

Exploring the Chinese Foreign Reserve Scale

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Data description

Data

- foreign reserve scale (reserve)
- short term debt (SD)
- foreign direct investment (FDI)
- export (EX)
- import (IM)
- exchange rate, CNY vs USD (exrate)

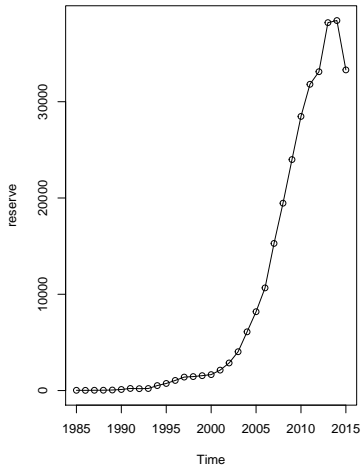
Data Source

- State of Administration of foreign exchange (<http://www.safe.gov.cn/>)
- Ministry of Commerce of the People's Republic of China Comprehensive Department
(<http://zhs.mofcom.gov.cn/tongji.shtml>)
- The People's Bank Of China (<http://www.pbc.gov.cn/>)

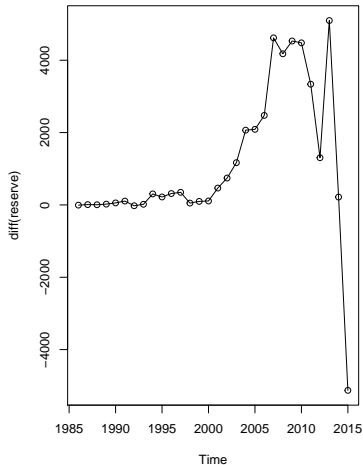
ARIMA modeling of foreign reserve scale

explanatory analysis

reseve plot

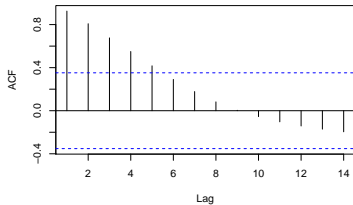


diff reserve plot

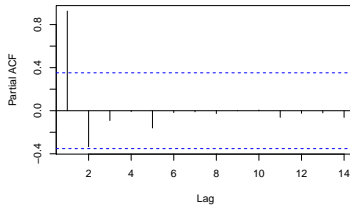


autocorrelation plots

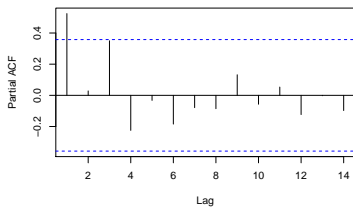
Series reserve



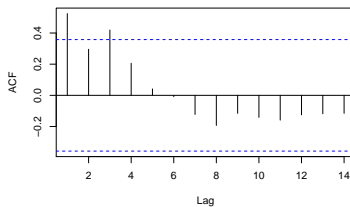
Series reserve



Series diff(reserve)



Series diff(reserve)



ARIMA model (ARIMA(1,1,0))

Call:

```
arima(x = reserve, order = c(1, 1, 0))
```

Coefficients:

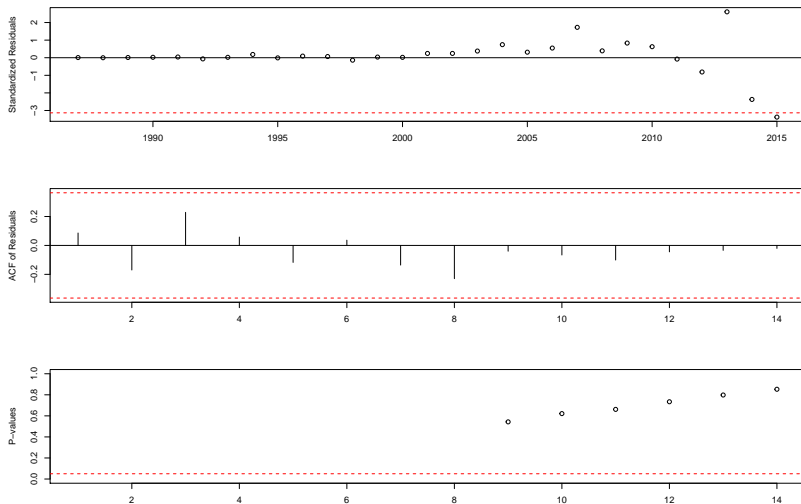
ar1

0.7721

s.e. 0.1242

sigma^2 estimated as 2458955: log likelihood = -263.75, aic = 529.5

diagnostics



prediction for next five years

Time Series:

