

## **“The effect of tourism on crime in Italy: a dynamic panel approach”**

### **ANSWER TO SUNIL SAPRA**

#### Question 1

*“The authors have conducted Hansen’s J-test for instrument validity. Nevertheless, a Hausman test for endogeneity of tourism will be useful in deciding if IV estimation is actually needed notwithstanding the strong intuition behind endogeneity of tourism...”*

#### Answer

We are aware of the advantage of using the Hausman Test to check for the presence of endogeneity of tourism variable, however as explained in the paper “we apply the Wooldridge test (Wooldridge, 2002) to check serial correlation in panel data; we find that the null hypothesis of no serial correlation is strongly rejected. This argument strongly suggests the use of the lagged dependent variable to remove serial correlation in the residuals (pages 8-9 of the paper). Therefore, we focus directly on equation 5 by using GMM approach.

#### Question 2

*“The authors use yearly average of arrivals per group to instrument the tourism variable. Question: Is average arrivals per group a strong or a weak instrument for tourism? If it turns out to be a weak instrument, the instrumental variable and the GMM estimators can be severely biased even in large samples and their distributions are not asymptotically normal. This could lead to confidence intervals with incorrect coverage probabilities and incorrect test size. A test for weak instruments, such as Cragg-Donald test can be conducted.”*

#### Answer

In our opinion the problem of whether the instrument in the first stage of the analysis is weak or not is not relevant since as explained in the previous point we find serial correlation in the residuals. As a consequence, a possible solution is represented by GMM approach which uses the lagged value of the dependent and explanatory variables as instruments.

#### Question 3

*“If the instruments are weak, limited information maximum likelihood (LIML) is an attractive alternative to IV estimation in that it provides finite sample bias reduction.”*

#### Answer

LIML is a possible solution in case of weak instrument, however as Akashi & Kunitomo (2012) explain (see theorem 2 p. 170), LIML estimators can be biased when  $t$  (number of periods) is small with respect to  $n$  (number of the observations). In our case since the ratio  $t/n$  is lower than  $\frac{1}{2}$  LIML estimator has an extra asymptotic bias term.

Reference: Akashi, K. , Kunitomo, N. (2012), Some properties of the LIML estimator in a dynamic panel structural equation, Journal of Econometrics, 166, 2, 167–183.