LONG TERM INEQUALITY IN EU COUNTRIES AND REGIONAL RESILIENCE

Enrico Marelli, Nicola Pontarollo
University of Brescia

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Aim of the study

- Analyse the great impact of the economic crisis started in 2008 on the EU regions
- Examine regional resilience to the financial and economic crisis, i.e. the regional capacity to face and react to an unexpected exogenous shock.
- Given that regions have been hit in different ways by the economic crisis, we use a spatially filtered unconditional quantile regression.
  - *Compared to conditional quantile regression, the unconditional quantile regression method (UQR) provides more interpretable results as it marginalizes the effect over the distributions of other covariates in the model.*

The macroeconomic background

- The global financial crisis (2007-08) and the “Great Recession” (2008-09) were followed in Europe by the sovereign debt crisis (2010-12), a new recession (2012-13) and a feeble recovery in the subsequent years.
- The new crisis was exacerbated by the incomplete (too little too late) and wrong (austerity) policy response by the EU institutions.
- Not only was the growth rate in Europe lower than in the US, but the dispersion within the EU – even within the Eurozone – has augmented, with the peripheral countries suffering because of falls in output and income, lacking aggregate demand, high unemployment, etc.
  - *Portugal, Italy, Greece, Spain (initially also Ireland), i.e. the PIGS, were hurt by the sovereign debt crisis. In the second half of last decade Spain and Portugal had a better performance (before the Covid crisis), while output of Italy and Greece was still in 2019 well below the 2008 level.*

Productivity evolution in Europe

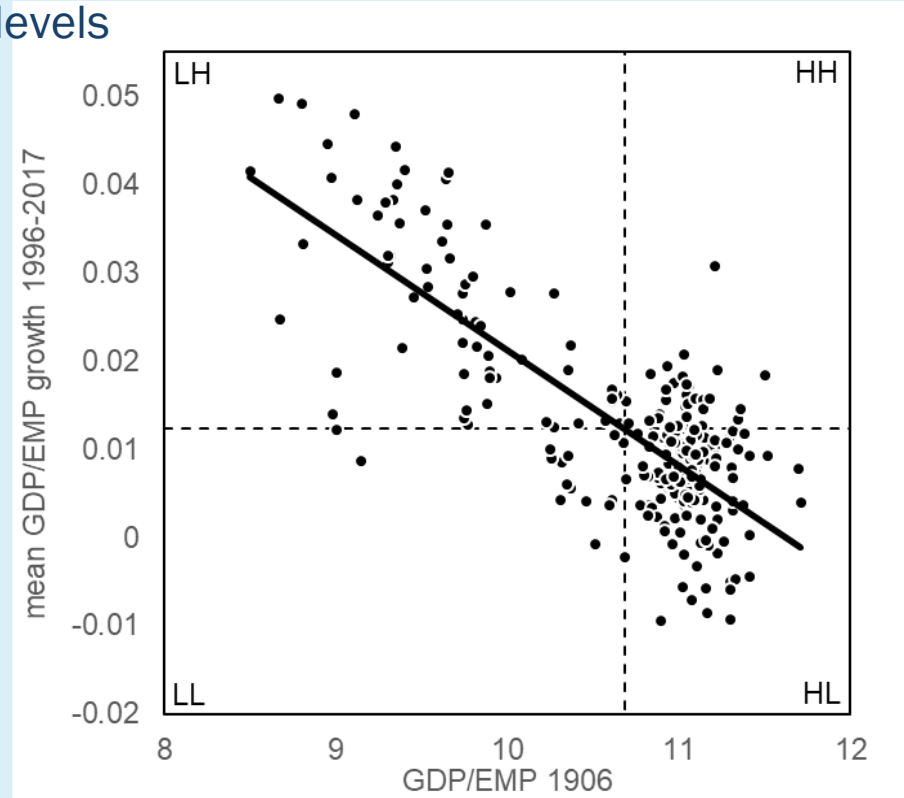
Regional productivity growth (260 NUTS2 regions of EU 28)

	GDP/EMP growth 1996-2008	GDP/EMP growth 2009-2017	GDP/EMP growth 1996-2017
All NUTS2 regions	0.01744 (0.0004)	0.01487 (0.00010)	0.01277 (0.00004)
Regions belonging to EMU	0.01244 (0.00020)	0.01117 (0.00012)	0.00862 (0.00008)
Regions not belonging to EMU	0.02448 (0.00024)	0.01896 (0.00017)	0.01891 (0.00014)

In brackets: Variance.

