0.012	0.967	1.007	0.002	0.002
competition_mu[81]	0.999	0.013	0.978	1.022	0.004	0.003
competition_mu[82]	1.010	0.011	0.991	1.029	0.001	0.001
competition_mu[83]	1.008	0.011	0.990	1.029	0.001	0.001
competition_mu[84]	0.999	0.011	0.979	1.021	0.000	0.000
competition_mu[85]	0.988	0.011	0.965	1.007	0.001	0.000
competition_mu[86]	0.992	0.012	0.970	1.012	0.002	0.001
competition_mu[87]	1.000	0.011	0.978	1.022	0.000	0.000
competition_mu[88]	1.003	0.011	0.985	1.024	0.002	0.001
competition_mu[89]	1.000	0.013	0.978	1.025	0.003	0.002

competition_mu[90]	0.996	0.012	0.978	1.020	0.002	0.001
competition_mu[91]	0.990	0.012	0.963	1.012	0.001	0.000
competition_mu[92]	0.992	0.010	0.975	1.013	0.001	0.001
competition_mu[93]	1.008	0.011	0.991	1.032	0.002	0.001
competition_mu[94]	1.012	0.012	0.988	1.033	0.001	0.001
competition_mu[95]	1.015	0.014	0.993	1.040	0.005	0.004
competition_mu[96]	1.008	0.011	0.988	1.029	0.000	0.000
competition_mu[97]	1.003	0.011	0.982	1.024	0.001	0.000
competition_mu[98]	1.003	0.013	0.978	1.024	0.004	0.003
competition_mu[99]	1.007	0.016	0.980	1.036	0.005	0.004
competition_mu[100]	0.999	0.012	0.980	1.023	0.000	0.000
competition_mu[101]	0.997	0.012	0.973	1.017	0.002	0.001
competition_mu[102]	1.001	0.013	0.978	1.022	0.003	0.002
competition_mu[103]	1.009	0.013	0.986	1.029	0.002	0.002
tgt_mu[0]	1.030	0.007	1.018	1.042	0.001	0.001
tgt_mu[1]	1.013	0.005	1.003	1.022	0.001	0.000
tgt_mu[2]	1.007	0.005	0.998	1.017	0.000	0.000
tgt_mu[3]	1.011	0.005	1.001	1.021	0.001	0.000
tgt_mu[4]	1.008	0.006	0.997	1.019	0.000	0.000
tgt_mu[5]	1.005	0.006	0.993	1.017	0.000	0.000
tgt_mu[6]	1.016	0.006	1.005	1.026	0.000	0.000
tgt_mu[7]	0.988	0.006	0.979	1.000	0.001	0.000
tgt_mu[8]	0.998	0.006	0.990	1.009	0.002	0.001
tgt_mu[9]	1.006	0.006	0.996	1.019	0.001	0.001
tgt_mu[10]	1.003	0.006	0.993	1.018	0.001	0.000
tgt_mu[11]	0.997	0.007	0.985	1.010	0.001	0.001
tgt_mu[12]	0.996	0.007	0.986	1.011	0.001	0.001
tgt_mu[13]	0.986	0.007	0.975	1.000	0.001	0.001
tgt_mu[14]	0.988	0.007	0.975	1.000	0.001	0.000
tgt_mu[15]	1.003	0.005	0.994	1.013	0.000	0.000
tgt_mu[16]	1.011	0.005	1.002	1.021	0.001	0.001
tgt_mu[17]	1.015	0.005	1.006	1.025	0.000	0.000
tgt_mu[18]	1.002	0.006	0.991	1.012	0.000	0.000
tgt_mu[19]	0.988	0.006	0.978	1.001	0.001	0.001

tgt_mu[20]	0.998	0.006	0.988	1.008	0.002	0.001
tgt_mu[21]	0.994	0.010	0.974	1.008	0.004	0.003
tgt_mu[22]	0.992	0.006	0.983	1.003	0.001	0.001
tgt_mu[23]	0.991	0.005	0.981	1.001	0.000	0.000
tgt_mu[24]	0.981	0.006	0.971	0.993	0.001	0.001
tgt_mu[25]	1.000	0.006	0.989	1.011	0.001	0.000
tgt_mu[26]	0.995	0.005	0.984	1.004	0.000	0.000
tgt_mu[27]	0.999	0.005	0.990	1.009	0.000	0.000
tgt_mu[28]	0.999	0.004	0.991	1.006	0.000	0.000
tgt_mu[29]	1.002	0.004	0.994	1.010	0.000	0.000
tgt_mu[30]	0.993	0.006	0.982	1.003	0.000	0.000
tgt_mu[31]	0.994	0.007	0.981	1.005	0.000	0.000
tgt_mu[32]	0.994	0.006	0.984	1.006	0.000	0.000
tgt_mu[33]	0.993	0.005	0.984	1.002	0.001	0.001
tgt_mu[34]	0.993	0.006	0.981	1.004	0.001	0.000
tgt_mu[35]	0.998	0.006	0.987	1.010	0.001	0.000
tgt_mu[36]	0.986	0.005	0.977	0.997	0.001	0.000
tgt_mu[37]	0.986	0.006	0.976	0.996	0.001	0.001
tgt_mu[38]	0.990	0.006	0.980	1.002	0.001	0.001
tgt_mu[39]	1.001	0.005	0.991	1.011	0.001	0.000
tgt_mu[40]	1.011	0.005	1.002	1.022	0.001	0.001
tgt_mu[41]	1.008	0.007	0.995	1.019	0.001	0.001
tgt_mu[42]	0.998	0.007	0.987	1.012	0.001	0.001
tgt_mu[43]	0.997	0.008	0.985	1.013	0.001	0.001
tgt_mu[44]	1.003	0.006	0.993	1.015	0.001	0.000
tgt_mu[45]	1.008	0.005	0.998	1.018	0.000	0.000
tgt_mu[46]	1.028	0.006	1.016	1.039	0.001	0.000
tgt_mu[47]	1.029	0.006	1.017	1.040	0.001	0.001
tgt_mu[48]	1.003	0.006	0.992	1.014	0.000	0.000
tgt_mu[49]	0.997	0.006	0.986	1.010	0.000	0.000
tgt_mu[50]	0.994	0.006	0.984	1.006	0.000	0.000
tgt_mu[51]	1.005	0.007	0.993	1.019	0.001	0.000
tgt_mu[52]	1.012	0.007	0.998	1.025	0.001	0.000
tgt_mu[53]	1.009	0.007	0.996	1.021	0.001	0.000

