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**STATA tip : a quick trick to perform
a Roy-Zellner test for poolability in
STATA**

Quaderno N. 08-04

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STATA tip: A quick trick to perform a Roy-Zellner test for poolability in Stata

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Vaona (2008) and Schiavo and Vaona (2008) showed two empirical applications of the Roy-Zellner test for poolability that have attracted considerable interest. This note shows a quick trick to implement this test in Stata, once applying it to the slope coefficients of a linear model.

In a given panel sample $(y_{it}, x_{it}) \in \mathbf{R}^{1+d}$, let y_{it} and x_{it} respectively be the observations of the dependent and of the d independent variables for individual i at time t . Suppose to have the following model:

$$y_{it} = \alpha + \beta_i x_{it} + \varepsilon_{it} \quad (1)$$

where ε_{it} is a stochastic error and α and β_i are coefficients. The null hypothesis of the Roy-Zellner test applied to the slope coefficients is that

$$\beta_i = \beta \quad (2)$$

under the assumption that $\varepsilon_{it} = \eta_i + u_{it}$, where $\eta_i \sim N(0, \sigma_\eta^2)$ and $u_{it} \sim N(0, \sigma_u^2)$. The difference with a Chow test is that the latter one tests (2) under the hypothesis that $\varepsilon_{it} \sim N(0, \sigma_\varepsilon^2)$. Baltagi (2001) recommends to rely on a Roy-Zellner test for poolability unless being sure that the underlying assumption of the Chow test is correct.

We discuss here how to easily implement a Roy-Zellner test in Stata. The procedure is in three steps. First, we interact the regressors with a set of individual dummies to obtain the unpooled data. Second, we run a random effect regression on the unpooled data. Finally, we test for the equality of the individual coefficients.

As in Baltagi (2001) we illustrate this procedure using the Grunflod dataset, which concerns 10 large manufacturing firms (whose indexes are contained in the variable `firm`) from 1935 to 1954 (a time index is contained in the variable `year`). We would like to explain real gross investment (I) as a function of outstanding shares (F) and the real value of the capital stock (C).

First tsset the dataset:

```
. tsset firm year
```

Then generate a set of individual dummy variables

```
. xi, prefix(F) i.firm
```

```
. gen Ffirm_1=1 if firm==1
```

```
. replace Ffirm_1=0 if firm!=1
```

¹ The author would like to thank Finn Martensen for an helpful comment. The usual disclaimer applies.

Interact these dummies with the regressors, F and C:

```
. foreach var of varlist C F{  
.   foreach num of numlist 1(1)10{  
.     gen `var'`_num'=`var'*Ffirm_`num'  
.   }  
.}
```

Run a random effect regression for the unpooled data:

```
. quietly xtreg I F_* C_*, re
```

Test for the equality of the coefficients of the unpooled data:

```
. test (F_1 = F_2 = F_3 = F_4 = F_5 = F_6 = F_7 = F_8 = F_9 = F_10) (C_1 = C_2 = C_3 = C_4 =  
C_5 = C_6 = C_7 = C_8 = C_9 = C_10)
```

Stata uses a Wald test distributed as a χ^2 with 18 degrees of freedom, which returns a value of 739.84, rejecting the null of poolability consistently with the results contained in Baltagi (2001).

References

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