Productivity evolution in Europe

Correlation between productivity growth (1996 – 2017) and 1996 productivity levels



- We observe a clear negative correlation between initial productivity and its long-run growth.
- 24% of regions belong to quadrant LH and 58% to HL.
- there are regions that “deviate” from this trend given that 12% belong to quadrant HH and 5.6% to LL.
- This deviation is observable also from the fact that various points (regions) are relatively far from the tendency line. This happens in particular for quadrant LH.

The empirical and spatial model

- With the empirical model we examine regional resilience to 2008 financial and economic crisis, i.e. the regional capacity to face and react to an unexpected exogenous shock.
- Stylized facts:
  - *not all regions have been hit in the same way by the economic crisis*
  - *regions are experiencing differentiated development stages*
  - *we observe that their reaction has been not homogeneous.*
- Consequently, we do not rely on ordinary least-squares regression or spatial regression analysis, that is considering resilience around the mean of the conditional distribution as is generally done, but we use a spatially filtered unconditional quantile regression

The empirical and spatial model

- In contrast with conditional quantile regression, that may generate results that are often not generalizable or interpretable in a policy context,
- the unconditional quantile regression method (UQR) provides more interpretable results as it marginalizes the effect over the distributions of other covariates in the model.
- Furthermore, to reduce problems related to spatial dependence into the UQR random effects eigenvector spatial filtering are included.

The empirical and spatial model

The eigenvector spatial filtering UQR model is as follows (Murakami and Seya, 2019):

$$\mathrm{r}_\tau = \mathrm{X}\boldsymbol{\beta}_\tau + \mathrm{E}\boldsymbol{\gamma}_\tau + \boldsymbol{\varepsilon}_\tau \qquad \boldsymbol{\gamma}_\tau \sim N(\mathbf{0}_\mathrm{L}, \sigma^2_{\gamma,\tau}\boldsymbol{\Lambda}(\alpha_\tau)) \qquad \boldsymbol{\varepsilon}_\tau \sim N(\mathbf{0}, \sigma^2_\tau \mathrm{I})$$

where r_τ is an *n×1* vector with an i^{th} element of the recentered influence function (RIF) $(y_\mathrm{i}; \hat{\mathrm{q}}_\tau)$,

y_i is GDP per employee growth over the period 2009-2015 and q_τ is quantile τ.

X is a vector of explanatory variables defined as the average 2000-2008,

The eigenvectors $\boldsymbol{\Lambda}$ and their corresponding eigenvalues E are extracted from the matricial form of the Moran Coefficient (MC)

The empirical and spatial model

- The eigenvectors **E** are orthogonal to **X** and then spatial confounding is reduced and, consequently, residual spatial dependence is reduced too.
- **E** reduce also omitted-variables bias (if the omitted variables have some spatial pattern).

The empirical and spatial model

Among the explanatory variables we can distinguish:

- *Patents per million of active population* to account for innovation
- *Absolute specialization and diversification indexes* (based on 15 NACE-1 sectors). The absolute specialization index is calculated taking the maximum of the shares of the sectoral employment. We focus on the absolute specialization, not relative, to avoid distortions that may arise when using relative specialization index. Absolute diversification increases as the composition of activities in the regions under configuration tends to mirror the diversity of the national economy.
- *Share of the working-age population who has attained secondary education and tertiary education* to measure the average level of human capital

The empirical and spatial model

Among the explanatory variables we can distinguish:

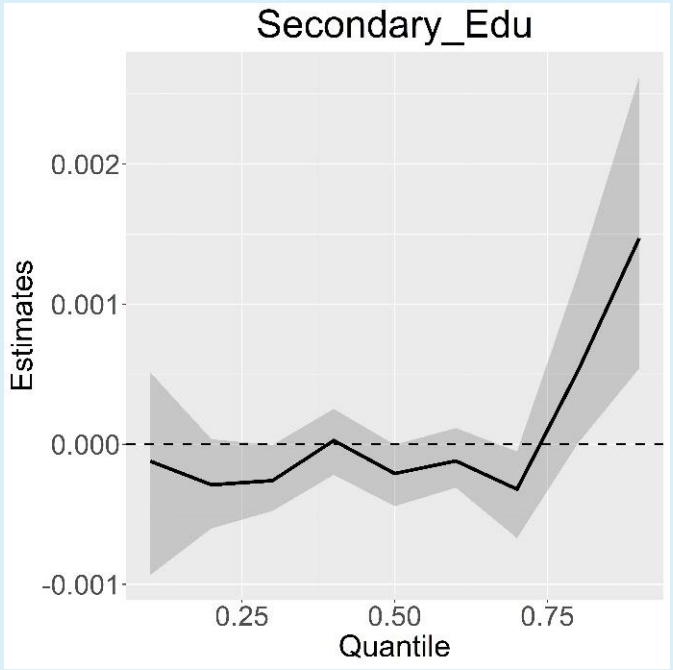
- *Gross fixed capital formation*
- *Employment share in agriculture and manufacturing* to account for economic structure
- *Population density* for agglomeration economies