tgt_mu[54]	1.004	0.006	0.993	1.016	0.000	0.000
tgt_mu[55]	1.006	0.006	0.993	1.016	0.000	0.000
tgt_mu[56]	1.000	0.006	0.988	1.011	0.000	0.000
tgt_mu[57]	0.993	0.007	0.980	1.007	0.000	0.000
tgt_mu[58]	1.002	0.007	0.990	1.015	0.001	0.000
tgt_mu[59]	0.993	0.005	0.984	1.002	0.000	0.000
tgt_mu[60]	0.967	0.011	0.950	0.986	0.005	0.003
tgt_mu[61]	1.002	0.005	0.993	1.011	0.000	0.000
tgt_mu[62]	0.985	0.006	0.974	0.996	0.001	0.000
tgt_mu[63]	0.995	0.006	0.984	1.006	0.000	0.000
tgt_mu[64]	1.002	0.006	0.991	1.016	0.000	0.000
tgt_mu[65]	0.994	0.006	0.983	1.007	0.001	0.000
tgt_mu[66]	0.984	0.005	0.973	0.993	0.001	0.000
tgt_mu[67]	0.977	0.006	0.965	0.987	0.001	0.001
tgt_mu[68]	0.982	0.006	0.970	0.994	0.001	0.001
tgt_mu[69]	0.990	0.006	0.980	1.001	0.001	0.001
tgt_mu[70]	0.994	0.005	0.984	1.004	0.000	0.000
tgt_mu[71]	0.991	0.005	0.982	1.000	0.000	0.000
tgt_mu[72]	0.976	0.007	0.962	0.991	0.001	0.000
tgt_mu[73]	0.980	0.014	0.955	1.000	0.004	0.003
tgt_mu[74]	0.985	0.013	0.965	1.007	0.004	0.003
tgt_mu[75]	0.988	0.007	0.976	1.000	0.001	0.000
tgt_mu[76]	0.998	0.008	0.984	1.015	0.001	0.001
tgt_mu[77]	1.005	0.008	0.989	1.018	0.001	0.001
tgt_mu[78]	0.989	0.006	0.977	0.999	0.000	0.000
tgt_mu[79]	0.997	0.007	0.983	1.010	0.001	0.000
tgt_mu[80]	1.003	0.007	0.989	1.016	0.001	0.000
tgt_mu[81]	0.999	0.006	0.986	1.011	0.001	0.000
tgt_mu[82]	0.999	0.006	0.988	1.010	0.001	0.000
tgt_mu[83]	0.996	0.006	0.986	1.007	0.000	0.000
tgt_mu[84]	0.994	0.006	0.984	1.005	0.000	0.000
tgt_mu[85]	0.990	0.006	0.978	1.000	0.001	0.001
tgt_mu[86]	1.004	0.006	0.992	1.015	0.000	0.000
tgt_mu[87]	1.007	0.006	0.997	1.018	0.000	0.000

tgt_mu[88]	1.006	0.006	0.995	1.017	0.001	0.000
tgt_mu[89]	1.002	0.006	0.989	1.011	0.001	0.000
tgt_mu[90]	1.006	0.006	0.994	1.016	0.000	0.000
tgt_mu[91]	0.996	0.006	0.984	1.006	0.001	0.000
tgt_mu[92]	0.983	0.006	0.969	0.993	0.001	0.001
tgt_mu[93]	0.993	0.006	0.981	1.004	0.001	0.000
tgt_mu[94]	1.011	0.006	1.000	1.022	0.001	0.001
tgt_mu[95]	1.016	0.006	1.004	1.028	0.001	0.000
tgt_mu[96]	1.028	0.007	1.015	1.039	0.001	0.000
tgt_mu[97]	1.022	0.007	1.009	1.034	0.001	0.000
tgt_mu[98]	1.020	0.006	1.007	1.030	0.000	0.000
tgt_mu[99]	1.023	0.006	1.011	1.034	0.000	0.000
tgt_mu[100]	1.015	0.006	1.005	1.027	0.000	0.000
tgt_mu[101]	1.005	0.006	0.995	1.017	0.000	0.000
tgt_mu[102]	1.004	0.005	0.993	1.013	0.000	0.000
tgt_mu[103]	1.013	0.006	1.002	1.024	0.000	0.000
seasonality_holidays_mu[0]	1.051	0.111	0.848	1.229	0.024	0.017
seasonality_holidays_mu[1]	1.045	0.105	0.818	1.204	0.007	0.005
seasonality_holidays_mu[2]	1.032	0.094	0.865	1.229	0.005	0.004
seasonality_holidays_mu[3]	1.038	0.094	0.872	1.243	0.004	0.003
seasonality_holidays_mu[4]	1.032	0.100	0.839	1.237	0.005	0.004
seasonality_holidays_mu[5]	1.059	0.108	0.840	1.256	0.005	0.004
seasonality_holidays_mu[6]	1.043	0.105	0.852	1.271	0.004	0.003
seasonality_holidays_mu[7]	0.988	0.131	0.775	1.183	0.050	0.037
seasonality_holidays_mu[8]	0.975	0.106	0.761	1.131	0.027	0.020
seasonality_holidays_mu[9]	0.959	0.110	0.818	1.188	0.021	0.015
seasonality_holidays_mu[10]	0.983	0.117	0.827	1.205	0.031	0.023
seasonality_holidays_mu[11]	1.014	0.106	0.819	1.236	0.004	0.003
seasonality_holidays_mu[12]	1.018	0.091	0.836	1.196	0.004	0.003
seasonality_holidays_mu[13]	1.007	0.098	0.819	1.189	0.006	0.004
seasonality_holidays_mu[14]	0.985	0.102	0.770	1.168	0.005	0.004
seasonality_holidays_mu[15]	0.996	0.105	0.787	1.151	0.028	0.021
seasonality_holidays_mu[16]	0.946	0.155	0.656	1.150	0.067	0.050
seasonality_holidays_mu[17]	0.957	0.136	0.729	1.152	0.053	0.039