Start = 2016

End = 2020

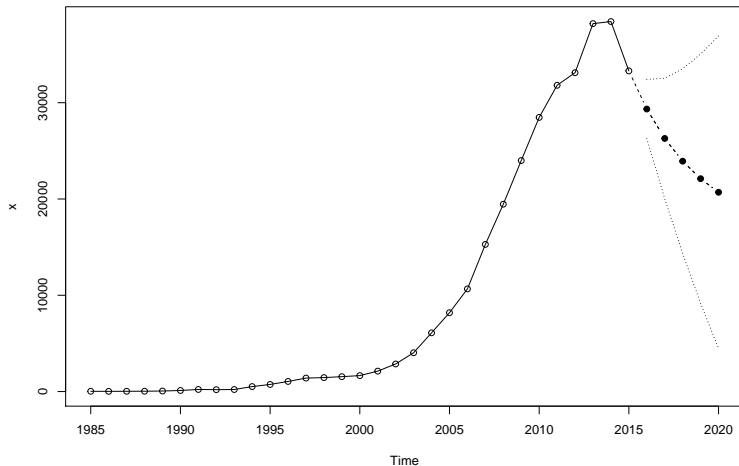
Frequency = 1

```
[1] 29345.24 26288.86 23928.92 22106.75 20699.79
```

- 2016, predicted reserve is 2.9 trillion dollar
- 2017, predicted reserve is 2.6 trillion dollar
- 2018, predicted reserve is 2.4 trillion dollar
- 2019, predicted reserve is 2.2 trillion dollar
- 2020, predicted reserve is 2.0 trillion dollar

prediction plot

prediction plot



Cointegration (Engle–Granger two-step method)

Integration(1) checking

- Cointegration analysis requires all variables have the same integration order
- Due to the relatively small sample and the trend effect, we use more powerful Hansen's Covariate-Augmented Dickey Fuller (CADF) test for unit roots
- We found all the variables are Integration(1)

longrun model (first step)

Call:

```
lm(formula = lnreserve ~ lnEX + lnIM + lnFDI, data = ecodatats)
```

Residuals:

Min	1Q	Median	3Q	Max
-0.44769	-0.13372	0.01372	0.14202	0.50479

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-4.91955	0.31067	-15.835	3.44e-15 ***
lnEX	2.18770	0.39212	5.579	6.46e-06 ***
lnIM	-0.98155	0.38710	-2.536	0.0173 *
lnFDI	0.46170	0.08143	5.670	5.07e-06 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2376 on 27 degrees of freedom

Multiple R-squared: 0.9917, Adjusted R-squared: 0.9908

F-statistic: 1074 on 3 and 27 DF, p-value: < 2.2e-16

Short term transitory model (a.k.a Error correction model, second step)

Call:

```
lm(formula = lnreserve.d ~ lnEX.d + lnIM.d + lnFDI.d + res.l1,
    data = dataFull)
```

Residuals:

	Min	1Q	Median	3Q	Max
	-0.30796	-0.09398	-0.02193	0.08639	0.50596

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.08024	0.05702	1.407	0.171669
lnEX.d	1.44139	0.41448	3.478	0.001867 **
lnIM.d	-0.33814	0.37724	-0.896	0.378617
lnFDI.d	-0.04536	0.15371	-0.295	0.770373
res.l1	-0.67198	0.15586	-4.311	0.000222 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1767 on 25 degrees of freedom

Final cointegration model

- longrun model

$$\ln Reserve_t = -4.9 + 2.19 * \ln EX_t - 0.98 * \ln IM_t + 0.46 * \ln FDI_t$$

- short term transitory model

$$\nabla \ln Reserve_t = 0.08 - 0.67 * \epsilon_{t-1} + 1.4 * \nabla \ln EX_t - 0.3 * \nabla \ln IM_t - 0.05 * \nabla \ln FDI_t$$

Q&A

Thank you!