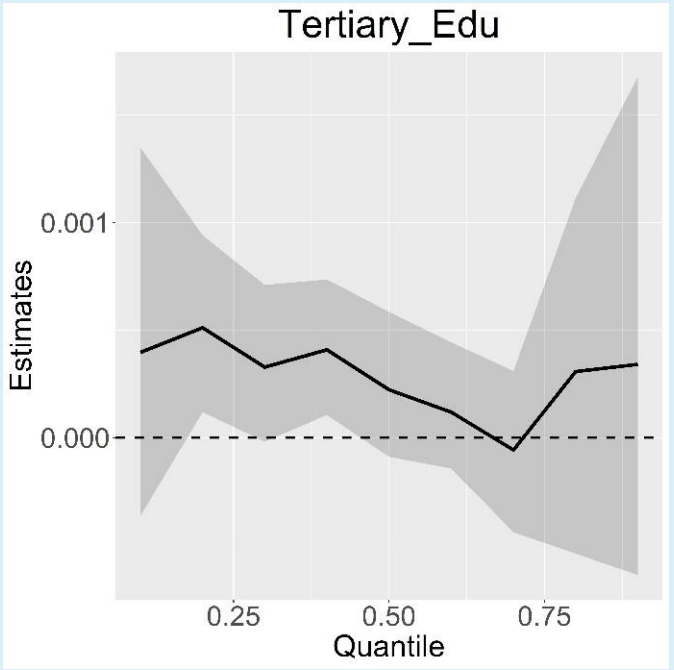
The empirical and spatial model

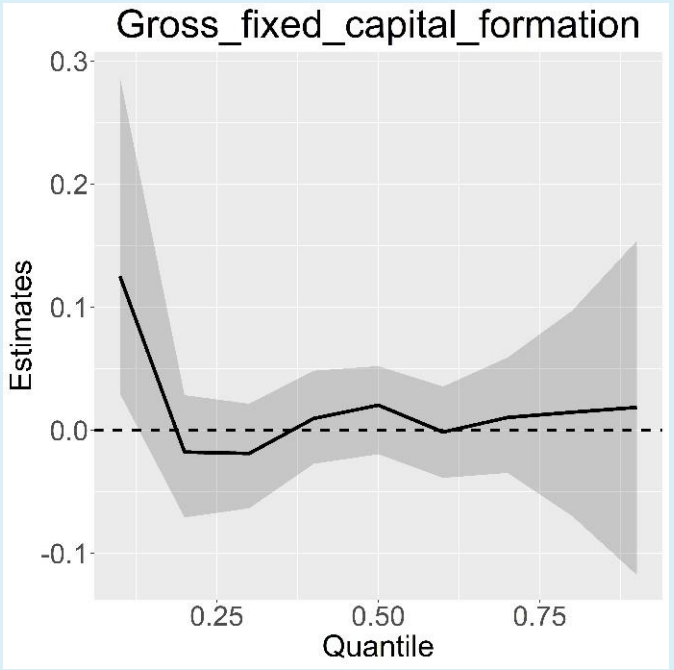
Among the explanatory variables we can distinguish:

- *Local accessibility*: Stępniak and Jacobs-Crisioni (2017) introduce an innovative method to reduce scale dependencies in estimation of travel time. Local accessibility is calculated as the population-weighted arithmetically averaged travel-time computed from a matrix between regularly distributed points with roughly 15km intervals.
- *General government debt-to-GDP ratio* is an indicator of an economy's health and a key factor for the sustainability of government finance