seasonality_holidays_mu[18]	0.969	0.102	0.791	1.165	0.010	0.008
seasonality_holidays_mu[19]	0.956	0.094	0.805	1.158	0.004	0.003
seasonality_holidays_mu[20]	0.872	0.099	0.654	1.045	0.006	0.005
seasonality_holidays_mu[21]	0.560	0.102	0.399	0.750	0.021	0.015
seasonality_holidays_mu[22]	0.858	0.104	0.680	1.057	0.017	0.013
seasonality_holidays_mu[23]	0.885	0.101	0.702	1.091	0.013	0.010
seasonality_holidays_mu[24]	0.918	0.094	0.748	1.115	0.004	0.003
seasonality_holidays_mu[25]	0.954	0.102	0.778	1.144	0.016	0.012
seasonality_holidays_mu[26]	0.874	0.116	0.700	1.068	0.039	0.029
seasonality_holidays_mu[27]	0.962	0.103	0.744	1.126	0.012	0.009
seasonality_holidays_mu[28]	0.991	0.105	0.784	1.164	0.018	0.013
seasonality_holidays_mu[29]	0.985	0.101	0.794	1.187	0.006	0.004
seasonality_holidays_mu[30]	0.963	0.108	0.791	1.189	0.018	0.013
seasonality_holidays_mu[31]	0.959	0.112	0.786	1.183	0.015	0.011
seasonality_holidays_mu[32]	0.981	0.093	0.800	1.144	0.005	0.003
seasonality_holidays_mu[33]	0.985	0.094	0.809	1.163	0.005	0.003
seasonality_holidays_mu[34]	0.974	0.114	0.790	1.201	0.019	0.014
seasonality_holidays_mu[35]	0.997	0.095	0.820	1.174	0.005	0.003
seasonality_holidays_mu[36]	0.992	0.101	0.793	1.180	0.004	0.003
seasonality_holidays_mu[37]	0.980	0.097	0.795	1.159	0.006	0.005
seasonality_holidays_mu[38]	0.971	0.092	0.782	1.134	0.008	0.006
seasonality_holidays_mu[39]	1.014	0.119	0.780	1.180	0.038	0.029
seasonality_holidays_mu[40]	0.995	0.109	0.795	1.204	0.006	0.005
seasonality_holidays_mu[41]	1.021	0.095	0.849	1.204	0.004	0.004
seasonality_holidays_mu[42]	1.028	0.100	0.861	1.240	0.005	0.003
seasonality_holidays_mu[43]	0.992	0.136	0.776	1.214	0.051	0.038
seasonality_holidays_mu[44]	1.051	0.109	0.838	1.203	0.028	0.021
seasonality_holidays_mu[45]	1.014	0.109	0.829	1.220	0.008	0.006
seasonality_holidays_mu[46]	1.017	0.110	0.837	1.245	0.007	0.005
seasonality_holidays_mu[47]	1.029	0.096	0.851	1.222	0.005	0.004
seasonality_holidays_mu[48]	1.033	0.104	0.831	1.217	0.005	0.004
seasonality_holidays_mu[49]	0.994	0.135	0.773	1.197	0.052	0.039
seasonality_holidays_mu[50]	1.056	0.111	0.858	1.225	0.031	0.023

seasonality_holidays_mu[51]	1.042	0.095	0.870	1.236	0.004	0.003
seasonality_holidays_mu[52]	1.051	0.106	0.851	1.258	0.005	0.003
seasonality_holidays_mu[53]	1.046	0.100	0.856	1.237	0.020	0.014
seasonality_holidays_mu[54]	1.046	0.102	0.854	1.219	0.022	0.016
seasonality_holidays_mu[55]	1.005	0.113	0.858	1.225	0.037	0.027
seasonality_holidays_mu[56]	1.036	0.114	0.843	1.255	0.019	0.014
seasonality_holidays_mu[57]	1.030	0.103	0.857	1.246	0.007	0.005
seasonality_holidays_mu[58]	1.031	0.101	0.850	1.228	0.005	0.003
seasonality_holidays_mu[59]	0.992	0.097	0.817	1.189	0.004	0.003
seasonality_holidays_mu[60]	1.005	0.105	0.837	1.251	0.006	0.005
seasonality_holidays_mu[61]	0.954	0.110	0.779	1.145	0.022	0.016
seasonality_holidays_mu[62]	1.016	0.112	0.798	1.210	0.018	0.013
seasonality_holidays_mu[63]	1.021	0.101	0.815	1.218	0.004	0.003
seasonality_holidays_mu[64]	1.008	0.108	0.820	1.214	0.016	0.012
seasonality_holidays_mu[65]	1.000	0.105	0.796	1.197	0.005	0.004
seasonality_holidays_mu[66]	0.992	0.101	0.775	1.179	0.006	0.004
seasonality_holidays_mu[67]	0.944	0.112	0.768	1.160	0.018	0.013
seasonality_holidays_mu[68]	0.992	0.103	0.799	1.189	0.004	0.003
seasonality_holidays_mu[69]	1.003	0.093	0.809	1.181	0.004	0.003
seasonality_holidays_mu[70]	0.990	0.104	0.775	1.194	0.005	0.004
seasonality_holidays_mu[71]	0.941	0.099	0.757	1.120	0.005	0.003
seasonality_holidays_mu[72]	0.887	0.097	0.719	1.089	0.004	0.003
seasonality_holidays_mu[73]	0.350	0.104	0.115	0.526	0.006	0.004
seasonality_holidays_mu[74]	0.385	0.098	0.191	0.542	0.012	0.008
seasonality_holidays_mu[75]	0.865	0.102	0.717	1.052	0.026	0.018
seasonality_holidays_mu[76]	0.943	0.102	0.755	1.150	0.005	0.003
seasonality_holidays_mu[77]	0.941	0.091	0.793	1.144	0.005	0.003
seasonality_holidays_mu[78]	0.927	0.104	0.722	1.107	0.020	0.015
seasonality_holidays_mu[79]	0.939	0.097	0.770	1.121	0.008	0.007
seasonality_holidays_mu[80]	0.986	0.106	0.747	1.150	0.009	0.006
seasonality_holidays_mu[81]	0.968	0.096	0.769	1.139	0.005	0.003
seasonality_holidays_mu[82]	0.993	0.100	0.780	1.168	0.004	0.003
seasonality_holidays_mu[83]	1.023	0.112	0.819	1.184	0.028	0.021
seasonality_holidays_mu[84]	0.959	0.107	0.769	1.167	0.016	0.012

