

List of Homework for

The Economics of European Regions:
Theory, Empirics, and Policy

Deadline: January 21, 2020

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December 21, 2019

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The couples of student randomly matched and number of assignment for each couple are:

1. Mossestad - Teien
2. Lund - Sorensen
3. Ulivieri - Maurizio
4. Ialenti - D'Agostino
5. Stivella - Calemma
6. Nagib - Flori

The economics of EU regions

We expected a paper of **about 30 pages** and a **zip file with R codes** used to produce pictures, tables and estimates reported in the paper.

1. The dynamics of GDP per worker in EU regions in the period 1992:2006

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets”.
- Build a panel of NUTS-2 regions for the period 1992:2006 taking any variables useful for explaining the growth of **GDP per worker** according to the Solovian model of growth.
- Estimate the **distribution dynamics in 1992:2006** (annual density, Markov matrix in discrete time and stochastic kernel). Discuss the results in terms of absolute, conditional and σ -convergence.
- Discuss the possible presence of **spatial dependence** on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate a **growth equation for GDP per worker** of EU regions using parametric and semiparametric methods by checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the **policy implications** of analysis.

2. The dynamics of GDP per worker in EU regions in the period 2006:2015

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets”.
- Build a panel of NUTS 2 regions for the period 2006:2015 taking any variables useful for explaining the growth of **GDP per worker** according to the Solovian model of growth.
- Estimate the **distribution dynamics in 2006:2015** (annual density, Markov matrix in discrete time and stochastic kernel). Discuss the results in terms of absolute, conditional and σ -convergence.
- Discuss the possible presence of **spatial dependence** on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate a **growth equation for GDP per worker** of EU regions using parametric and semiparametric methods by checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the **policy implications** of analysis.

3. Structural change in EU regions

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets”.
- Build a panel of NUTS 2 regions for the period 1992:2015 taking any variables useful for explaining the growth of **GVA per worker** according to the Solovian model of growth with **structural change**.
- Estimate the **distribution dynamics in 1992:2015** (density, Markov matrix in discrete time and stochastic kernel) at sectoral level. Discuss the results in terms of absolute, conditional and σ -convergence at sectoral level.
- Discuss the possible presence of **spatial dependence** in structural change on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate a **growth equation for GVA per worker** of EU regions using parametric and semiparametric methods by taking explicitly into account structural change and checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the **policy implications** of analysis.

4. Compensation per employee in EU regions

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets”.
- Build a panel of NUTS 2 regions for the period 1992:2015 taking any variables useful for explaining the growth of **compensation per employee** on the base of theoretical model discussed in the classes.
- Estimate the **distribution dynamics in 1992:2015** of compensation per employee (density, Markov matrix in discrete time and stochastic kernel) at sectoral level. Discuss the results in terms of absolute, conditional and σ -convergence at sectoral level.
- Discuss the possible presence of **spatial dependence** in compensation per employee on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate a **growth equation for compensation per employee** using parametric and semiparametric methods by taking explicitly into account structural change and checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the **policy implications** of analysis.

5. Migration in EU regions

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets” and at Eurostat data center (<https://ec.europa.eu/eurostat/data/database>) on net migration at NUTS 2 level.
- Build a panel of NUTS 2 regions for the period 1992:2015 taking any variables useful for explaining the **net migration in EU regions**.
- Estimate the **distribution dynamics** in 1992:2015 of regional population (density, Markov matrix in discrete time and stochastic kernel). Discuss the results in terms of absolute, conditional and σ -convergence.
- Discuss the possible presence of **spatial dependence** in regional net migration on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate **the determinants of regional net migration** using parametric and semiparametric methods by taking explicitly into account regional heterogeneity in wages and checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the expected effects of **Brexit** on net migration in EU on the base of the results of analysis.

6. Resilience in EU regions

- Download data at <https://eer.ec.unipi.it/teaching-materials/> following the link to “Link to Dropbox directory with datasets”.
- Build a panel of NUTS 2 regions for the period 1992:2015 taking any variables useful for explaining the **resilience of GDP per capita** in EU regions.
- Estimate the **distribution dynamics** in 1992:2015 (density, Markov matrix in discrete time and stochastic kernel) of regional resilience. Discuss the results in terms of absolute, conditional and σ -convergence.
- Discuss the possible presence of **spatial dependence** in regional resilience on the base of Moran I and LISA using an appropriate geographical spatial matrix (based on contiguity or k-nearest neighbour). Discuss the results in light of theoretical spatial models.
- Estimate the **determinants of regional resilience** using parametric and semiparametric methods by taking explicitly into account output composition and checking for the presence of endogeneity. Discuss the results in light of theoretical models.
- Discuss the **policy implications** of analysis.

Exam: Causality

We expected a paper of **about 10 pages** and a **zip file with R codes** used to produce pictures, tables and estimates reported in the paper.

1. Assessing the impact of Objective 1 funds 1994-1999 on growth

The EU provides grants to disadvantaged regions of member states to allow them to catch up with the EU average under the Regional Policy. In particular, NUTS2 regions with a per capita GDP level below 75% of the EU average are eligible under the Objective 1 scheme. This rule gives rise to a regression-discontinuity design. Becker *et al.* (2010) exploit the discrete jump in the probability of EU transfer receipt at the 75% threshold for identification of causal effects of Objective 1 treatment on outcome such as economic growth of EU regions.

- Carefully read the paper of Becker, S. O., Egger, P. H., and Von Ehrlich, M. (2010), “Going NUTS: The effect of EU Structural Funds on regional performance”, *Journal of Public Economics*, 94(9), 578-590.;
- Download the data “dataset_for_causality.RData” and consider only the **OB1 funds** of the programming period **1994-1999** and their impact on the GDP per capita growth over the same period.
- Replicate their Table 3 comparing treated and non-treated regions with respect to the difference in their GDP per capita. Discuss the results.
- Show if a *fuzzy* regression-discontinuity design is needed (i.e., replicate Table 4 of Becker *et al.* (2010) for NUTS2). Discuss the results.
- Graphically show the discontinuity. Discuss the results for the identification of the causal effect.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Objective 1 funds on the **GDP per capita growth**. Discuss the results.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Objective 1 funds on the **GDP per worker growth**. Discuss the results.

2. Assessing the impact of Objective 1 funds 2000-2006 on growth

The EU provides grants to disadvantaged regions of member states to allow them to catch up with the EU average under the Regional Policy. In particular, NUTS2 regions with a per capita GDP level below 75% of the EU average are eligible under the Objective 1 scheme. This rule gives rise to a regression-discontinuity design. Becker *et al.* (2010) exploit the discrete jump in the probability of EU transfer receipt at the 75% threshold for identification of causal effects of Objective 1 treatment on outcome such as economic growth of EU regions.

- Carefully read the paper of Becker, S. O., Egger, P. H., and Von Ehrlich, M. (2010), “Going NUTS: The effect of EU Structural Funds on regional performance”, *Journal of Public Economics*, 94(9), 578-590.;
- Download the data “dataset_for_causality.RData” and consider only the **OB1 funds** of the programming period **2000-2006** and their impact on the GDP per capita growth over the same period.
- Replicate their Table 3 comparing treated and non-treated regions with respect to the difference in their GDP per capita. Discuss the results.
- Show if a *fuzzy* regression-discontinuity design is needed (i.e., replicate Table 4 of Becker *et al.* (2010) for NUTS2). Discuss the results.
- Graphically show the discontinuity. Discuss the results for the identification of the causal effect.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Objective 1 funds on the **GDP per capita growth**. Discuss the results.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Objective 1 funds on the **GDP per worker growth**. Discuss the results.

3. Assessing the impact of Objective 1 funds 2007-2013 on growth rate of NUTS2 regions

The EU provides grants to disadvantaged regions of member states to allow them to catch up with the EU average under the Regional Policy. In particular, NUTS2 regions with a per capita GDP level below 75% of the EU average are eligible under the Objective 1 scheme. This rule gives rise to a regression-discontinuity design. Becker *et al.* (2010) exploit the discrete jump in the probability of EU transfer receipt at the 75% threshold for identification of causal effects of Objective 1 treatment on outcome such as economic growth of EU regions.

- Carefully read the paper of Becker, S. O., Egger, P. H., and Von Ehrlich, M. (2010), “Going NUTS: The effect of EU Structural Funds on regional performance”, *Journal of Public Economics*, 94(9), 578-590.;
- Download the data “wp13_3_db_nuts2_ae.xlsx” and consider the **Convergence objective** of the programming period **2007-2013** using the data on “Expenditures 2014 EUR MILLION”.
- Do the same analysis in Table 3 of *et al.* comparing treated and non-treated regions with respect to the difference in their GDP per capita. Discuss the results.
- Show if a *fuzzy* regression-discontinuity design is needed (i.e., the same analysis in Table 4 of Becker *et al.* (2010) for NUTS2). Discuss the results.
- Graphically show the discontinuity. Discuss the results for the identification of the causal effect.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Convergence objective funds on the **GDP per capita growth**. Discuss the results.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Convergence objective funds on the **GDP per worker growth**. Discuss the results.

4. Analysis of the return to attending medical school on earnings

Seats in Dutch medical schools are assigned through a lottery. Applicants to medical studies in the Netherlands are assigned to lottery categories based on their high school grades. The categories differ by the probability to be awarded a place (to win the lottery). If people lose a lottery they can try again the following year.