Results

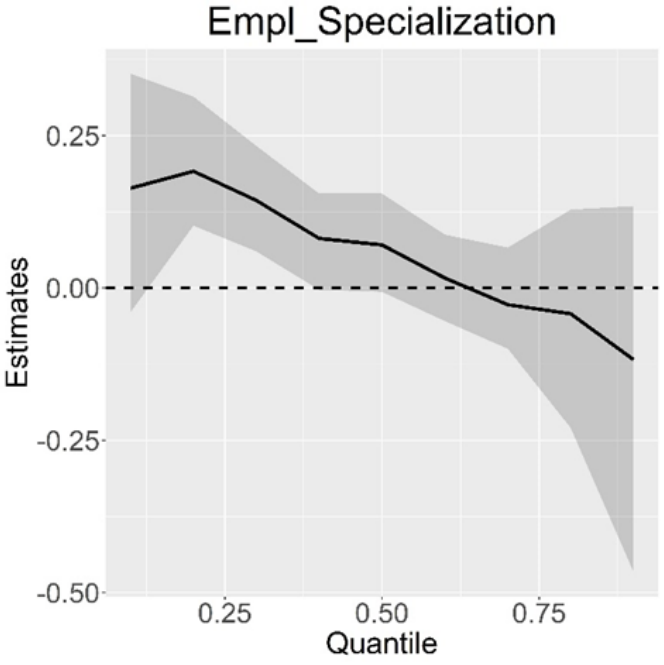


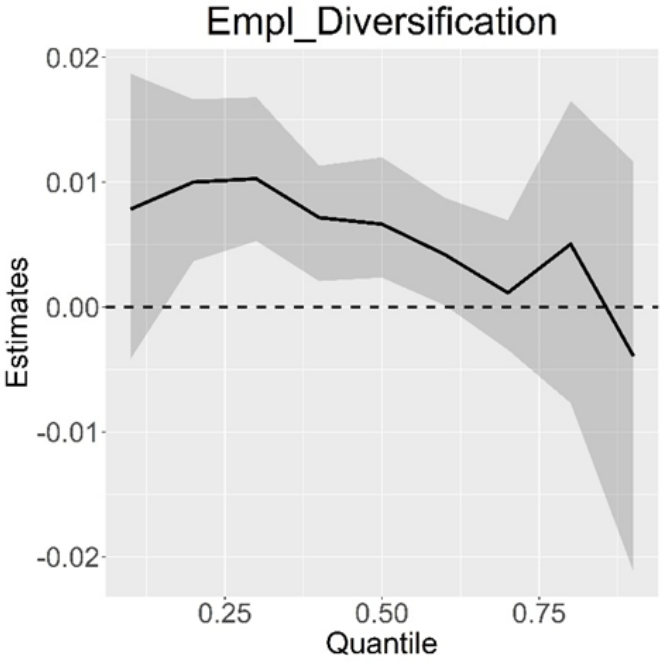


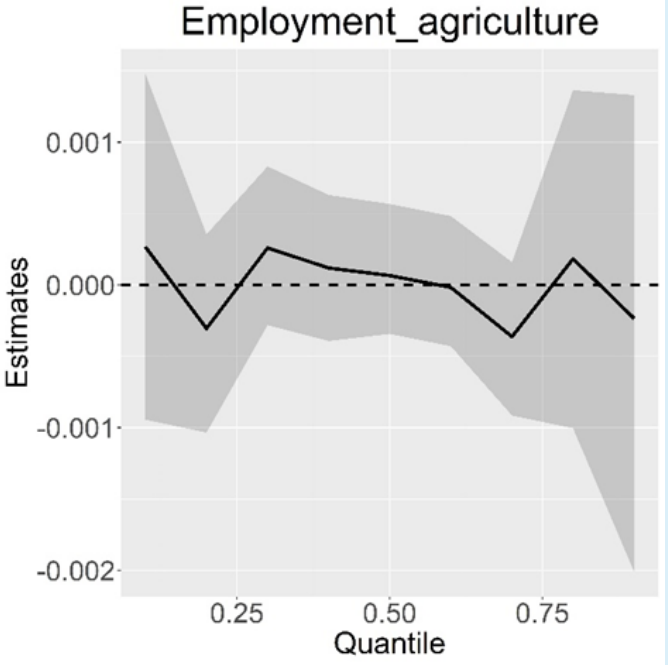


In grey: 95% confidence interval.