seasonality_holidays_mu[85]	0.992	0.093	0.793	1.170	0.004	0.003
seasonality_holidays_mu[86]	0.993	0.097	0.813	1.174	0.004	0.003
seasonality_holidays_mu[87]	0.970	0.098	0.825	1.178	0.014	0.011
seasonality_holidays_mu[88]	1.017	0.110	0.811	1.188	0.022	0.016
seasonality_holidays_mu[89]	1.008	0.122	0.798	1.185	0.041	0.031
seasonality_holidays_mu[90]	0.988	0.099	0.792	1.170	0.005	0.003
seasonality_holidays_mu[91]	0.998	0.107	0.803	1.184	0.017	0.012
seasonality_holidays_mu[92]	1.005	0.107	0.801	1.204	0.004	0.003
seasonality_holidays_mu[93]	1.044	0.106	0.849	1.232	0.021	0.015
seasonality_holidays_mu[94]	1.014	0.105	0.829	1.207	0.016	0.012
seasonality_holidays_mu[95]	1.016	0.100	0.827	1.204	0.005	0.004
seasonality_holidays_mu[96]	1.049	0.099	0.852	1.209	0.017	0.012
seasonality_holidays_mu[97]	1.003	0.104	0.855	1.223	0.006	0.005
seasonality_holidays_mu[98]	1.006	0.116	0.817	1.231	0.021	0.015
seasonality_holidays_mu[99]	1.048	0.094	0.869	1.214	0.011	0.008
seasonality_holidays_mu[100]	1.039	0.097	0.852	1.225	0.004	0.003
seasonality_holidays_mu[101]	1.009	0.142	0.766	1.215	0.055	0.041
seasonality_holidays_mu[102]	1.085	0.118	0.894	1.263	0.036	0.027
seasonality_holidays_mu[103]	1.040	0.097	0.877	1.258	0.006	0.004
 covid_new_cases_mu[0]	0.358	0.407	-0.559	1.090	0.143	0.105
covid_new_cases_mu[1]	0.238	0.451	-0.487	1.130	0.147	0.108
covid_new_cases_mu[2]	0.541	0.476	-0.224	1.227	0.142	0.144
covid_new_cases_mu[3]	0.156	0.490	-0.558	1.072	0.096	0.068
covid_new_cases_mu[4]	0.162	0.405	-0.658	0.972	0.073	0.061
covid_new_cases_mu[5]	0.418	0.396	-0.504	1.013	0.136	0.104
covid_new_cases_mu[6]	0.233	0.394	-0.578	0.883	0.117	0.085
covid_new_cases_mu[7]	0.212	0.399	-0.503	0.994	0.128	0.094
covid_new_cases_mu[8]	0.231	0.426	-0.560	1.028	0.103	0.074
covid_new_cases_mu[9]	0.214	0.466	-0.609	1.084	0.125	0.090
covid_new_cases_mu[10]	0.381	0.407	-0.325	1.112	0.076	0.082
covid_new_cases_mu[11]	0.155	0.456	-0.736	0.789	0.087	0.062
covid_new_cases_mu[12]	0.249	0.409	-0.587	0.935	0.108	0.078
covid_new_cases_mu[13]	0.222	0.426	-0.625	0.966	0.120	0.087

covid_new_cases_mu[14]	0.362	0.379	-0.403	1.030	0.060	0.043
covid_new_cases_mu[15]	0.234	0.442	-0.613	0.993	0.096	0.069
covid_new_cases_mu[16]	0.217	0.477	-0.701	0.990	0.083	0.059
covid_new_cases_mu[17]	0.311	0.384	-0.402	1.095	0.059	0.042
covid_new_cases_mu[18]	0.183	0.371	-0.514	0.856	0.056	0.040
covid_new_cases_mu[19]	0.373	0.428	-0.571	1.085	0.150	0.110
covid_new_cases_mu[20]	0.177	0.498	-0.468	1.246	0.105	0.075
covid_new_cases_mu[21]	0.213	0.392	-0.528	0.944	0.077	0.055
covid_new_cases_mu[22]	0.052	0.470	-0.613	0.941	0.139	0.101
covid_new_cases_mu[23]	0.224	0.402	-0.571	0.980	0.095	0.069
covid_new_cases_mu[24]	0.427	0.507	-0.367	1.230	0.214	0.188
covid_new_cases_mu[25]	0.404	0.482	-0.376	1.090	0.184	0.137
covid_new_cases_mu[26]	0.155	0.398	-0.630	0.830	0.135	0.099
covid_new_cases_mu[27]	0.219	0.474	-0.447	1.241	0.091	0.065
covid_new_cases_mu[28]	0.317	0.501	-0.637	0.961	0.110	0.079
covid_new_cases_mu[29]	0.375	0.406	-0.470	1.117	0.057	0.041
covid_new_cases_mu[30]	0.233	0.348	-0.461	0.865	0.063	0.045
covid_new_cases_mu[31]	0.374	0.549	-0.657	1.406	0.109	0.088
covid_new_cases_mu[32]	0.233	0.355	-0.431	0.882	0.042	0.030
covid_new_cases_mu[33]	0.075	0.428	-0.683	0.942	0.128	0.093
covid_new_cases_mu[34]	0.133	0.410	-0.735	0.743	0.071	0.051
covid_new_cases_mu[35]	0.303	0.476	-0.675	1.076	0.083	0.060
covid_new_cases_mu[36]	0.200	0.427	-0.589	1.048	0.172	0.128
covid_new_cases_mu[37]	0.256	0.318	-0.265	0.905	0.069	0.050
covid_new_cases_mu[38]	0.193	0.449	-0.696	0.880	0.154	0.113
covid_new_cases_mu[39]	0.335	0.377	-0.394	0.949	0.059	0.048
covid_new_cases_mu[40]	0.459	0.483	-0.443	1.134	0.096	0.108
covid_new_cases_mu[41]	0.317	0.457	-0.354	1.288	0.161	0.118
covid_new_cases_mu[42]	0.385	0.447	-0.472	1.168	0.085	0.061
covid_new_cases_mu[43]	0.406	0.468	-0.542	1.106	0.112	0.080
covid_new_cases_mu[44]	0.301	0.293	-0.315	0.814	0.041	0.029
covid_new_cases_mu[45]	0.150	0.415	-0.632	0.958	0.065	0.046
covid_new_cases_mu[46]	0.390	0.432	-0.449	1.185	0.129	0.094
covid_new_cases_mu[47]	0.169	0.382	-0.330	1.066	0.091	0.065

