

Package: struchange Vignette: struchange-intro.Rnw

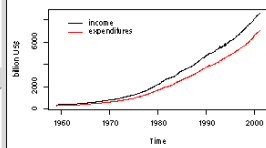
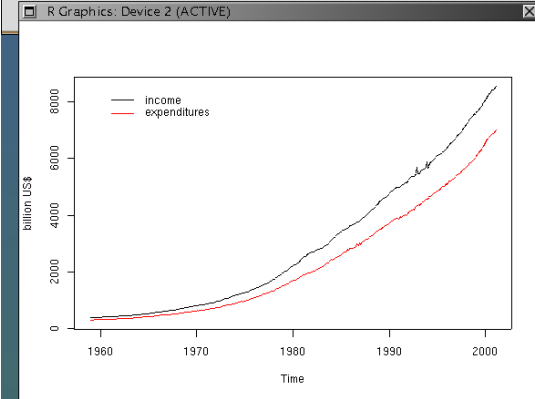
R Source Code

```
coint.res <- residuals(lm(expenditure ~ income, data = USInc
coint.res <- lag(ts(coint.res, start = c(1985,12), freq = 12
USIncExp2 <- cbind(USIncExp2, diff(USIncExp2), coint.res)
USIncExp2 <- window(USIncExp2, start = c(1986,1), end = c(20
colnames(USIncExp2) <- c("income", "expenditure", "diff.inco
                        "diff.expenditure", "coint.res")
ecm.model <- diff.expenditure ~ coint.res + diff.income
```

Results of Execution

```
R> coint.res <- residuals(lm(expenditure ~ income, data = U
R> coint.res <- lag(ts(coint.res, start = c(1985, 12), freq
+ k = -1)
R> USIncExp2 <- cbind(USIncExp2, diff(USIncExp2), coint.res
R> USIncExp2 <- window(USIncExp2, start = c(1986, 1), end =
+ 2))
```

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Personal income and personal consumption expenditures in the US

error correction model (ECM) for the consumption function similar to [Hansen](#)

$$\Delta e_t = \beta_1 + \beta_2 e_{t-1} + \beta_3 \Delta i_t + u_t, \quad (5)$$

$$e_t = \alpha_1 - \alpha_2 i_t, \quad (6)$$

consumption expenditure and i_t the income. We estimate the cointegration equation (6) by OLS and use the residuals \hat{e}_t as regressors in equation (5), in which we will test for structural change. Thus, the dependent variable is the increase in expenditure and the regressors are the cointegration residuals and the increments of income (and a constant). To compute the cointegration residuals and set up the model equation we need the following steps in R:

```
> coint.res <- residuals(lm(expenditure ~ income, data = USIncExp2))
> coint.res <- lag(ts(coint.res, start = c(1985, 12), freq = 12),
+ k = -1)
> USIncExp2 <- cbind(USIncExp2, diff(USIncExp2), coint.res)
> USIncExp2 <- window(USIncExp2, start = c(1986, 1), end = c(2001,
+ 2))
> colnames(USIncExp2) <- c("income", "expenditure", "diff.income",
+ "diff.expenditure", "coint.res")
> ecm.model <- diff.expenditure ~ coint.res + diff.income
```

Figure 2 shows the transformed time series necessary for estimation of equation (5).

In the following sections we will apply the methods introduced to test for structural change in this model.

4 Generalized fluctuation tests

The generalized fluctuation tests fit a model to the given data and derive an empirical process, that captures the fluctuation either in residuals or in estimates. For these empirical processes the limiting processes are known, so that boundaries can be computed, whose crossing probability under the null hypothesis is α . If the empirical process path crosses these boundaries, the fluctuation