Results







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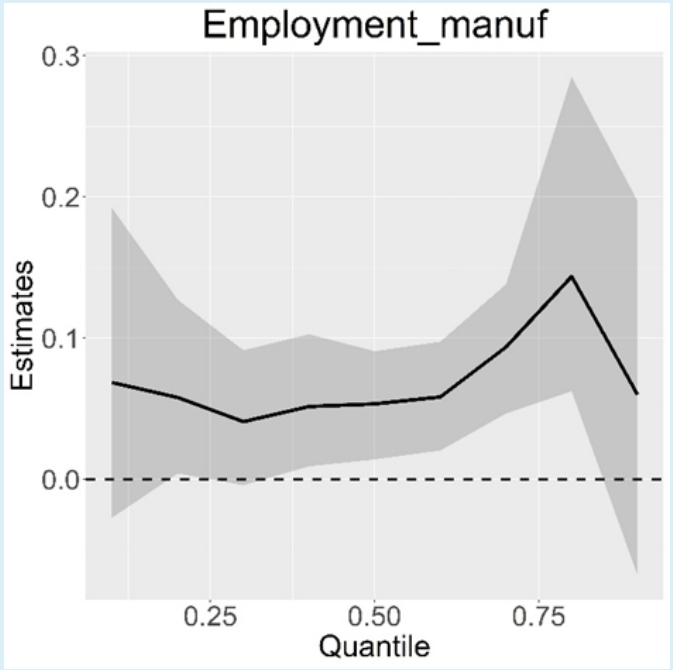