covid_new_cases_mu[48]	0.319	0.440	-0.277	1.255	0.124	0.090
covid_new_cases_mu[49]	0.290	0.384	-0.341	1.008	0.140	0.103
covid_new_cases_mu[50]	0.155	0.515	-0.745	1.043	0.115	0.082
covid_new_cases_mu[51]	0.285	0.471	-0.585	0.966	0.217	0.164
covid_new_cases_mu[52]	0.147	0.425	-0.663	0.976	0.078	0.065
covid_new_cases_mu[53]	0.192	0.448	-0.399	1.054	0.148	0.108
covid_new_cases_mu[54]	0.272	0.412	-0.507	0.904	0.126	0.091
covid_new_cases_mu[55]	0.180	0.589	-0.741	1.089	0.229	0.170
covid_new_cases_mu[56]	0.217	0.451	-0.427	1.144	0.095	0.068
covid_new_cases_mu[57]	0.264	0.440	-0.503	1.019	0.127	0.092
covid_new_cases_mu[58]	0.323	0.419	-0.410	1.059	0.163	0.120
covid_new_cases_mu[59]	0.259	0.433	-0.404	1.180	0.064	0.058
covid_new_cases_mu[60]	0.110	0.409	-0.623	0.995	0.091	0.065
covid_new_cases_mu[61]	0.444	0.448	-0.549	1.035	0.087	0.062
covid_new_cases_mu[62]	0.253	0.484	-0.684	0.971	0.156	0.113
covid_new_cases_mu[63]	0.380	0.346	-0.294	1.039	0.051	0.036
covid_new_cases_mu[64]	0.270	0.449	-0.516	1.116	0.124	0.090
covid_new_cases_mu[65]	0.018	0.641	-1.075	0.897	0.327	0.252
covid_new_cases_mu[66]	0.342	0.480	-0.566	1.228	0.104	0.078
covid_new_cases_mu[67]	0.199	0.420	-0.550	1.143	0.101	0.073
covid_new_cases_mu[68]	0.272	0.376	-0.468	1.010	0.053	0.038
covid_new_cases_mu[69]	0.258	0.474	-0.588	0.875	0.143	0.150
covid_new_cases_mu[70]	0.271	0.397	-0.401	1.130	0.052	0.037
covid_new_cases_mu[71]	0.249	0.354	-0.265	0.939	0.064	0.046
covid_new_cases_mu[72]	0.277	0.502	-0.768	1.214	0.172	0.126
covid_new_cases_mu[73]	0.195	0.435	-0.540	1.110	0.073	0.052
covid_new_cases_mu[74]	0.105	0.416	-0.670	0.910	0.072	0.052
covid_new_cases_mu[75]	0.218	0.417	-0.508	1.047	0.068	0.069
covid_new_cases_mu[76]	0.387	0.455	-0.229	1.453	0.120	0.087
covid_new_cases_mu[77]	0.428	0.518	-0.322	1.386	0.196	0.145
covid_new_cases_mu[78]	0.222	0.419	-0.382	1.150	0.084	0.067
covid_new_cases_mu[79]	0.201	0.390	-0.436	0.957	0.057	0.040
covid_new_cases_mu[80]	0.425	0.397	-0.416	1.051	0.083	0.060
covid_new_cases_mu[81]	0.395	0.339	-0.295	0.954	0.110	0.080

covid_new_cases_mu[82]	0.250	0.411	-0.477	1.007	0.096	0.069
covid_new_cases_mu[83]	0.104	0.389	-0.561	0.946	0.070	0.050
covid_new_cases_mu[84]	0.311	0.386	-0.426	1.033	0.055	0.040
covid_new_cases_mu[85]	0.091	0.416	-0.532	1.050	0.079	0.059
covid_new_cases_mu[86]	0.531	0.470	-0.483	1.213	0.097	0.069
covid_new_cases_mu[87]	0.270	0.411	-0.440	1.109	0.065	0.054
covid_new_cases_mu[88]	0.210	0.380	-0.594	0.867	0.102	0.074
covid_new_cases_mu[89]	0.199	0.357	-0.465	0.901	0.063	0.049
covid_new_cases_mu[90]	0.386	0.525	-0.416	1.199	0.226	0.198
covid_new_cases_mu[91]	0.180	0.475	-0.610	1.300	0.098	0.080
covid_new_cases_mu[92]	0.347	0.376	-0.261	1.074	0.150	0.111
covid_new_cases_mu[93]	0.316	0.428	-0.703	0.967	0.109	0.079
covid_new_cases_mu[94]	0.326	0.499	-0.547	1.185	0.130	0.119
covid_new_cases_mu[95]	0.145	0.369	-0.641	0.719	0.060	0.045
covid_new_cases_mu[96]	0.567	0.508	-0.339	1.409	0.127	0.092
covid_new_cases_mu[97]	0.476	0.414	-0.204	1.302	0.062	0.044
covid_new_cases_mu[98]	0.317	0.403	-0.379	1.097	0.122	0.089
covid_new_cases_mu[99]	0.379	0.394	-0.487	1.115	0.088	0.063
covid_new_cases_mu[100]	0.294	0.385	-0.389	1.047	0.162	0.121
covid_new_cases_mu[101]	0.474	0.414	-0.248	1.277	0.073	0.056
covid_new_cases_mu[102]	0.365	0.370	-0.314	1.059	0.066	0.047
covid_new_cases_mu[103]	0.533	0.396	-0.327	1.252	0.054	0.039
tgt_sigma	0.004	0.002	0.001	0.007	0.001	0.000
beta_price_to_promo	-0.122	0.026	-0.177	-0.079	0.002	0.002
beta_offline_to_online	0.091	0.049	0.005	0.160	0.016	0.012
beta_seasonality_holidays_to_online	-0.036	0.021	-0.070	-0.005	0.007	0.006
beta_covid_new_cases_to_online	-0.061	0.051	-0.147	-0.002	0.012	0.009
beta_promo_to_competition	-0.027	0.023	-0.066	-0.000	0.002	0.002
beta_online_to_competition	-0.024	0.019	-0.057	-0.001	0.007	0.006
beta_distribution_to_competition	-0.122	0.074	-0.265	-0.013	0.012	0.008
beta_seasonality_holidays_to_tgt	-0.015	0.014	-0.040	-0.001	0.006	0.005
beta_covid_new_cases_to_tgt	-0.004	0.003	-0.011	-0.000	0.000	0.000
beta_distribution_to_tgt	0.069	0.074	0.004	0.225	0.022	0.016
beta_competition_to_tgt	-0.301	0.118	-0.483	-0.071	0.022	0.016

beta_online_to_tgt	0.013	0.013	0.000	0.036	0.003	0.002
beta_price_to_tgt	-0.304	0.076	-0.454	-0.170	0.011	0.009
beta_promo_to_tgt	0.481	0.094	0.321	0.614	0.039	0.031
beta_otherprod_to_tgt	0.052	0.027	0.001	0.098	0.003	0.002
beta_offline_to_tgt	0.011	0.006	0.001	0.021	0.000	0.000
beta_online_spend[0]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[1]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[2]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[3]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[4]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[5]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[6]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[7]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[8]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[9]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[10]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[11]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[12]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[13]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[14]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[15]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[16]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[17]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[18]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[19]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[20]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[21]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[22]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[23]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[24]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[25]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[26]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[27]	1.000	0.000	1.000	1.000	0.000	0.000
beta_online_spend[28]	1.000	0.000	1.000	1.000	0.000	0.000

