

Wooldridge - Econometrics - Ch18 - Ex2

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- i. Test for a unit root in $\log(\text{invpc})$, including a linear time trend and two lags of $\log(\text{invpc})$. Use a 5% significance level.

Upload package

```
library(wooldridge)
library(tseries)
```

```
## Registered S3 method overwritten by 'quantmod':
##   method      from
##   as.zoo.data.frame zoo
```

Upload data

```
HSEINV<-wooldridge::hseinv
```

Define variables

```
log_invpc <- log(HSEINV$invpc)
d1_log_invpc <- diff(log_invpc, lag = 1)
d2_log_invpc <- diff(log_invpc, lag = 2)
time_trend <- 1:length(log_invpc)
```

ADF test

```
adf.test(log_invpc, alternative = "stationary", k = 2)
```

```
## Warning in adf.test(log_invpc, alternative = "stationary", k = 2): p-value
## smaller than printed p-value
```

```
##
## Augmented Dickey-Fuller Test
##
## data: log_invpc
## Dickey-Fuller = -4.8326, Lag order = 2, p-value = 0.01
## alternative hypothesis: stationary
```

Based on the ADF-Test, the series is stationary in level.

- ii. Use the approach from part (i) to test for a unit root in $\log(\text{price})$.

Define variable

```
log_price <- log(HSEINV$price)
```

ADF test

```
adf.test(log_price, alternative = "stationary", k = 2)
```

```
##  
## Augmented Dickey-Fuller Test  
##  
## data: log_price  
## Dickey-Fuller = -2.4089, Lag order = 2, p-value = 0.4125  
## alternative hypothesis: stationary
```

- iii. Given the outcomes in parts (i) and (ii), does it make sense to test for cointegration between $\log(\text{invpc})$ and $\log(\text{price})$?

Based on the Adf-Test, the `log_price` variable, shows an unit-root, hence is non-stationary.

Yes, it makes sense to test for cointegration between $\log(\text{invpc})$ and $\log(\text{price})$ since they are both non-stationary variables. Cointegration occurs when two or more non-stationary variables are related through a stationary linear combination, which means that they share a long-run relationship. Therefore, if $\log(\text{invpc})$ and $\log(\text{price})$ are cointegrated, it suggests that they have a long-term equilibrium relationship that can be modeled using a vector error correction model (VECM).