

ARIMA Models for Seasonal Adjustment

(i) As for the detail of seasonal adjustment method, please refer to the "ESTIMATION METHOD OF PRELIMINARY QUARTERLY GDP (QE)" on the website.

(ii) ARIMA models will be reconsidered at annual estimates, and also be re-estimated if necessary when newly available or revised source data are incorporated.

(iii) As for Private inventory increase and Public inventory increase, models are chosen among 81 models [(0 0 0)(0 0 0)~(2 0 2)(2 0 2)] based on the discussions at sub committees of Advisory Council on the System of National Accounts.

1. Demand Components of GDP (from January–March 1994 to the latest quarter)

(1) Demand Components of GDP

Series	ARIMA model Nominal series Real series	Leap Year Effect	Dummy Variables	
			Type	Explanation
Domestic final consumption expenditure of households	-	-	-	-
Durable goods	(010X011) (011X011)	x	VAT97	Fluctuation of consumption expenditure due to the increase of the consumption tax rate.
Semi-durable goods	(212X011) (212X011)	x	VAT97	Fluctuation of consumption expenditure due to the increase of the consumption tax rate.
Non-durable goods	(011X210) (012X212)	x	VAT97	Fluctuation of consumption expenditure due to the increase of the consumption tax rate.
Services(excluding imputed rent)	(010X011) (010X011)	x	VAT97	Fluctuation of consumption expenditure due to the increase of the consumption tax rate.
Services(imputed rent)	(111X011) (110X011)	x	n.a.	
Direct overseas purchase by resident households	(010X011) (010X011)	x	AO2001.4	Slump in the number of Japanese overseas travelers under the impact of September 11th Attacks.
			AO2003.2	Slump in the number of Japanese overseas travelers under the impact of Iraq War.
			LS2006.1	Revision of travel account in the Balance of Payment Statistics (BOP).
Direct domestic purchase by nonresident households	(212X011) (212X011)	x	AO2003.2	Slump in the number of visitor arrivals under the impact of Iraq War.
			LS2003.1	Revision of travel account in the Balance of Payment Statistics (BOP).
			LS2006.1	Revision of travel account in the Balance of Payment Statistics (BOP).
Government individual consumption expenditure	(011X110) (110X011)	x	LS1997.3	Reform in medical care system in September 1997.
			LS2000.2	Introduction of the long-term care insurance.
			LS2002.4	Reform in medical care system in October 2002.
Government collective consumption expenditure	(112X110) (110X011)	x	n.a.	
Private housing investment	(011X011) (011X011)	x	n.a.	
Private non-residential investment	(110X210) (110X210)	x	n.a.	
Public housing investment	(110X011) (110X011)	x	n.a.	
Public non-residential investment	(212X210) (212X210)	x	n.a.	
General government fixed capital formation	(010X210) (010X210)	x	n.a.	
Private inventory increase in materials and supplies	(102X101) (102X101)	x	n.a.	
Private inventory increase in work-in-process	(200X200) (202X200)	x	n.a.	
Private inventory increase in finished goods	(102X101) (102X101)	x	VAT97	Fluctuation of inventory increase due to the increase of the consumption tax rate.
Private inventory increase in wholesale and retail trade	(201X102) (100X101)	x	n.a.	
Public corporation inventory increase	(202X100) (000X001)	x	n.a.	
General government inventory increase	(001X100) (001X100)	x	n.a.	
Exports of goods	(010X011) (212X011)	x	n.a.	
Exports of services (except direct domestic purchase by nonresident households)	(010X011) (010X011)	x	n.a.	
Imports of goods	(110X011) (212X112)	x	n.a.	
Imports of services (except direct overseas purchase by resident households)	(010X011) (010X011)	x	n.a.	
Income from the rest of the world	(212X211) (212X211)	x	LS1996.1	Revision of the BOP: financial derivatives were included before 1995.
Payment to the rest of the world	(111X011) (111X011)	x	LS1996.1	Revision of the BOP: financial derivatives were included before 1995.
Gross Fixed Capital Formation by type	-	-	-	-
Residential investment	(011X011) (011X011)	x	n.a.	
Other buildings and structures	(212X011) (212X111)	x	n.a.	
Transport equipment	(010X011) (010X011)	x	n.a.	
Other machinery and equipment etc.	(012X010) (012X010)	x	n.a.	
Computer software	(110X111) (110X012)	x	n.a.	

(Note) VAT97 is defined as follows: 1997.1=1, 1997.2=-1, other periods=0.

"MODE" for inventory series is "ADD".

ARIMA model selection were implemented using data from 1994.1 to 2006.4.

Due to large-scale acquisition of fixed assets by the central government from private sector, private non-residential investment figures and general government fixed capital formation figures are seasonal adjusted after these transactions are eliminated.

(2) Indicator Series

Series	ARIMA model	Leap Year Effect	Dummy Variables	
			Type	Explanation
Private non-residential investment: supply-side estimates	(110X210)	x	n.a.	
Private non-residential investment: demand-side estimates	(110X210)	x	n.a.	

(Note) ARIMA model selection was implemented for data from 1994.1 to 2006.4.

2. Compensation of employees (from January-March 1980 to the latest quarter)

Series	ARIMA model	Leap Year Effect	Dummy Variables	
			Type	Explanation
Wages, salaries	(012X112)	x	n.a.	
Employer's actual social contribution	(110X010)	x	n.a.	
Employer's imputed social contribution	(111X111)	x	n.a.	

(Note) ARIMA model selection was implemented using data from 1980.1 to 2006.4. "MAXBACK"=0.

An example program for nominal domestic final consumption expenditure of households (Durable Goods)

```
series { start =1994.1
        span =(1994.1,2006.4)
        modelspan =(1994.1,2006.4)
        period=4
        decimals =3
        precision =3}
transform { function=log }
arima { model = ( 0 1 0 )( 0 1 1 ) }
forecast { maxlead = 8
          maxback = 20 }
regression {
user = ( vat97 )
file = "xxxxxxxxxxxxxxxxxxxxxxxxxxxx"
}
estimate { maxiter = 20000 }
x11{ savelog = q
     appendfcst = yes
     save = ( d11 d16 ) }
```