beta_offline_spend[94]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[95]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[96]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[97]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[98]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[99]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[100]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[101]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[102]	0.000	0.000	0.000	0.000	0.000	0.000
beta_offline_spend[103]	0.000	0.000	0.000	0.000	0.000	0.000
alpha_offline	0.549	0.093	0.363	0.710	0.025	0.018
theta_offline	0.758	0.263	0.288	1.239	0.097	0.072
alpha_online	0.522	0.171	0.183	0.789	0.077	0.060
theta_online	0.356	0.089	0.195	0.480	0.044	0.033
marketing_offline[0]	0.251	0.070	0.133	0.371	0.024	0.018
marketing_offline[1]	0.562	0.058	0.452	0.658	0.016	0.012
marketing_offline[2]	0.684	0.013	0.660	0.699	0.003	0.002
marketing_offline[3]	0.806	0.029	0.757	0.856	0.010	0.007
marketing_offline[4]	0.930	0.023	0.889	0.970	0.006	0.005
marketing_offline[5]	0.954	0.005	0.946	0.965	0.002	0.001
marketing_offline[6]	0.910	0.011	0.891	0.930	0.003	0.003
marketing_offline[7]	0.586	0.085	0.437	0.726	0.029	0.021
marketing_offline[8]	0.192	0.073	0.075	0.336	0.021	0.015
marketing_offline[9]	0.026	0.019	0.001	0.059	0.005	0.003
marketing_offline[10]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[11]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[12]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[13]	0.329	0.092	0.175	0.488	0.032	0.023
marketing_offline[14]	0.672	0.061	0.565	0.780	0.016	0.012
marketing_offline[15]	0.731	0.012	0.710	0.752	0.003	0.002
marketing_offline[16]	0.473	0.069	0.354	0.588	0.023	0.017
marketing_offline[17]	0.536	0.064	0.436	0.654	0.022	0.017
marketing_offline[18]	0.796	0.056	0.699	0.900	0.015	0.011

marketing_offline[19]	0.860	0.010	0.844	0.881	0.002	0.001
marketing_offline[20]	0.571	0.080	0.431	0.703	0.027	0.020
marketing_offline[21]	0.571	0.057	0.482	0.674	0.020	0.015
marketing_offline[22]	0.876	0.069	0.740	0.986	0.020	0.015
marketing_offline[23]	0.958	0.019	0.925	0.994	0.005	0.003
marketing_offline[24]	0.612	0.094	0.448	0.768	0.031	0.023
marketing_offline[25]	0.441	0.039	0.364	0.505	0.010	0.007
marketing_offline[26]	0.602	0.046	0.517	0.679	0.014	0.010
marketing_offline[27]	0.688	0.014	0.658	0.711	0.003	0.002
marketing_offline[28]	0.453	0.067	0.337	0.566	0.023	0.017
marketing_offline[29]	0.483	0.054	0.398	0.582	0.019	0.014
marketing_offline[30]	0.762	0.062	0.638	0.859	0.018	0.013
marketing_offline[31]	0.870	0.014	0.841	0.892	0.003	0.002
marketing_offline[32]	0.582	0.083	0.438	0.720	0.028	0.021
marketing_offline[33]	0.192	0.073	0.076	0.335	0.021	0.015
marketing_offline[34]	0.027	0.019	0.001	0.060	0.005	0.003
marketing_offline[35]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[36]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[37]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[38]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[39]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[40]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[41]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[42]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[43]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[44]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[45]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[46]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[47]	0.490	0.137	0.261	0.727	0.047	0.035
marketing_offline[48]	1.075	0.108	0.884	1.264	0.029	0.022
marketing_offline[49]	1.283	0.021	1.242	1.308	0.004	0.003
marketing_offline[50]	1.167	0.040	1.096	1.232	0.014	0.010
marketing_offline[51]	1.188	0.033	1.137	1.250	0.012	0.009
marketing_offline[52]	1.355	0.037	1.290	1.423	0.011	0.008

marketing_offline[53]	1.377	0.013	1.355	1.401	0.004	0.003
marketing_offline[54]	1.183	0.049	1.098	1.268	0.016	0.012
marketing_offline[55]	1.154	0.027	1.110	1.200	0.009	0.007
marketing_offline[56]	1.279	0.029	1.227	1.333	0.008	0.006
marketing_offline[57]	1.346	0.008	1.332	1.358	0.002	0.001
marketing_offline[58]	0.913	0.125	0.696	1.121	0.043	0.032
marketing_offline[59]	0.307	0.115	0.124	0.535	0.033	0.024
marketing_offline[60]	0.043	0.031	0.001	0.097	0.007	0.005
marketing_offline[61]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[62]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[63]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[64]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[65]	0.312	0.087	0.166	0.462	0.030	0.022
marketing_offline[66]	0.740	0.082	0.578	0.870	0.023	0.017
marketing_offline[67]	0.925	0.022	0.886	0.956	0.005	0.004
marketing_offline[68]	0.634	0.089	0.479	0.782	0.031	0.023
marketing_offline[69]	0.211	0.080	0.083	0.368	0.023	0.016
marketing_offline[70]	0.029	0.021	0.001	0.066	0.005	0.004
marketing_offline[71]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[72]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[73]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[74]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[75]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[76]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[77]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[78]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[79]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[80]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[81]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[82]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[83]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[84]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[85]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[86]	0.000	0.000	0.000	0.000	0.000	0.000

marketing_offline[87]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[88]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[89]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[90]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[91]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[92]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[93]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[94]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[95]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[96]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[97]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[98]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[99]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[100]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[101]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[102]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_offline[103]	0.000	0.000	0.000	0.000	0.000	0.000
marketing_online[0]	0.664	0.062	0.600	0.791	0.031	0.023
marketing_online[1]	1.197	0.000	1.197	1.197	0.000	0.000
marketing_online[2]	1.158	0.004	1.151	1.162	0.002	0.001
marketing_online[3]	1.083	0.004	1.075	1.087	0.002	0.002
marketing_online[4]	1.123	0.007	1.116	1.137	0.003	0.003
marketing_online[5]	1.162	0.002	1.158	1.164	0.001	0.001
marketing_online[6]	0.972	0.016	0.939	0.988	0.008	0.006
marketing_online[7]	0.833	0.000	0.833	0.833	0.000	0.000
marketing_online[8]	0.837	0.000	0.837	0.838	0.000	0.000
marketing_online[9]	0.834	0.001	0.833	0.835	0.000	0.000
marketing_online[10]	0.825	0.000	0.824	0.825	0.000	0.000
marketing_online[11]	0.826	0.000	0.826	0.827	0.000	0.000
marketing_online[12]	0.834	0.000	0.834	0.835	0.000	0.000
marketing_online[13]	0.840	0.000	0.840	0.840	0.000	0.000
marketing_online[14]	0.837	0.000	0.836	0.837	0.000	0.000
marketing_online[15]	0.835	0.000	0.835	0.835	0.000	0.000
marketing_online[16]	0.838	0.000	0.838	0.838	0.000	0.000