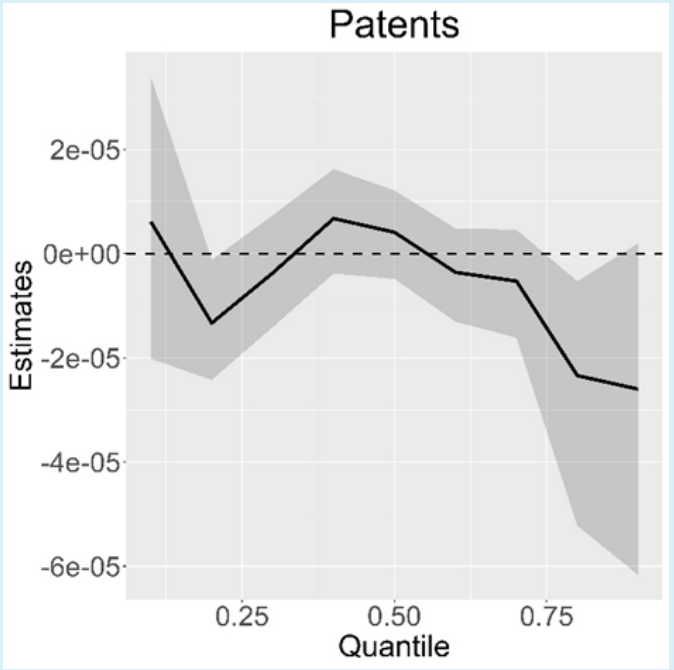

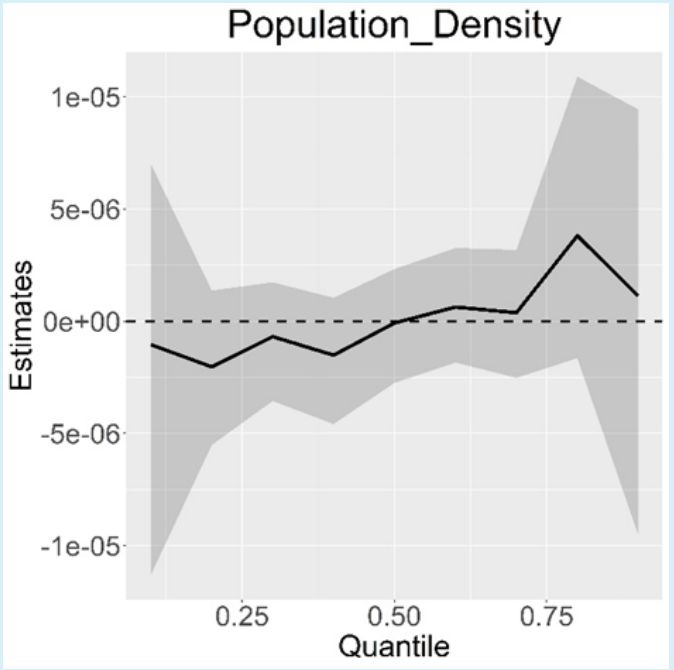

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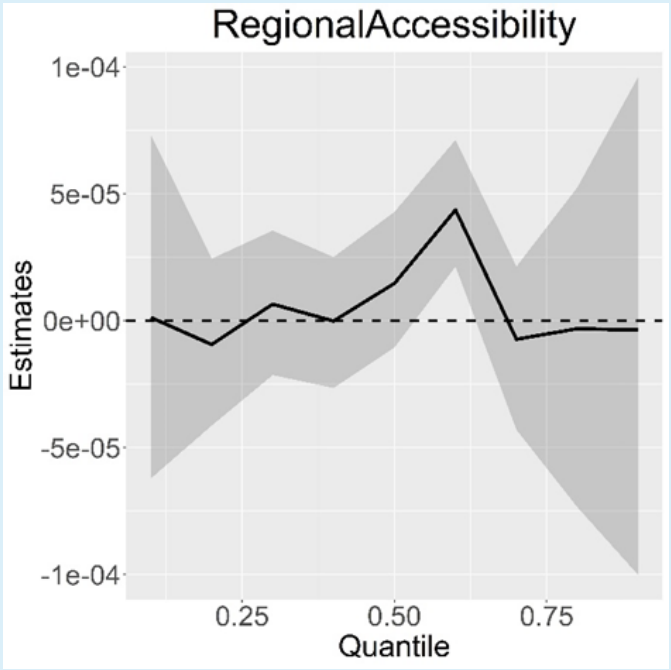

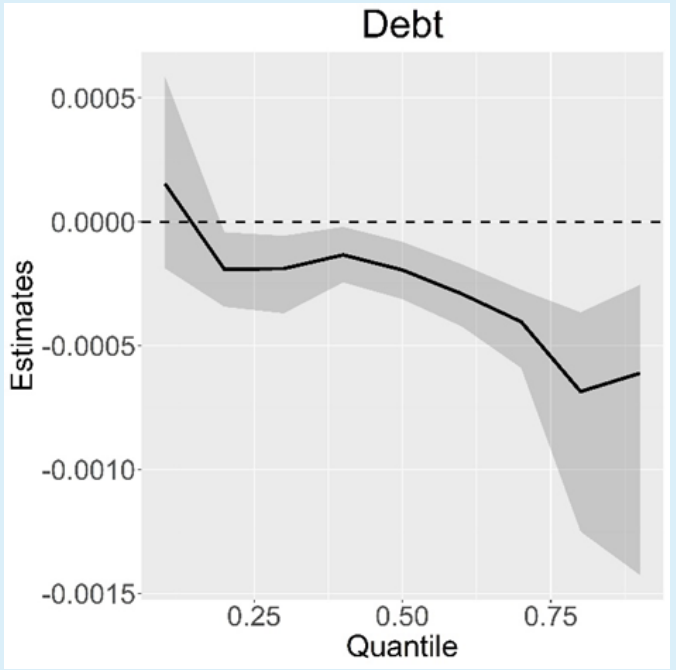

In grey: 95% confidence interval.

Conclusions and policy implications

- The estimates for secondary education show that a minimum “critical mass” is required to have an effect on regional growth.
- For those regions with a high share of people with tertiary education, the absence of significance could be linked to a labor market mismatch.
- Gross fixed capital formation is basically never significant,
- The positive and significant effects of specialization and diversification coexist in regions in 0.20–0.40 quantiles, supporting Farhauer and Kröll (2012) hypothesis of ‘diversified specialization’. This implies that regions generally have the options of specializing or diversifying, but they can also put emphasis strategically in one sector diversifying their structure with respect to the others.

Conclusions and policy implications

- Employment in a low productive sector like agriculture is, as conceivable, not statistically significant,
- Conversely, employment share in manufacturing is generally positive and significant and increases its effect in higher quantiles.
- Patents are not statistically significant, as well as accessibility and agglomeration significant for 0.80 quantiles.
- Public debt, finally, is negative and statistically significant for all quantile. Its negative effect increases in higher quantiles

Conclusions and policy implications

- Given that post-crisis GDP per capita growth is driven by human capital, policies in its support should be reinforced in particular for those regions with higher growth
- As manufacturing is driving growth, appropriate policies including reshoring incentives could be adopted
- A mix of specialization in some sectors together with a sectoral diversification, i.e. diversified specialization, deserves particular attention for policy makers, in particular for regions below the median growth
- Public debt hampers regional growth, in particular for more performing regions. Debt-GDP ratio has a negative effect indirectly: countries with high debt have less fiscal space for industrial, regional or growth-support policies; moreover, the higher interest rates on public debt also affect the private economy (loans to businesses, etc.).
- Finally, the absence of significance of GFCF deserves further investigation