- Download the dataset “lotteryData.RData” which contains results from peoples’ first lottery outcome for participants in 1988 and 1989, and whether they attended medical school, as well as earnings from a survey that was sent out in 2007.
- You want to estimate the return to attending medical school (D) on earnings in 2007 ($\ln w$) using the lottery outcome (Z) as instrument.
- **Discuss** instrument exogeneity, exclusion and monotonicity.
- **Assess** instrument relevance.
- Estimate the return to attending medical school on earnings in 2007 using IV, and interpret the results.
- Count the number of compliers, and compare them to the population of applicants in terms of gender.
- Is the IV estimate an estimate of the ATT? Explain why or why not.
- Estimate the mean and distribution of Y_0 and Y_1 for compliers.
- What can you say about Y_0 and Y_1 for always- and never-takers?
- The lottery is within lottery category and year, so your instrument is only exogenous within these groups. Estimate lottery category $\times$ year specific LATEs and combine these in one estimate. Compare this to the specification where you control for lottery category $\times$ year dummies and also interact the instrument with these dummies.

5. Assessing the impact of Objective 1 funds 2007-2013 on growth rate of NUTS3 regions

The EU provides grants to disadvantaged regions of member states to allow them to catch up with the EU average under the Regional Policy. In particular, NUTS2 regions with a per capita GDP level below 75% of the EU average are eligible under the Objective 1 scheme. This rule gives rise to a regression-discontinuity design. Becker *et al.* (2010) exploit the discrete jump in the probability of EU transfer receipt at the 75% threshold for identification of causal effects of Objective 1 treatment on outcome such as economic growth of EU regions.

- Carefully read the paper of Becker, S. O., Egger, P. H., and Von Ehrlich, M. (2010), “Going NUTS: The effect of EU Structural Funds on regional performance”, *Journal of Public Economics*, 94(9), 578-590.;
- Download the data “wp13_3_db_nuts3_ae.xlsx” and consider the **Convergence objective** of the programming period **2007-2013** using the data on “Expenditures 2014 EUR MILLION”.
- Do the same analysis in Table 3 of *et al.* comparing treated and non-treated regions with respect to the difference in their GDP per capita. Discuss the results.
- Show if a *fuzzy* regression-discontinuity design is needed (i.e., the same analysis in Table 4 of Becker *et al.* (2010) for NUTS2). Discuss the results.
- Graphically show the discontinuity. Discuss the results for the identification of the causal effect.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Convergence objective funds on the **GDP per capita growth**. Discuss the results.
- Replicate the regression analysis in Section 4 of Becker *et al.* (2010) of the impact of Convergence objective funds on the **GDP per worker growth**. Discuss the results.

6. Assessing the impact of minimum wage laws on employment

In order to assess the impact of minimum wage laws on employment, Card and Krueger (1994) exploited the exogenous policy change in minimum wage that occurred in April 1992 in New Jersey (NJ): the hourly minimum wage was raised from 4.25 to 5.05 dollars in NJ but not in nearby States. Card and Krueger collected data at fast-food stores in NJ, before and after the policy change and also collected data at fast-food stores in a nearby State, Pennsylvania (PA), where the minimum wage was not changed.

- Download the “cardKrueger.RData” dataset and the corresponding codebook “codebook_cardKrueger”. Carefully read the paper “Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania”, Card and Krueger (1994).

- Estimate the following regression on the sample of fast food restaurants in Feb-Mar 1992:

$$empft_{ikt} = \alpha + \delta minwage_{kt} + \beta_1 nregs_{ikt} + \beta_2 hrsopen_{ikt} + \sum_{j=2}^4 \eta_j d_j + u_{ikt}$$

where i denotes restaurant, k denotes state, and $t = 0$ if the observation is from Feb-Mar and $t = 1$ if the observation is from Nov-Dec.

- Interpret the coefficient δ , and calculate a 90% confidence interval.
- Give an economic interpretation of the coefficients $\eta_2 - \eta_4$. What might explain the relatively large coefficient on d_4 ?
- Test $H_0 : \eta_2 = \eta_3 = 0$.
- Generate a table of means, a table of standard errors and a table of frequencies for $empft$ in each state and each time period ($post = 1$ and $post = 0$).
- Using these statistics, calculate a difference-in-differences (DD) estimate of the impact of the minimum wage law on employment.
- Specify and estimate the corresponding regression.
- How much does this suggest that the minimum wage affects full time employment in fast-food restaurants?
- Explain why the t-test from the regression above may understate the uncertainty in the effect of the minimum wage on full time employment. How could you correct the standard error? Compare the t-values with and without this correction?
- What regression would you run to estimate the DD model including control variables? Run the regression using robust standard errors.