marketing_online[17]	0.838	0.000	0.838	0.838	0.000	0.000
marketing_online[18]	0.838	0.000	0.838	0.838	0.000	0.000
marketing_online[19]	0.837	0.000	0.837	0.837	0.000	0.000
marketing_online[20]	0.832	0.000	0.832	0.833	0.000	0.000
marketing_online[21]	0.843	0.001	0.841	0.845	0.001	0.000
marketing_online[22]	0.989	0.013	0.976	1.014	0.006	0.005
marketing_online[23]	1.112	0.001	1.111	1.115	0.001	0.001
marketing_online[24]	1.165	0.004	1.161	1.173	0.002	0.001
marketing_online[25]	1.166	0.003	1.159	1.169	0.001	0.001
marketing_online[26]	1.134	0.001	1.133	1.135	0.000	0.000
marketing_online[27]	1.130	0.000	1.130	1.130	0.000	0.000
marketing_online[28]	1.088	0.004	1.081	1.092	0.002	0.001
marketing_online[29]	1.133	0.007	1.126	1.148	0.004	0.003
marketing_online[30]	1.183	0.001	1.181	1.185	0.001	0.000
marketing_online[31]	1.190	0.002	1.189	1.193	0.001	0.001
marketing_online[32]	1.151	0.005	1.141	1.156	0.002	0.002
marketing_online[33]	1.072	0.003	1.065	1.075	0.002	0.001
marketing_online[34]	1.044	0.000	1.044	1.044	0.000	0.000
marketing_online[35]	1.042	0.000	1.041	1.042	0.000	0.000
marketing_online[36]	1.028	0.001	1.026	1.029	0.001	0.000
marketing_online[37]	1.015	0.000	1.014	1.015	0.000	0.000
marketing_online[38]	1.020	0.001	1.019	1.021	0.000	0.000
marketing_online[39]	1.026	0.000	1.026	1.026	0.000	0.000
marketing_online[40]	1.031	0.001	1.031	1.032	0.000	0.000
marketing_online[41]	1.038	0.000	1.038	1.038	0.000	0.000
marketing_online[42]	1.042	0.000	1.042	1.043	0.000	0.000
marketing_online[43]	1.046	0.000	1.046	1.046	0.000	0.000
marketing_online[44]	1.044	0.000	1.043	1.044	0.000	0.000
marketing_online[45]	1.040	0.000	1.039	1.040	0.000	0.000
marketing_online[46]	1.041	0.000	1.041	1.042	0.000	0.000
marketing_online[47]	1.048	0.000	1.048	1.049	0.000	0.000
marketing_online[48]	1.053	0.000	1.053	1.053	0.000	0.000
marketing_online[49]	1.052	0.000	1.052	1.052	0.000	0.000
marketing_online[50]	1.043	0.001	1.042	1.044	0.000	0.000

marketing_online[51]	1.030	0.001	1.029	1.031	0.000	0.000
marketing_online[52]	1.036	0.001	1.035	1.038	0.000	0.000
marketing_online[53]	1.045	0.000	1.045	1.045	0.000	0.000
marketing_online[54]	1.044	0.000	1.044	1.044	0.000	0.000
marketing_online[55]	1.044	0.000	1.044	1.044	0.000	0.000
marketing_online[56]	1.090	0.004	1.085	1.098	0.002	0.002
marketing_online[57]	1.142	0.001	1.140	1.145	0.001	0.001
marketing_online[58]	1.144	0.001	1.143	1.145	0.000	0.000
marketing_online[59]	1.148	0.001	1.147	1.151	0.001	0.000
marketing_online[60]	1.149	0.001	1.147	1.149	0.000	0.000
marketing_online[61]	1.073	0.006	1.060	1.079	0.003	0.002
marketing_online[62]	1.023	0.000	1.022	1.024	0.000	0.000
marketing_online[63]	1.030	0.000	1.030	1.030	0.000	0.000
marketing_online[64]	1.055	0.002	1.053	1.059	0.001	0.001
marketing_online[65]	1.065	0.001	1.064	1.066	0.000	0.000
marketing_online[66]	1.055	0.000	1.054	1.055	0.000	0.000
marketing_online[67]	1.050	0.000	1.050	1.050	0.000	0.000
marketing_online[68]	1.039	0.001	1.037	1.040	0.000	0.000
marketing_online[69]	1.060	0.003	1.057	1.066	0.001	0.001
marketing_online[70]	1.083	0.000	1.083	1.083	0.000	0.000
marketing_online[71]	1.062	0.002	1.058	1.064	0.001	0.001
marketing_online[72]	1.030	0.002	1.027	1.031	0.001	0.001
marketing_online[73]	1.011	0.001	1.010	1.011	0.000	0.000
marketing_online[74]	1.000	0.001	0.999	1.001	0.000	0.000
marketing_online[75]	0.996	0.000	0.996	0.996	0.000	0.000
marketing_online[76]	0.994	0.000	0.994	0.994	0.000	0.000
marketing_online[77]	0.995	0.000	0.994	0.995	0.000	0.000
marketing_online[78]	0.990	0.001	0.989	0.991	0.000	0.000
marketing_online[79]	0.983	0.000	0.982	0.983	0.000	0.000
marketing_online[80]	0.987	0.001	0.986	0.988	0.000	0.000
marketing_online[81]	0.980	0.001	0.978	0.981	0.001	0.000
marketing_online[82]	0.875	0.009	0.857	0.885	0.004	0.003
marketing_online[83]	0.822	0.002	0.820	0.826	0.001	0.001
marketing_online[84]	0.848	0.001	0.848	0.850	0.000	0.000

marketing_online[85]	0.814	0.004	0.807	0.818	0.002	0.001
marketing_online[86]	0.843	0.006	0.837	0.855	0.003	0.002
marketing_online[87]	0.881	0.001	0.879	0.882	0.001	0.000
marketing_online[88]	0.875	0.000	0.875	0.876	0.000	0.000
marketing_online[89]	0.853	0.002	0.848	0.855	0.001	0.001
marketing_online[90]	0.842	0.001	0.841	0.843	0.000	0.000
marketing_online[91]	0.895	0.004	0.891	0.904	0.002	0.002
marketing_online[92]	0.946	0.001	0.945	0.948	0.001	0.000
marketing_online[93]	0.956	0.000	0.956	0.956	0.000	0.000
marketing_online[94]	0.954	0.000	0.954	0.954	0.000	0.000
marketing_online[95]	0.953	0.000	0.953	0.954	0.000	0.000
marketing_online[96]	0.948	0.001	0.946	0.948	0.000	0.000
marketing_online[97]	0.930	0.001	0.928	0.931	0.001	0.000
marketing_online[98]	0.915	0.001	0.914	0.915	0.000	0.000
marketing_online[99]	0.941	0.003	0.938	0.947	0.001	0.001
marketing_online[100]	0.965	0.000	0.965	0.965	0.000	0.000
marketing_online[101]	1.014	0.005	1.009	1.024	0.002	0.002
marketing_online[102]	1.026	0.003	1.020	1.028	0.001	0.001
marketing_online[103]	0.987	0.001	0.984	0.989	0.001	0.001

5.2.8 View Evaluation Metrics

In [25]:

```
print(  
    az.waic(trace_model_change_priors, var_name="tgt_pred", scale='deviance')  
    az.loo(trace_model_change_priors, var_name="tgt_pred", scale='deviance'))
```

```

Got error No model on context stack. trying to find log_likelihood in translation.
//anaconda3/lib/python3.7/site-packages/arviz/data/io_pymc3_3x.py:102: FutureWarning: Using `from_pymc3` without the model will be deprecated in a future release. Not using the model will return less accurate and less useful results.
Make sure you use the model argument or call from_pymc3 within a model context
.
  FutureWarning,
//anaconda3/lib/python3.7/site-packages/arviz/stats/stats.py:1460: UserWarning : For one or more samples the posterior variance of the log predictive densities exceeds 0.4. This could be indication of WAIC starting to fail.
See http://arxiv.org/abs/1507.04544 for details
  "For one or more samples the posterior variance of the log predictive "
Got error No model on context stack. trying to find log_likelihood in translation.
//anaconda3/lib/python3.7/site-packages/arviz/data/io_pymc3_3x.py:102: FutureWarning: Using `from_pymc3` without the model will be deprecated in a future release. Not using the model will return less accurate and less useful results.
Make sure you use the model argument or call from_pymc3 within a model context
.
  FutureWarning,
Computed from 800 by 104 log-likelihood matrix

```

	Estimate	SE
deviance_waic	-843.12	2.84
p_waic	65.78	-

There has been a warning during the calculation. Please check the results. Computed from 800 by 104 log-likelihood matrix

	Estimate	SE
deviance_loo	-808.15	5.86
p_loo	83.27	-

There has been a warning during the calculation. Please check the results.

```

//anaconda3/lib/python3.7/site-packages/arviz/stats/stats.py:695: UserWarning: Estimated shape parameter of Pareto distribution is greater than 0.7 for one or more samples. You should consider using a more robust model, this is because importance sampling is less likely to work well if the marginal posterior and LOO posterior are very different. This is more likely to happen with a non-robust model and highly influential observations.
  "Estimated shape parameter of Pareto distribution is greater than 0.7 for "

```

6. Conclusions, Insights and Future

From the results we can know that, although the modified model still cannot perfectly simulate data that is similar to the real-world data, it successfully decreases the gap between real data and simulated data compared with the original model. Meanwhile, lower WAIC and LOO also indicates that it has a better predictive ability.

Due to the limitation of the tasks assigned to me, it's hard to provide many really useful information about the business, but some insights can be obtained from interaction. For interaction priors, if we pick those with $| \text{mean} | > 0.3$ and $\text{std} < 0.6$, then we will get a table as following, where green refers to positive correlation and red refers to negative correlation. Meanwhile, the larger the circle is, the stronger the relationship is.

Some correlations are quite obvious, so I am not going to explain all of them. However, two interesting ideas can indeed be pointed out. First, the company should launch more promotion activities, especially on holidays. Second, don't make the price too high. This seems obvious, but there are cases when companies might want to make the price higher, because they think higher price can make people think that their product is more valuable than others, and thus consumers who chase high quality would like to buy it. However, the result shows that this thought doesn't make sense.

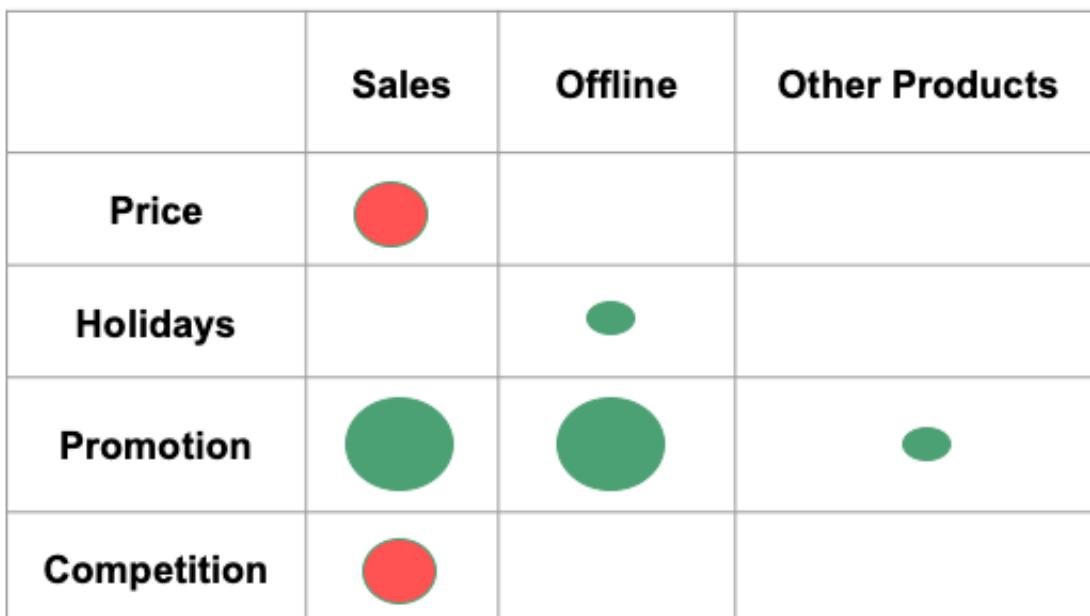
For future work, continue finding better prior should be one of the most important things to do, since priors can affect result, and thus more domain knowledge can be considered into prior selection.

In [28]:

```
%%html  
  
# directed graph  

```

directed graph



In []: