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SASI Modelling for ET2050 Scenarios with "Less efficient Regulation" Framework Conditions

Working Paper

Annex to the ESPON Policy Brief
"Territorial Implication of Better Regulation for Europe towards 2050"

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This paper presents the details of scenarios developed by Spiekermann & Wegener within a service contract in the framework of the ESPON 2020 Cooperation Programme. The paper is the final report of this service and serves as background to the Policy Brief “Territorial Implication of Better Regulation for Europe towards 2050”

The partnership behind the ESPON 2020 Cooperation Programme consists of the EU Commission and the Member States of the EU28, plus Iceland, Liechtenstein, Norway and Switzerland. Each partner is represented in the ESPON Monitoring Committee.

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This basic report exists only in an electronic version.

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SASI Modelling for ET2050 Scenarios with "Less Efficient Regulation" Framework Conditions

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1. Introduction

The Dutch EU Presidency is interested in scenarios as a follow- up of the Luxembourg Presidency conclusions. The ESPON EGTC has been asked to consider scenarios related to the issue of the territorial consequences of better regulation following the Institutional Agreement on Better Law-Making proposed by the European Commission (2015a). An ESPON policy brief will be drafted for the NTCCP meeting on 6-7 April 2016, and a final version is planned for the DG meeting on 11 May 2016.

The Luxembourg presidency used the baseline and three territorial scenarios developed by the ESPON ET2050 project. The socioeconomic SASI model was used in ET2050 to make long-term simulations to investigate the likely economic, social and environmental impacts of EU and national policies in the fields of regional development and transport. In addition, three alternative framework conditions were combined with the scenarios and also tested with the SASI model.

Considering that the ET2050 scenarios implicitly assume a "best-regulation" hypothesis, the objective of this study was to examine the consequences of less efficient regulation. This means that “less efficient regulation” framework conditions were developed and compared with the four scenarios of the ET2050 project. To be able to compare the “less efficient regulation” framework conditions with the “best-regulation” scenarios modelled by the SASI model, the “less efficient regulation” framework conditions imposed on the scenarios were modelled with the SASI model as well.

This report presents the methodology including the assumptions made for the "less efficient regulation" scenarios and the results of these scenario simulations and compares them with the results of the "best-regulation" scenarios of the ET2050 project. The assumption is that the difference between the "less efficient regulation" and the best-regulation" scenarios can be taken as indicators of the costs of less efficient regulation.

2. Methodology

The methodology of the reported project consists of the comparison of scenarios of the spatial development of the territory of the European Union produced with the socioeconomic SASI model under different assumptions about the quality of regulation of EU territorial policies in the receiving EU member states.

2.1 The SASI model

The SASI model is a recursive simulation model of socio-economic development of regions in Europe subject to exogenous assumptions about the economic and demographic development of the European Union as a whole and transport and other spatial policies. The SASI model differs from other approaches to model regional development by modelling not only production (the de-

mand side of regional labour markets) but also population (the supply side of regional labour markets).

The spatial dimension of the model is established by the subdivision of the European territory into NUTS-3 or equivalent regions and by connecting these by road, rail and air networks. For forecasting regional economic development the SASI model applies an extended production function with regional economic structure, regional productivity, accessibility, availability of labour, R&D investments, population density and availability of developable land as explanatory variables. In addition it uses a migration function in which net migration is forecast with regional wage level and quality of life as explanatory variables.

Figure 1 visualises the structure of the SASI model.

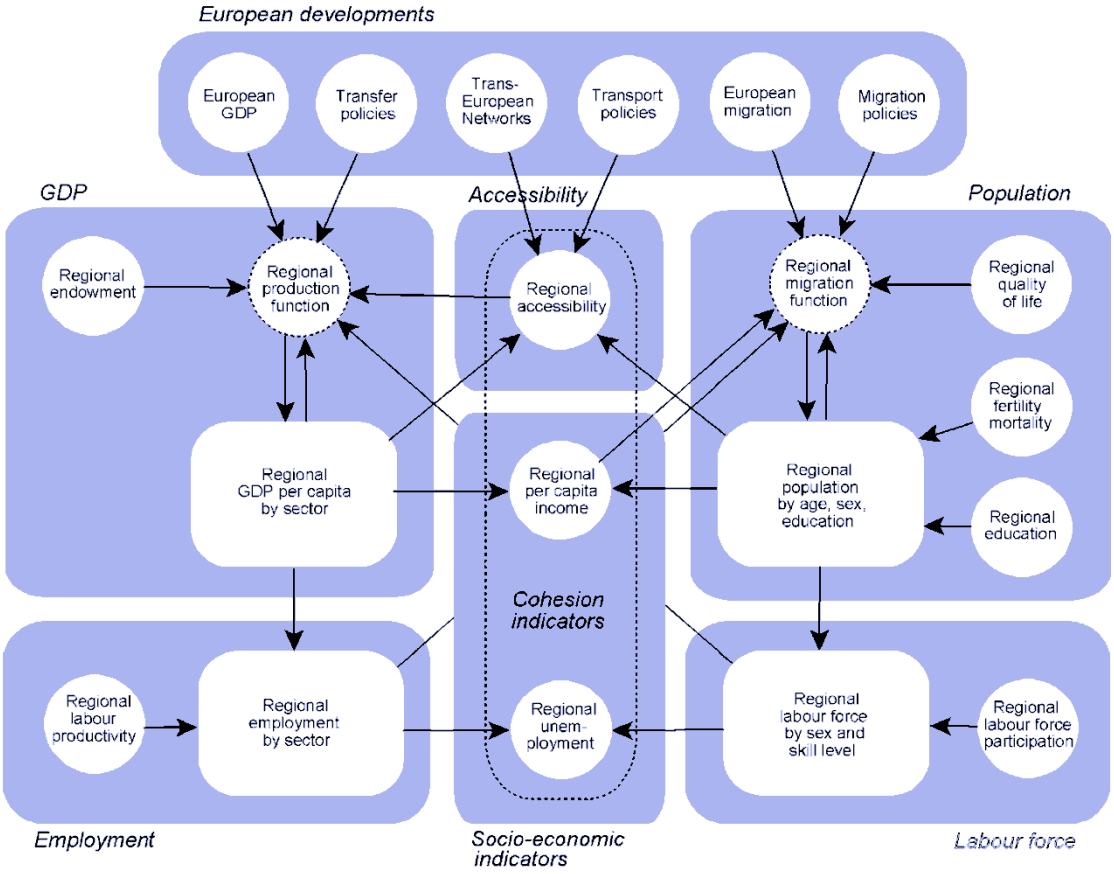


Figure 1. The structure of the SASI model

The SASI model has seven forecasting submodels (see Figure 1):

(1) The *European developments* submodel prepares exogenous assumptions about the wider economic and policy framework of the simulations.

(2) The *Accessibility* submodel calculates accessibility indicators expressing the locational advantage of each region with respect to relevant destinations.

(3) The *GDP* submodel calculates regional GDP by industrial sector based on sector-specific quasi-production functions.

(4) The *Employment* submodel calculates regional employment by industrial sector from regional GDP and labour productivity.

(5) The *Population* submodel forecasts regional population through natural change (fertility, mortality) and net migration.

(6) The *Labour force* submodel calculates regional labour force from regional population and labour force participation.

(7) The *Socio-economic indicators* submodel calculates cohesion and polycentricity indicators.

The temporal dimension of the model is established by dividing time into periods of one year duration. In each simulation year the seven submodels of the SASI model are processed in a recursive way, i.e. sequentially one after another. This implies that within one simulation period no equilibrium between model variables is established; in other words, all endogenous effects in the model are lagged by one or more years.. A detailed documentation of the SASI model is contained in Wegener (2008) and Spiekermann and Wegener (2014).

All simulations with the SASI model start from 1981 to demonstrate that the model is able to reproduce the past development and how the future development continues or deviates from the past development. Because the database of the SASI model is largely based on census data, it ends with the year 2051 instead of 2050.

Because it is not the purpose of the model to predict the economic crisis of the years 2008-2009, total GDP of the countries most affected by the crisis (Cyprus, Estonia, Spain, Greece, Lithuania, Latvia, Portugal and Slovenia) was exogenously entered into the model for the years 2005-2013 plus a recovery period until 2020.

2.2 Existing ESPON ET2050 scenarios

In the ESPON project ET2050 the SASI model was used to develop a range of scenarios of the spatial evolution of the territory of the European Union.

For forecasting regional economic development the SASI model applies an extended production function with regional economic structure, regional productivity, accessibility, availability of labour, R&D investments, population density and availability of developable land as explanatory variables. In addition it uses a migration function in which net migration is forecast with regional wage level and quality of life as explanatory variables. To take account of the slow process of economic structural change, the economic variables are lagged by five years

Two kinds of EU policies are considered in the SASI model, subsidies and transport policies:

(1) *Structural Funds subsidies* consist of EU regional policy expenditures from the European Regional Development Fund (ERDF), the European Agricultural Fund for Rural Development (EAFRD), the European Social Fund (ESF) and the Cohesion Fund (CF). It is assumed that the total volume of these funds will stay the same as in the funding period 2007-2013, i.e. will grow in proportion to the expected growth of the economy of the European Union. As allocation rule an inverse exponential function of GDP per capita empirically derived from the allocation estimates for the funding period 2007-2013 in the SFC database (European Commission, 2008) was used:

$$b_i = \exp\left[-0.035 \times \left(y_i - 51.0\right)\right] \times 3.0$$

where b_i is Cohesion policy expenditure as per cent of GDP in region i, and y_i is GDP per capita in region i as per cent of the average GDP per capita of the European Union (EU27=100). Figure 2 shows how this function was derived from data of the funding period 2007-2013. Cohesion policy expenditures are treated as transfers, i.e. are paid by all regions in proportion to their GDP per capita.

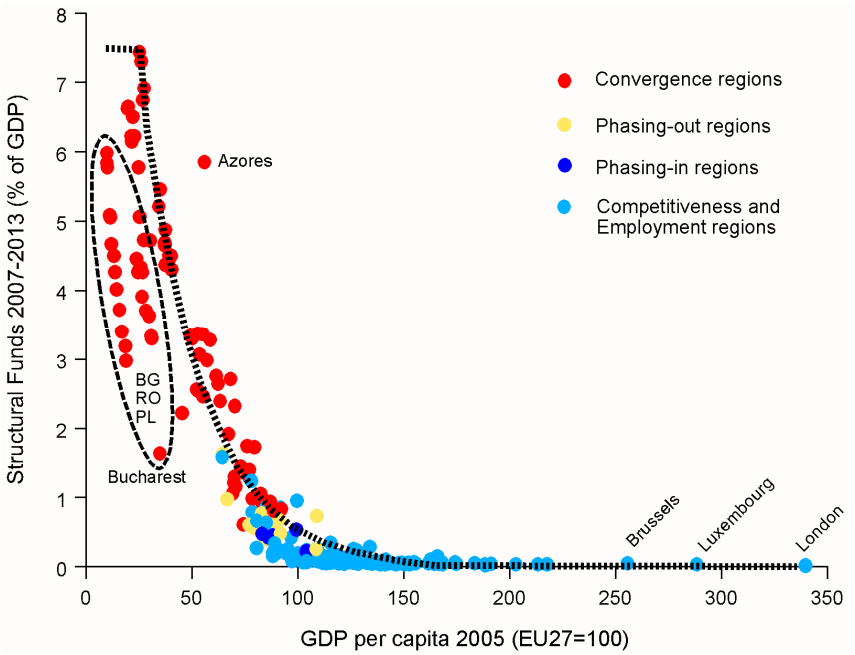


Figure 2. Structural Funds of regions as % of GDP v. GDP per capita (EU27=100)

(2) *Transport policies* consist of time-sequenced network improvements and assumed changes of the generalised costs of passenger and goods transport through energy price increases and advances in energy efficiency of vehicles. In addition, perceived energy costs of transport are calculated as a combination of energy prices, energy efficiency and household incomes. If transport costs increase by the same rate as GDP per capita, no change in accessibility is assumed.

The Baseline Scenario is a business-as-usual scenario, i.e. it assumes that current policies are continued in the future.

Besides the Baseline Scenario three exploratory scenarios were developed, in which the allocation of EU subsidies and transport policies are changed after 2013:

- In the *MEGAs* A-*scenarios* large European metropolitan areas are promoted in the interest of global competitiveness and economic growth.
- In the *Cities* B-*scenarios* secondary European cities are promoted in order to strengthen the balanced polycentric spatial structure of the European territory.
- In the *Regions* C-*scenarios* rural and peripheral regions are promoted to advance territorial cohesion between affluent and economically lagging regions.

In addition three scenario variants, in which the three exploratory scenarios were combined with alternative framework conditions, were tested:

1 *Economic recession*: Globalisation and growth of emerging economies lead to significant slowing down of the growth of the European economy.

2 *Technology advance*: New innovations in labour productivity and transport technology result in significant increases in labour and transport system productivity.

3 *Energy/climate*: Rising energy costs and/or greenhouse gas emission taxes lead to strong increases of production and transport costs.

Table 1 shows the combinations of the three exploratory scenarios and the three different framework conditions resulting in nine scenario variants.

Table 1. Exploratory scenarios and their variants

Spatial orientation of the scenarios	Framework conditions			
	As in the Baseline Scenario	1 Economic recession	2 Technology advance	3 Energy/ climate
Baseline	00			
Promotion of large metropolitan areas	A0	A1	A2	A3
Promotion of secondary European cities	B0	B1	B2	B3
Promotion of peripheral regions	C0	C1	C2	C3

2.3 "Best-regulation" and "less efficient regulation" framework conditions

"Best-regulation" framework conditions are oriented at the Institutional Agreement on Better Law-Making proposed by the European Commission (2015a). Better regulation is defined as "a way of working to ensure that political decisions are prepared in an open, transparent manner, informed by the best available evidence and backed by the comprehensive involvement of stakeholders. This is necessary to ensure that the Union's interventions respect the overarching principles of subsidiary and proportionality i.e. acting only where necessary and in a way that does not go beyond what is needed to resolve the problem" (European Commission, 2015b, 5). Better regulation addresses all parts of what is called the European Union policy cycle, i.e. policy design and preparation, adoption; implementation, application, evaluation and revision. A set of better regulation principles, objectives, tools and procedures are defined for each part of this policy cycle. This includes in particular planning, impact assessment, stakeholder consultation, implementation, monitoring and evaluation.

For the policies considered here, i.e. Structural Funds and transport infrastructure policies, "best-regulation" framework conditions describe a well-functioning of the EU policy cycle. For such a storyline it is assumed that in the fields of cohesion and transport policy a reasonably effective co-operation between the EU and its member states is in place for all elements of the policy process. This means that projects subsidised by the EU will be co-financed by the member states, implemented within a reasonable given time frame and eventually will display the expected effects, and that the integration of the Single European Market will proceed.

In a world that is less characterised by this favourable mechanism, i.e. characterised by "less efficient regulation" framework conditions, the development and implementation of policies would be much more difficult and the efficiency of the policies would be worse. "Less efficient regulation" plays a hindering role in all parts of the EU policy cycle. The planning process is less well organised, impact assessments might give too optimistic expectations, stakeholder consultation yields irreconcilable positions and low commitments, the implementation process is delayed or even not happening, monitoring and evaluation show that the objectives are only partially reached and that the policy is less effective than foreseen.

In the field of Structural Funds, "less efficient regulation" framework conditions have an impact on the degree the subsidies can be used in the regions and on the efficiency of its use. By today, the subsidies available from the Structural and Investments Funds of the Programming Period 2007-2013 have been spent by around 90 percent only (European Commission, 2016). This so-called absorption rate "represents the extent to which a country is capable of effectively and efficiently spending its Structural Funds allocation, and is expressed in percentage of the total allocation" (Katsarova, 2013, 2). Accordingly, the absorption capacity is related to institutional factors at EU

level including consistency and increased co-ordination in the fund allocation process and at national level. "Absorption capacity is usually positively correlated to the ability of central and regional authorities to prepare consistent multi-annual plans, to cope with the substantial amount of administrative work, and, finally, to finance and supervise implementation and corruption" (Katsarova, 2013, 4). The European Commission points to a couple of reasons for low and delayed absorption rates including "an underlying lack (or even decline) in administrative capacity, the challenges in preparing major infrastructure projects and obtaining Commission approval, changes in legislation, inconsistent political ownership (changes in national and regional government, changes to institutions) and the effects of national sectoral reforms" European Commission, 2013, 5).

However, low or delayed financial execution of Structural Funds is not the only characteristic of "less efficient regulation" framework conditions. Among many others, Bubbico and De Michelis (2011) point to the fact that effectiveness of policy measures implemented and their consequences on regional development might also be mayor obstacles and should not be ignored. Or as Becker (2012, 10) puts it: "Not all regions are equally good at converting … transfers into additional growth. Giving untied transfers to regions where the education level of the workforce is below average, or government is of poor quality, is ineffective and a poor use of limited funds".

For transport infrastructure investments the same hindering mechanism as for Structural Funds are at work in a situation with "less efficient regulation" framework conditions. For instance, an evaluation report on the effectiveness of urban public transport project co-financed by the European Union shows some of those effects (European Court of Auditors, 2012). While in general most projects were implemented according to their initial specifications, some projects had serious delays or cost overruns. In terms of effects of the projects, two thirds of the projects were underutilised compared to estimated demand in the planning phase with the consequences of clear underperformance regarding economic and social benefits and financial imbalances for the public authorities. "The underutilisation of public transport is mainly due to weaknesses in project design and mobility policy. Several could have been addressed at the project planning stage (European Court of Auditors, 2012, 5).

For the two policy fields considered here, Structural Funds and transport investments, a "less efficient regulation" storyline sees the co-ordination between EU policies and their implementation in the member states as less efficient or even distorted by lack of institutional and human capacity. This means that projects subsidised by the EU will be delayed or even not implemented and will have less impacts than anticipated.

2.4 Integration of "Less efficient regulation" in the ET2050 scenario system

All scenarios developed in the ET2050 project adopt a "best-regulation" hypothesis, i.e. assume that policies are implemented in time and as planned without any obstacles.

To assess the importance of the best possible legal and institutional regulation for the co-operation between EU and the member states in the field of territorial and transport development, the development assumed in the ET2050 scenarios was compared with contrasting scenarios in which the implementation of the EU policies is less efficient.

To do so, the base scenario 00 and the three exploratory scenarios A0, B0 and C0 were combined with a fourth set of framework conditions, "less efficient regulation", in which the co-ordination between EU policies and their implementation in the member states is less efficient or even distorted by national egoism or lack of co-operation. Table 2 shows such an integration of a fourth set of framework conditions into the scenario system of ESPON ET2050. It has to be noted that the existing scenarios 00, A0, B0 and C0 are relabelled into 0Br, ABr, BBr and CBr to reflect that they assume the better regulation framework conditions. All scenario acronyms with less efficient framework conditions do end with Lr.

Table 2. Integration of "less efficient regulation" scenarios into the scenario system

Spatial orientation of the scenarios	Framework conditions				
	Br As in the Baseline Scenario	1 Economic recession	2 Tech-nology advance	3 Energy/ climate	Lr Less efficient regulation
Baseline	0Br				0Lr
Promotion of large metropolitan areas	ABr	A1	A2	A3	ALr
Promotion of secondary European cities	BBr	B1	B2	B3	BLr
Promotion of peripheral regions	CBr	C1	C2	C3	CLr

In order to be in line with the way the scenarios in ET2050 were implemented, the less efficient regulation assumptions start in the present and are continued in the future. The pair-wise comparison of the results of these four "Less efficient regulation" scenarios 0Lr, ALr, BLr and CLr with the corresponding scenarios 0Br, ABr, BBr and CBr answers the question "How might Europe and its regions develop ifEU policies achieve their objectives in the most effective and efficient way?"

2.5 Model assumptions

In technical terms, the possibilities to reduce the efficiency and level of co-ordination in the field of territorial development between the EU and member states are implemented by using assumptions about the Structural Funds and transport investments as variable components. It has to be noted that not the policy processes in the context of "less efficient regulation" framework conditions are modelled as such, but outcome of assumptions reflecting the way "less efficient regulation" influences the implementation and efficiency of policy measures.

2.5.1 Structural Funds subsidies

In the present model subsidies of the Structural Funds (ERDF, EAFRD, ESF, CF) are allocated to regions subject to the inverse function of regional GDP per capita explained above. It is assumed that the subsidies are co-financed by member states and, with appropriate multipliers, promote the regional economy, including generative effects. To model the effects of less efficient regulation on EU subsidies it was assumed

- that in each year the total volume of EU subsidies stays the same in all better regulation and less efficient regulation scenarios as in the Baseline Scenario, 0.4 percent of the total annual EU GDP,
- that in each year in all scenarios the donor countries continue to contribute their share of total ERDF, EAFRD, ESF and CF subsidies to the EU,
- that in each year in the less efficient regulation scenarios the subsidies allocated to receiving member states are underutilised for the intended purpose due to less efficient regulation.

It is assumed that underutilisation of EU subsidies is larger in less developed member states with less efficient administrative systems. The degree of underutilisation is estimated for each NUTS3 region by referring to two components:

- The share of subsidies allocated to each member state but not used by it is estimated by the so-called absorption rate, the amount of Structural Funds subsidies allocated and actually received and applied to the intended purpose. The current absorption rates of each EU member state accumulated during the 2007-2013 funding period is shown in the map in Figure 3 (European Commission, 2016).
- In addition it is attempted to estimate the efficiency of project implementation in each member state by referring to the *Opportunity sub-index*, part of the *Social Progress Index* currently under development by DG Regio (2016). The Opportunity sub-index contains component indicators, such as "trust in the political system", "quality and accountability of government services", "corruption" and "impartiality of government services" that are likely to be correlated with government efficiency, and indicators such as "tertiary educational attainment" or "lifelong learning" which describe the human capacity of regions. The Opportunity sub-index of each NUTS 2 region of the European Union is shown in the map in Figure 4 (DG Regio, 2016). To estimate administrative efficiency, an inverse exponential function of the Opportunity sub-index is applied to the economic multiplier of subsidies used in the model.

It is assumed that the Structural Funds subsidies not used by member states are blocked, i.e. not redirected to other purposes. This avoids that more efficient member states benefit from the inability of some member states to absorb EU subsidies. This does not imply that there are only losers and no winners of less efficient regulation. It cannot, and probably should not be avoided that regions with more efficient administration or better accessibility grow faster than regions with inefficient administration or poor accessibility. However, in all scenarios the negative effects of less efficient regulation are dominant; in no case a positive effect was found.

2.5.2 Transport investments

Transport infrastructure investments of the trans-European network programme and national transport projects are entered into the model exogenously and implemented following an expected and realistic time table. For the Baseline Scenario 0Br this time table of project implementation is in line with the expectation concerning the start of operation of the links of the trans-European network programme. For the three exploratory scenarios ABr, BBr and CBr additional transport links guaranteeing a scenario-specific minimum quality level of transport links serving the different spatial orientation of the scenarios are added to the networks of the Baseline Scenario 0Br.

For the "less efficient regulation" scenarios assumptions were developed that systematically delay by a number of years or altogether abandon the opening of the transport infrastructure projects in order to reflect contradictory rules, inefficiency of implementation, weak absorption capacity or underutilisation of effects. These assumptions were translated into changes of the transport infrastructure sections that were upgraded or newly built in the different scenarios. These changes are in form of lower travel speeds in the "less efficient regulation" scenarios on those transport links. This leads to higher generalised transport costs and thus to a reduction of accessibility in the affected regions. This is done in the following way:

- In the "less efficient regulation" variant 0Lr of the Baseline Scenario 0Br, the speed of new or upgraded trans-European transport links was reduced by a factor based on the Opportunity sub-index of the Social Progress Index as described above. To reflect the national implementation competence for implementing the TEN-T programme, national averages of this factor were used.
- In the three "less efficient regulation" scenarios ALr, BLr and CLr, besides the network changes of Scenario 0Lr, the regional index values were used to reduce the speed of the additional transport links as well as of the intra-regional transport connections.

Figure 3.
European Structural Funds 2007-2013 absorption rate (March 2016) (in % of allocated funds)

Regional level: NUTS 0
Origin of data: European Commission (2016)

- < 80
- 80 - 84
- 84 - 88
- 88 - 92
- 92 - 96
- > 96
- no data available

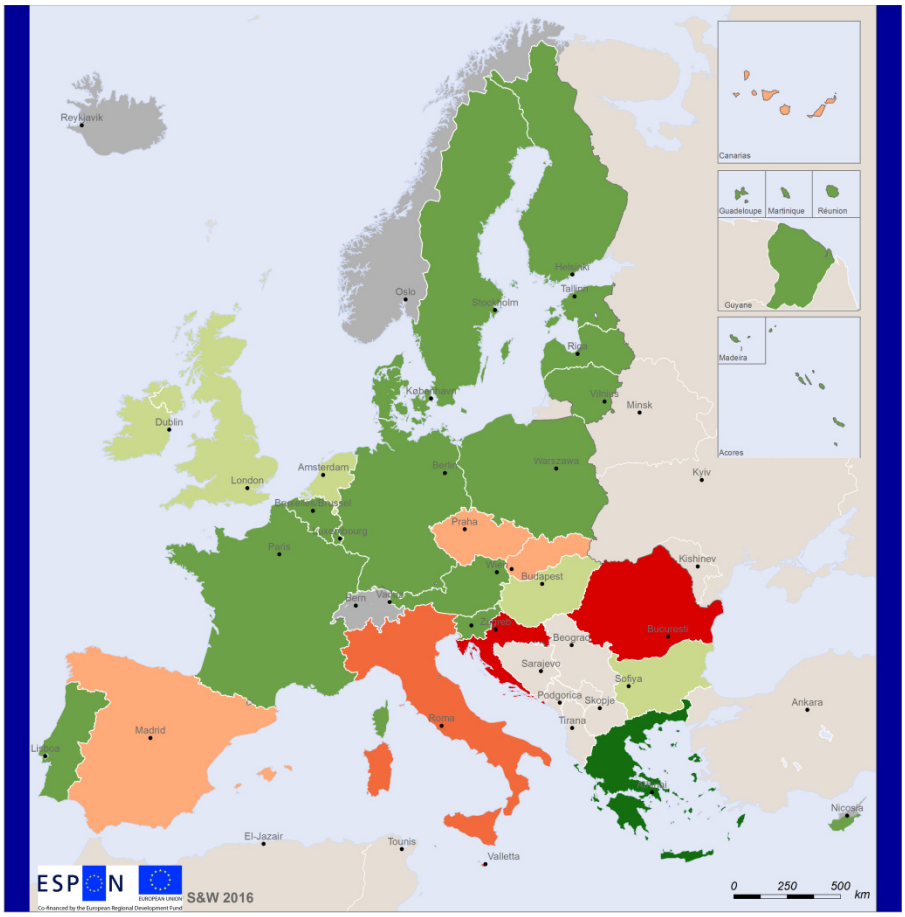
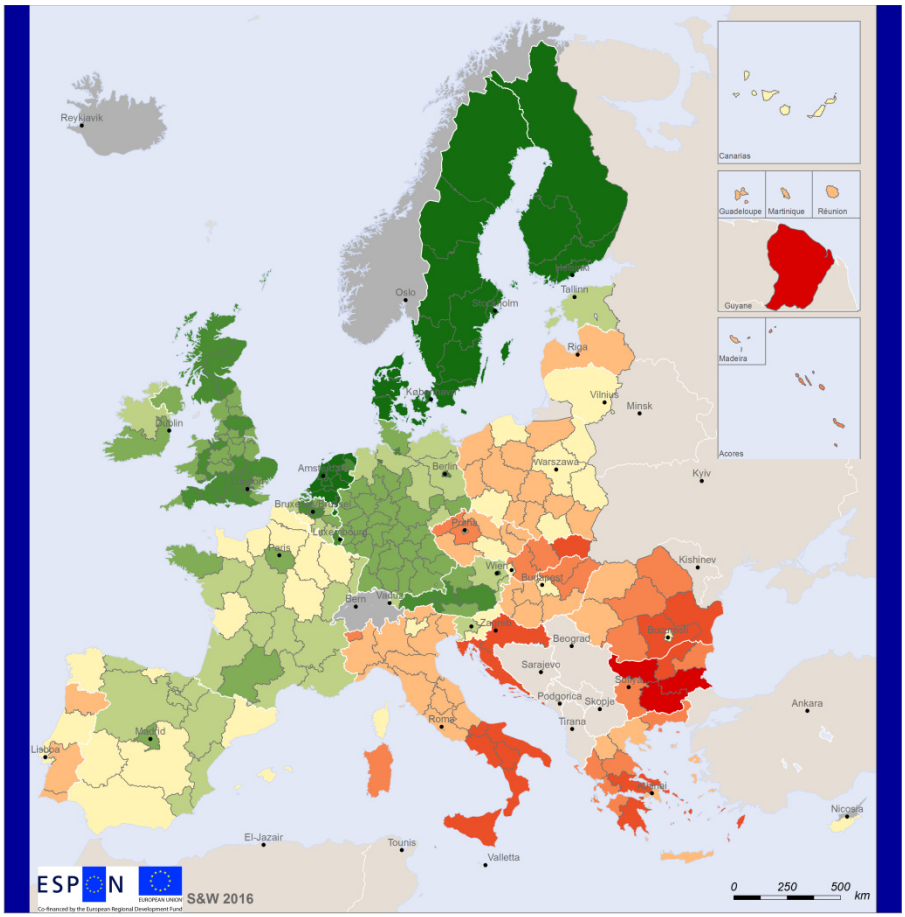


Figure 4.
EU Social Progress Index
Opportunity sub-index

Regional level: NUTS2
Origin of data: DG Regio (2016)

- < 35
- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- > 70
- no data available



3. Results

In this section the results of the "less efficient regulation" scenario simulations are presented. To make the individual contributions of less efficient regulation of Structural Funds subsidies and transport infrastructure investments visible, the two groups of EU policies are first presented separately and then in their combined impacts.

3.1 Structural Funds subsidies

The maps in Figures 5-8 show the impacts of less efficient regulation in terms of low absorption of Structural Funds subsidies and associated inefficiency of administration. As indicator of impact the effect on gross domestic product (GDP) per capita was used, although this indicator has become increasingly criticised as giving only an incomplete description of human well-being, which has led to the concept of *Social Progress Indicator* (SPI). However, in the ESPON ET2050 project, and hence the current version of the SASI model, the SPI has not yet been implemented as an output indicator.

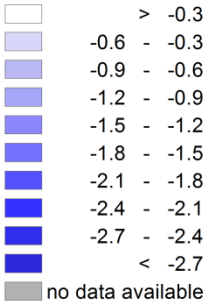
The map in Figure 5 shows the impact of less efficient regulation on GDP per capita in the Baseline Scenario 0Lr, in which less efficient regulation is assumed, compared to the original Baseline Scenario 0Br, in which better regulation is assumed. The distribution of negative impacts clearly reflects the distribution of Structural Funds subsidies assumed as a function of GDP per capita shown in Figure 1, with much higher subsidies in percent of regional GDP in the new member states in Eastern Europe Poland, Slovakia, Hungary, Romania, Bulgaria and more recently Croatia and the Mediterranean countries Portugal, Spain, southern Italy and Greece. However, the overall impact is modest with the highest values in Romania and Bulgaria in the range of 3-5 percent. Given the current nominal GDP per capita of these countries of between 8,000 and 10,000 Euro, this amounts to between 240 and 500 Euro per capita annually in these countries. The reasons for these relatively small impacts lie in the fact that the reduction in EU subsidies received by these countries amounts to no more than 11.1 percent annually plus the more informal reductions in administrative efficiency represented in this exploratory study by the Opportunity sub-index of the Social Progress Index.

The maps in the following three Figures 6-8 show how these effects change in the three spatial scenarios examined in the ESPON ET2050 project (see Figures 21-23 on Pages 19-20 of Spiekermann and Wegener, 2014). The map in Figure 6 shows the impacts in the MEGAs Scenario ALr compared with the Baseline MEGAs-Scenario ABr, in which better regulation is assumed. As to be expected, the impacts are very small because the Metropolitan areas promoted in the A-Scenarios receive only relatively low Structural Funds subsidies (in percent of their GDP), are located in countries with relatively high Structural Funds absorption rates and score high in terms of the SPI Opportunity sub-index. Accordingly, the amount of Structural Funds subsidies not used goes down to 9.8 percent. The map in Figure 7 shows the effects of less efficient regulation on the Cities Scenario BLr compared with the Baseline Cities-Scenario BBr. Now the effects are little stronger amounting to 10.0 percent of all Structural Funds subsidies not used and concentrated on the medium-sized urban areas promoted in the B-Scenarios. Finally, the map in Figure 8 shows the effects of less efficient regulation on the Regions-Scenario CLr compared with the Baseline Regions-Scenario CBr. Now the effects are strongest amounting to 11.2 percent of Structural Funds subsidies not absorbed focused on the rural and peripheral regions in Eastern Europe, Portugal, Spain, southern Italy and Greece.

In summary, the analysis has shown that the impacts of less efficient regulation in the field of Structural Funds subsidy absorption and efficiency are measurable but not really large due to the fact that the total Structural Funds subsidies amount to not more than 0.4 percent of the total GDP of the European Union.

Figure 5.
Less efficient regulation of Structural Funds: Difference in GDP per capita between Scenario 0Lr and Scenario 0Br (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



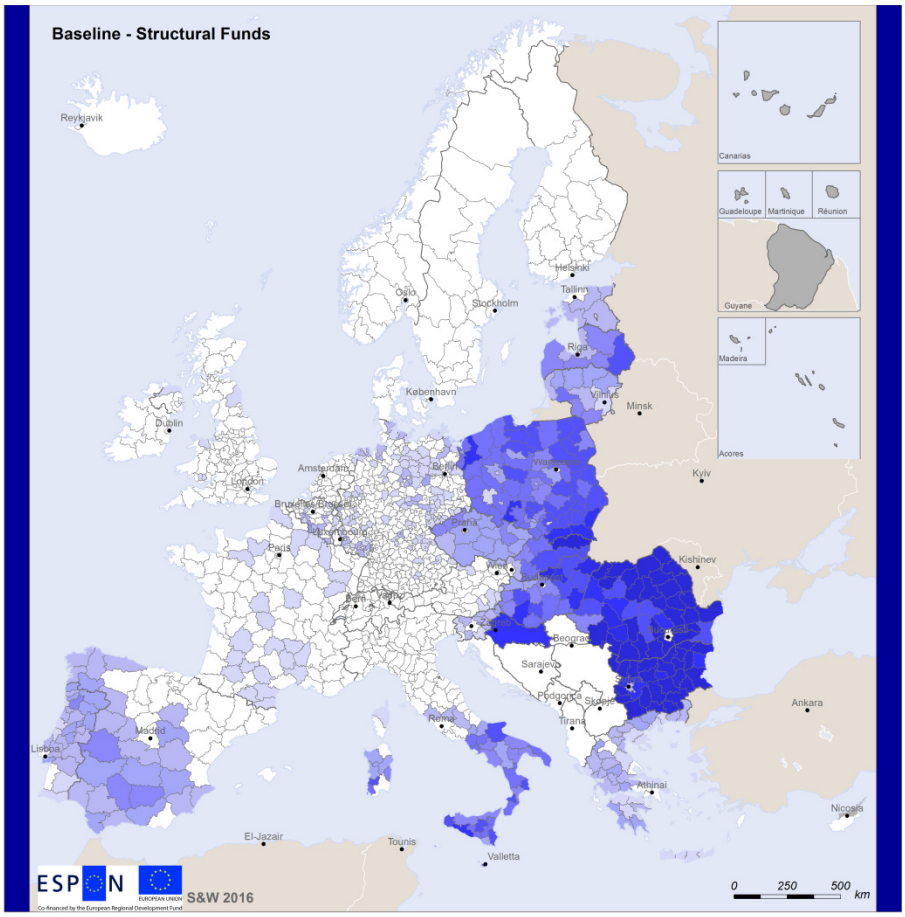
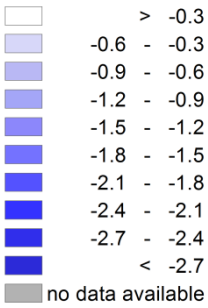


Figure 6.
Less efficient regulation of Structural Funds: Difference in GDP per capita between Scenario ALr and Scenario ABr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



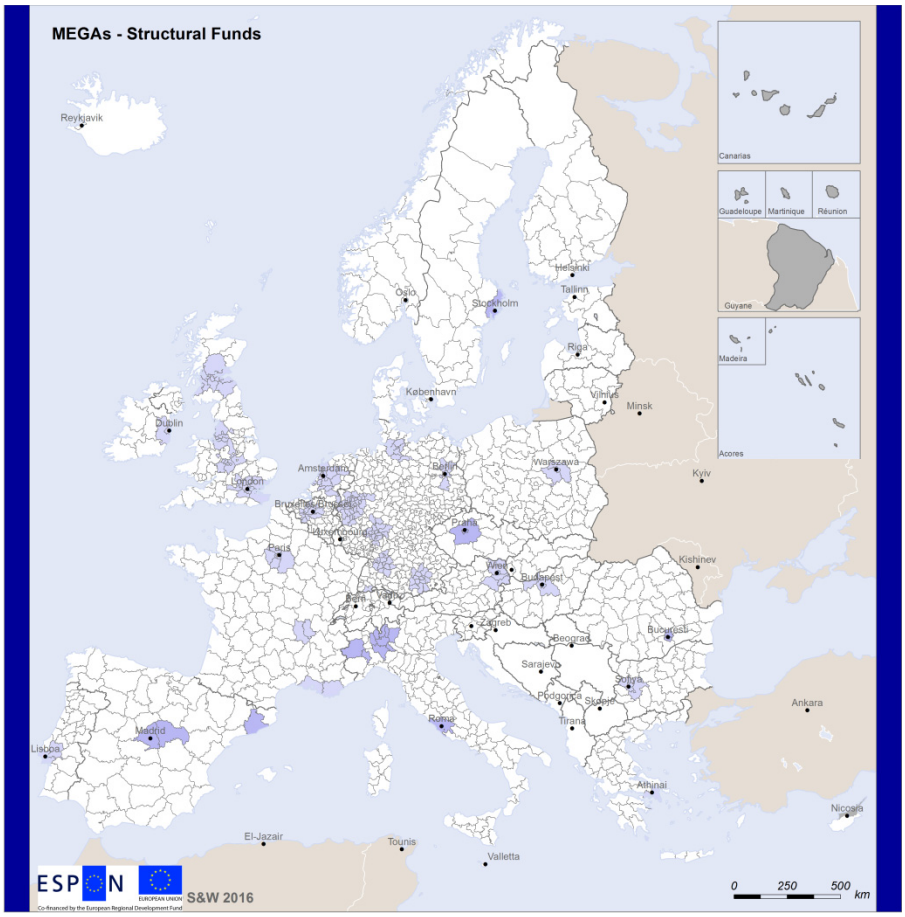
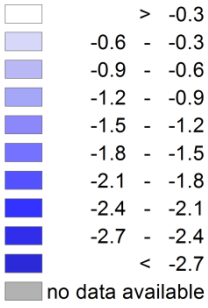


Figure 7.
Less efficient regulation of Structural Funds: Difference in GDP per capita: between Scenario BLr and Scenario BBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



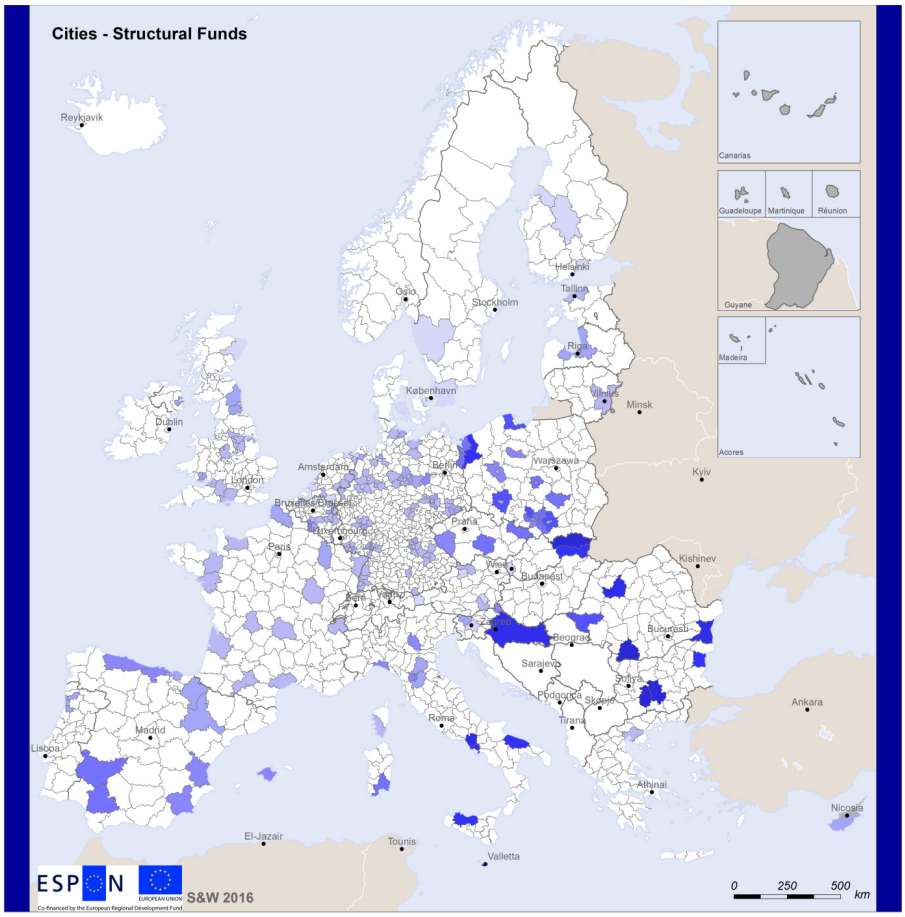
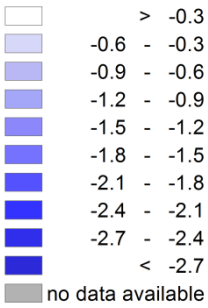
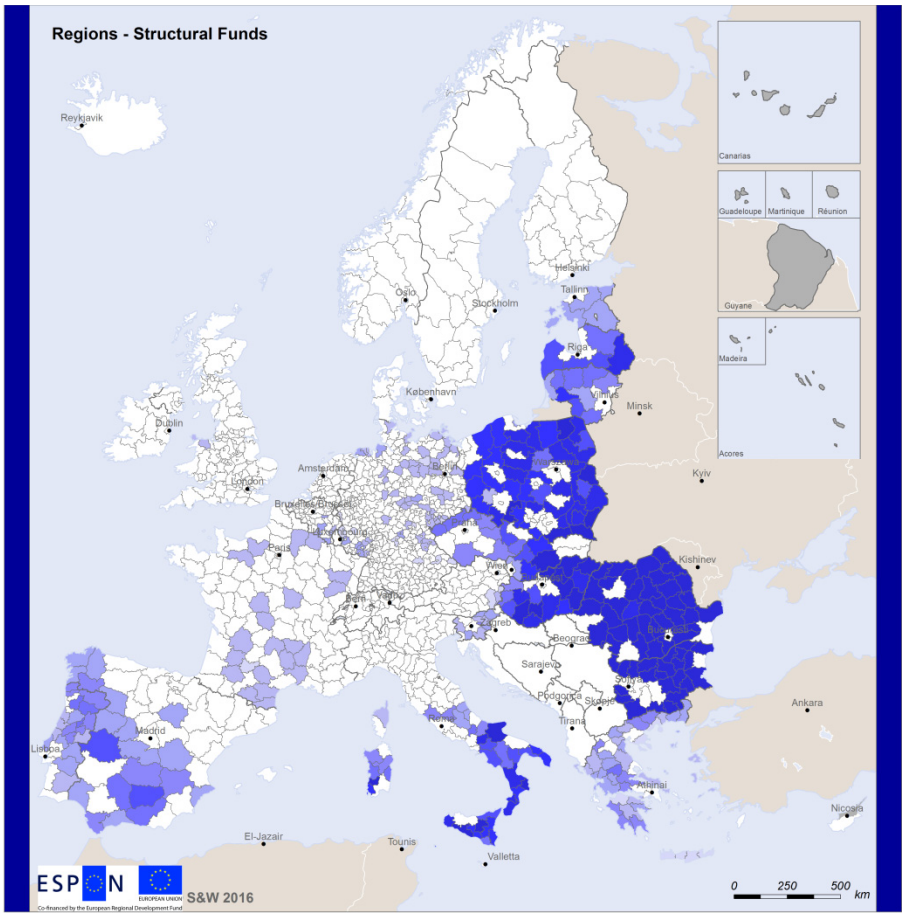


Figure 8.
Less efficient regulation of Structural Funds: Difference in GDP per capita: between Scenario CLr and Scenario CBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016





However, because of the strong focus of the spatial distribution of Structural Funds subsidies on territorial cohesion, the impacts are substantial in the less developed member states receiving the highest Structural Funds subsidies relative to their GDP per capita. Unfortunately, some of these countries are also most deficient with respect to administrative capacity and efficiency. However, the impacts of less efficient regulation on indicators of territorial cohesion are relatively small (see Section 3.3).

3.2 Transport policies

The maps in Figures 9-12 show the impacts of less efficient regulation on the implementation of European, national and regional transport projects.

Figure 9 shows the spatial distribution of impacts of less efficient regulation for the Baseline Scenario 0Lr on GDP per capita. As the underlying transport infrastructure development of Baseline Scenario 0Br is rather modest, the negative impacts of less efficient regulation are almost negligible for most European regions. However, a few areas of stronger negative effects do exist, such as the Baltic States and eastern Poland, Romania and Bulgaria. Here, the only partial implementation of transport infrastructure projects, such as the Rail Baltica, lead to a decrease in regional economic performance compared with a situation in which those projects are fully implemented.

The maps of Figures 10-12 show the effect of less efficient regulation on the three spatial scenarios of ESPON ET2050. In those scenarios the "best-regulation" assumption led to additional transport links of good minimum quality between the MEGAs in Scenario ABr, between the cities in Scenario BBr and between the lagging regions and MEGAs and cities in Scenario CBr. In the "less efficient regulation" variants of these scenarios ALr, BLr and CLr, the quality of these additional links was reduced as described above.

In general, the effects of less efficient regulation of transport investment policies are less confined to the regions for which the lower-speed assumptions were introduced. The network effect leads to a spreading of negative effects beyond those regions. There is a clear spatial tendency of negative effects. Regardless of the spatial orientation of the policies of the scenarios, negative effects occur to a lower degree in the core areas of Europe and to a higher rate at the more peripheral regions of Europe. Here, the negative effect is rising when reducing the network improvements from linking MEGAs (Scenario ALr) towards connecting lagging regions to important urban areas (Scenario CLr). The negative effects of less efficient regulation of transport infrastructure policies as assumed here can add up to 3 percent of reduction of regional economic performance in the year 2051.

3.3 All transfer policies

The maps in Figures 13-16 show the impacts of less efficient regulation on Structural Funds subsidies absorption and European and national transport policy implementation.

As to be expected, the effects of Structural Funds absorption, low administrative efficiency and delayed or totally abandoned transport projects reinforce each other. Figure 13 shows the impact in the Base Scenario 0Lr, in which less efficient regulation with respect to both Structural Funds subsidies and transport project implementation is assumed, compared to the original Baseline Scenario 0Br, in which better regulation is assumed. The map is similar to the one in Figure 5, except that the impacts are much stronger due to the combined effect of lower Structural Funds absorption, lower administrative efficiency and delayed or totally abandoned transport projects. Similarly, the maps in Figures 14-16 are more pronounced versions of the maps in Figures 10-12, respectively, due to the combinations of the effects. Now in the most affected regions in Bulgaria and Romania, the negative impacts amount to up to 8 percent equivalent to 500-800 Euro per capita annually in these countries.

Figure 9.
Less efficient regulation of transport policies: Difference in GDP per capita between Scenario 0Lr and Scenario 0Br (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016

	> -0.3
	-0.6 - -0.3
	-0.9 - -0.6
	-1.2 - -0.9
	-1.5 - -1.2
	-1.8 - -1.5
	-2.1 - -1.8
	-2.4 - -2.1
	-2.7 - -2.4
	< -2.7
	no data available

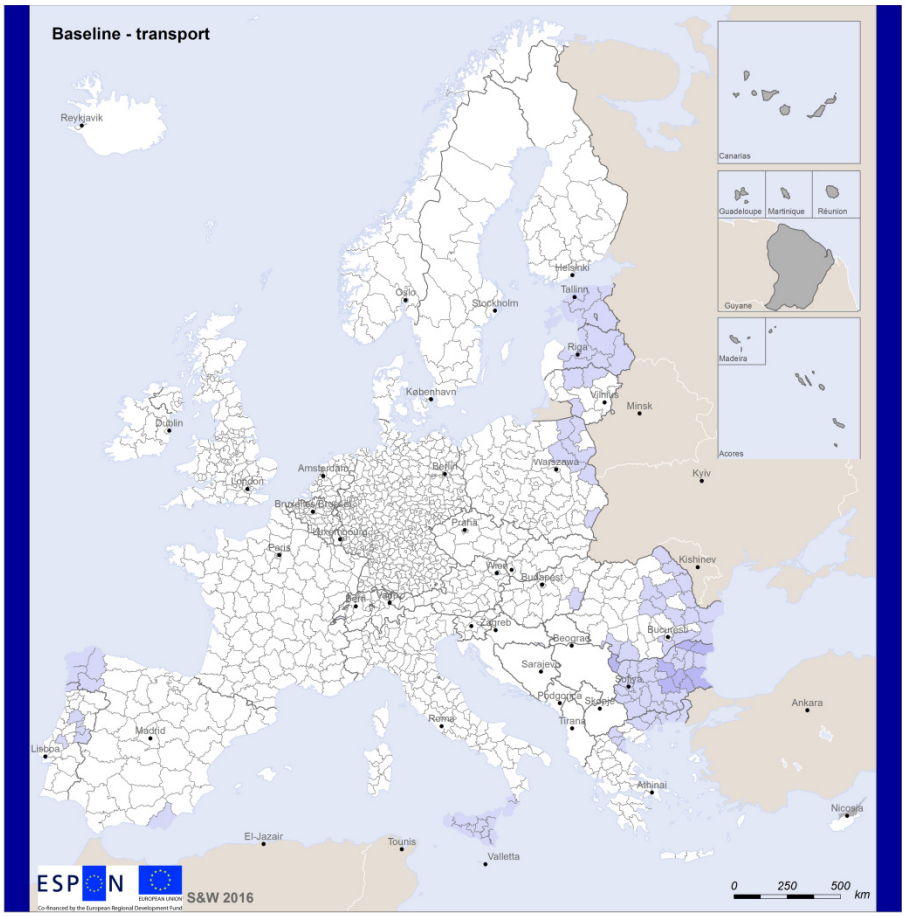


Figure 10.
Less efficient regulation of transport policies: Difference in GDP per capita between Scenario ALr and Scenario ABr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016

	> -0.3
	-0.6 - -0.3
	-0.9 - -0.6
	-1.2 - -0.9
	-1.5 - -1.2
	-1.8 - -1.5
	-2.1 - -1.8
	-2.4 - -2.1
	-2.7 - -2.4
	< -2.7
	no data available

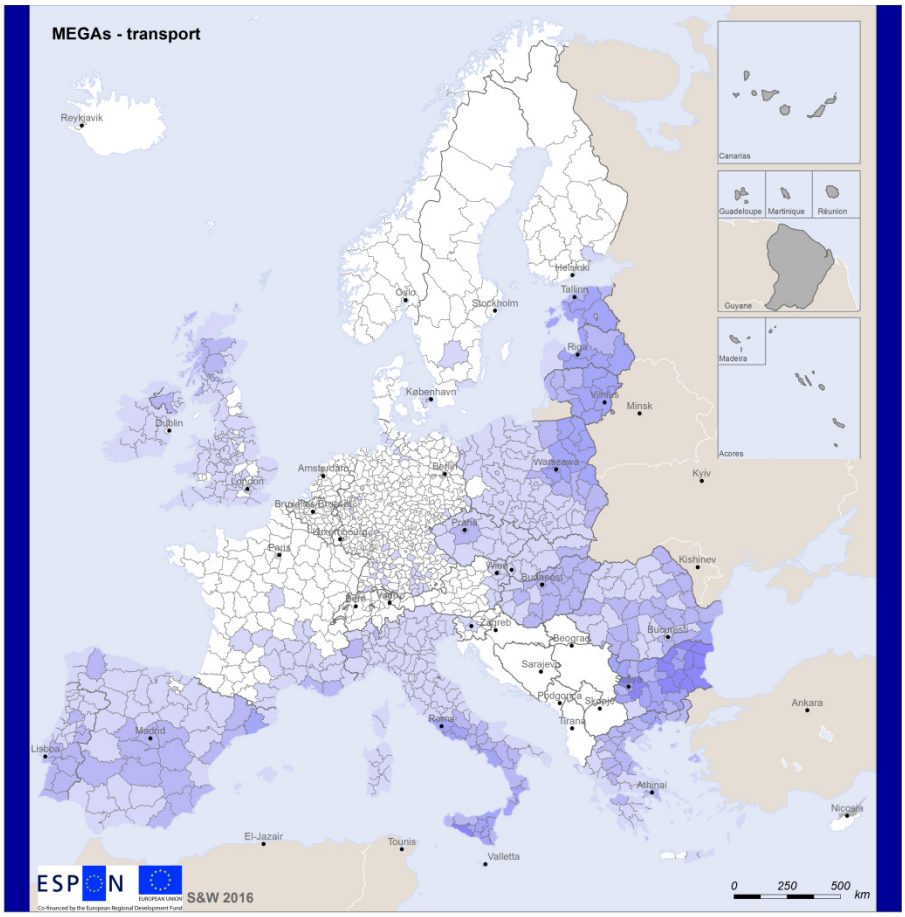


Figure 11.
Less efficient regulation of transport policies: Difference in GDP per capita between Scenario BLr and Scenario BBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016

	> -0.3
	-0.6 - -0.3
	-0.9 - -0.6
	-1.2 - -0.9
	-1.5 - -1.2
	-1.8 - -1.5
	-2.1 - -1.8
	-2.4 - -2.1
	-2.7 - -2.4
	< -2.7
	no data available

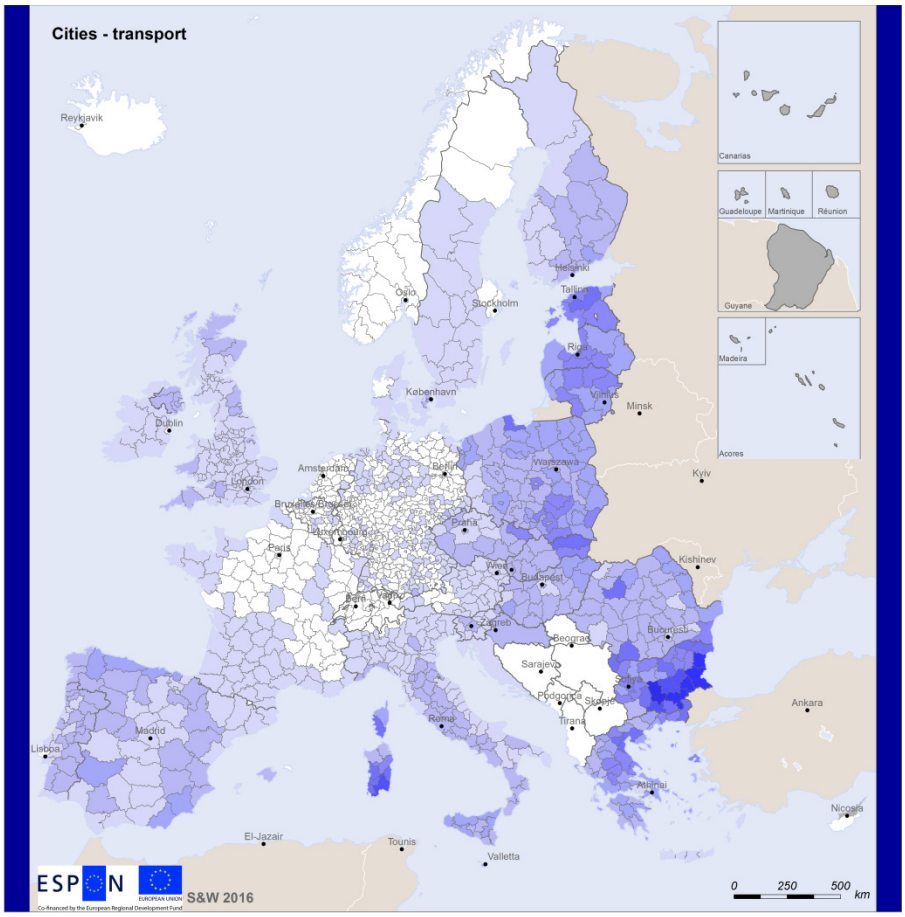


Figure 12.
Less efficient regulation of transport policies: Difference in GDP per capita between Scenario CLr and Scenario CBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016

	> -0.3
	-0.6 - -0.3
	-0.9 - -0.6
	-1.2 - -0.9
	-1.5 - -1.2
	-1.8 - -1.5
	-2.1 - -1.8
	-2.4 - -2.1
	-2.7 - -2.4
	< -2.7
	no data available

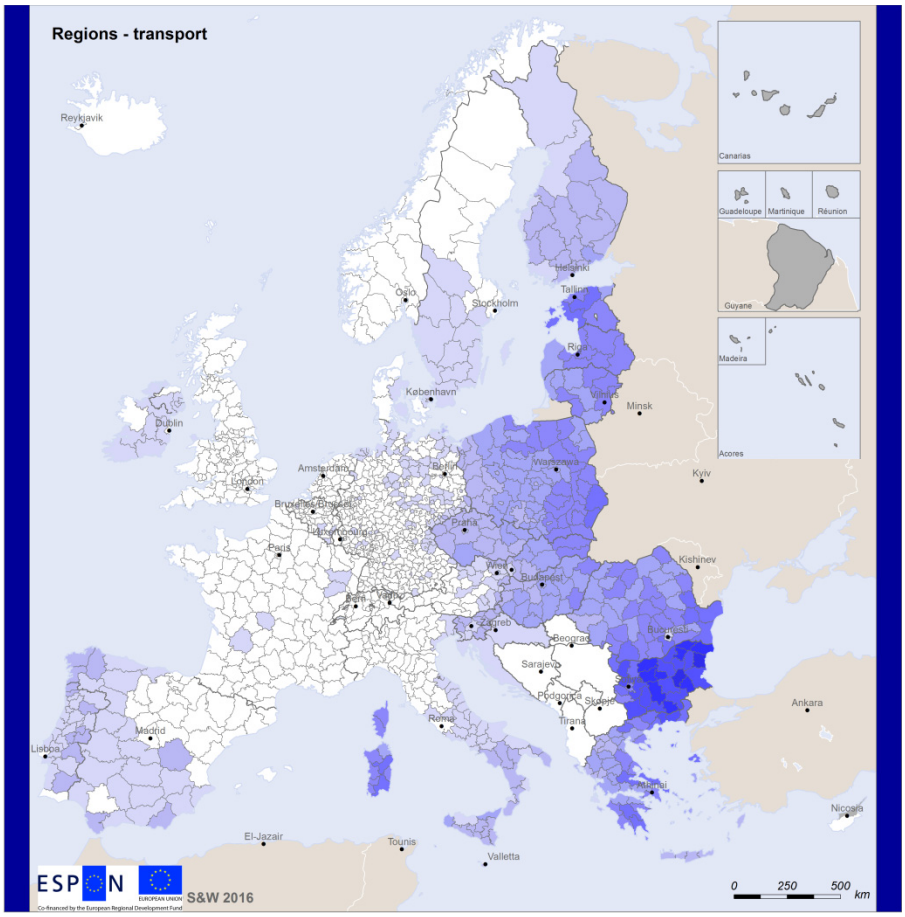
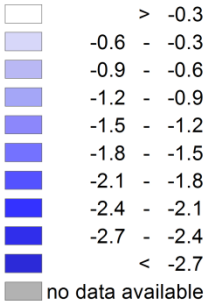


Figure 13.
Less efficient regulation of all transfer policies: Difference in GDP per capita between Scenario 0Lr and Scenario 0Br (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



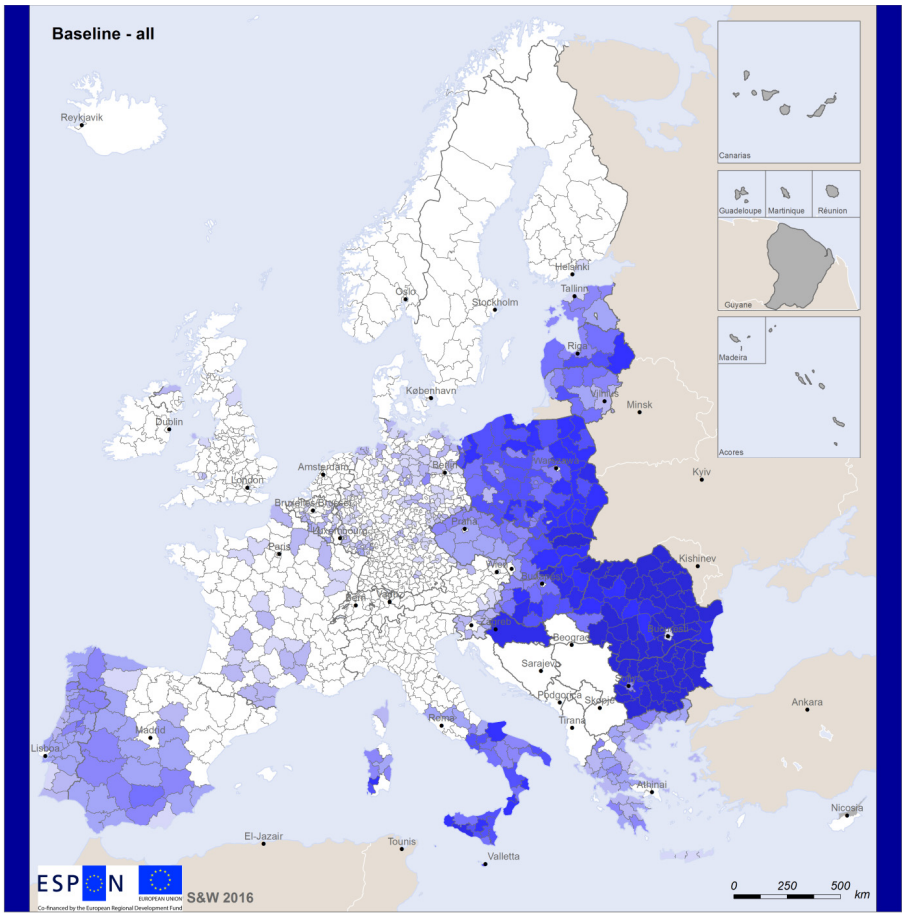
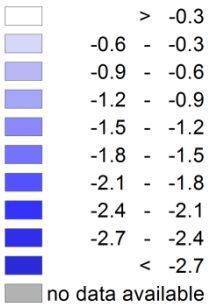


Figure 14.
Less efficient regulation of all transfer policies: Difference in GDP per capita between Scenario ALr and Scenario ABr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



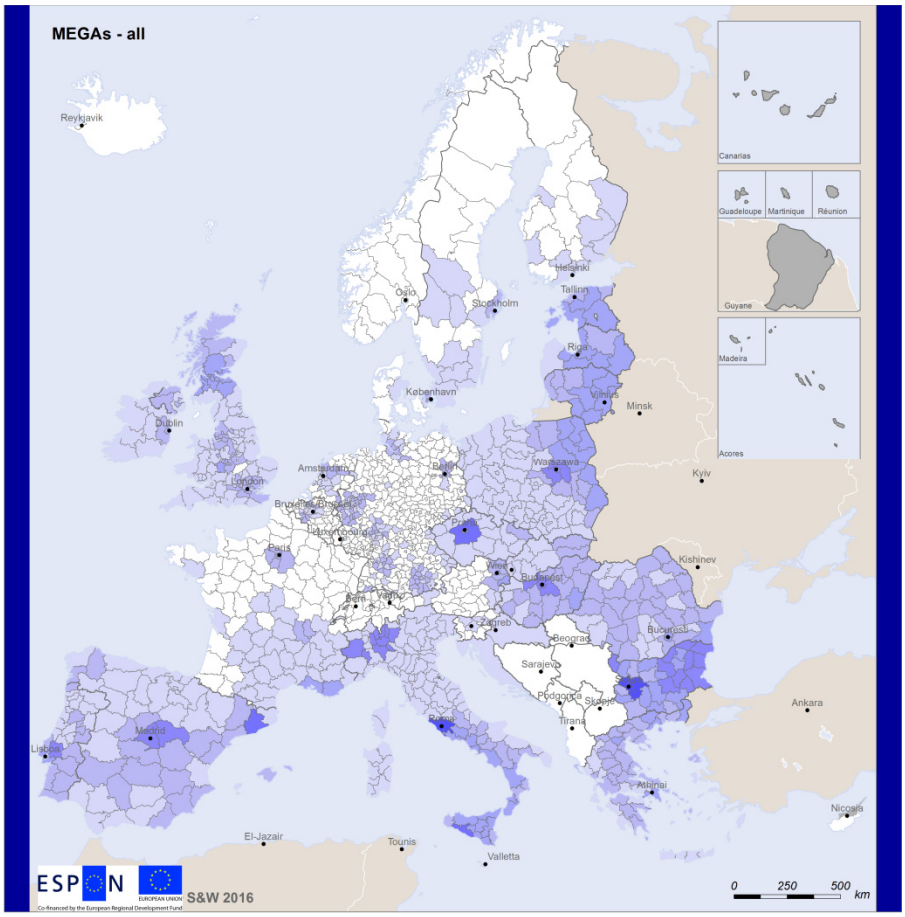
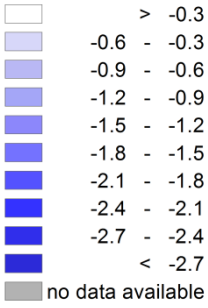


Figure 15.
Less efficient regulation of all transfer policies: Difference in GDP per capita between Scenario BLr and Scenario BBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016



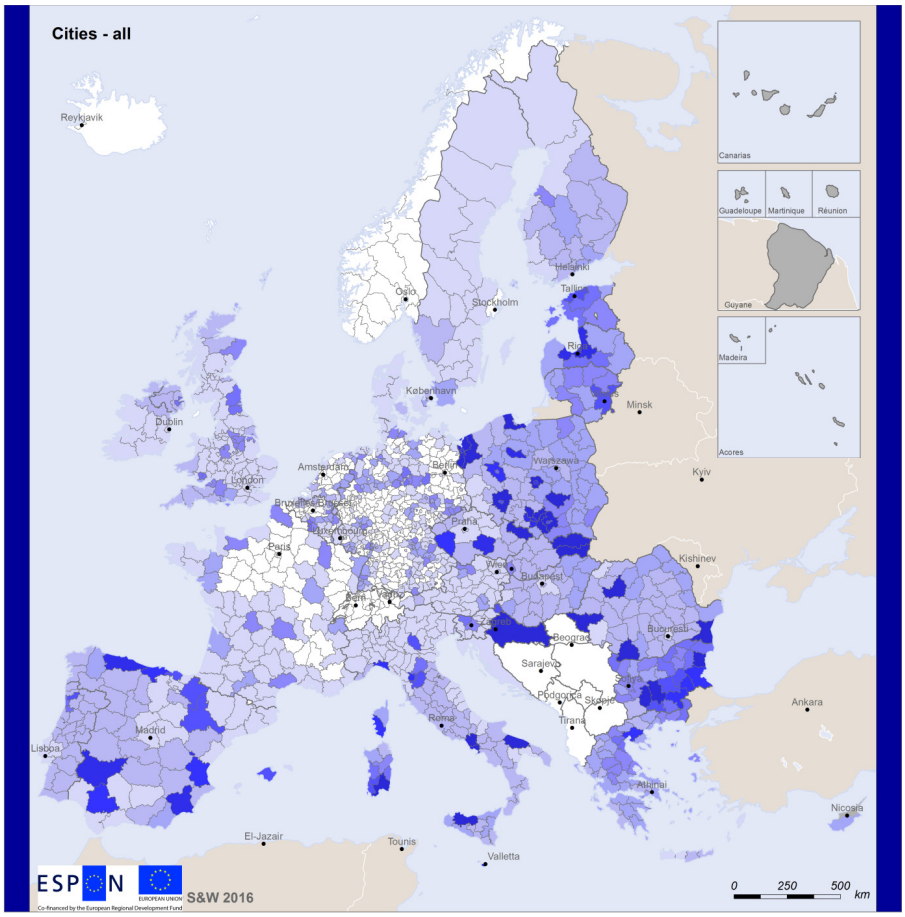
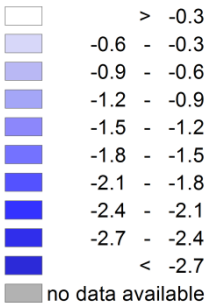
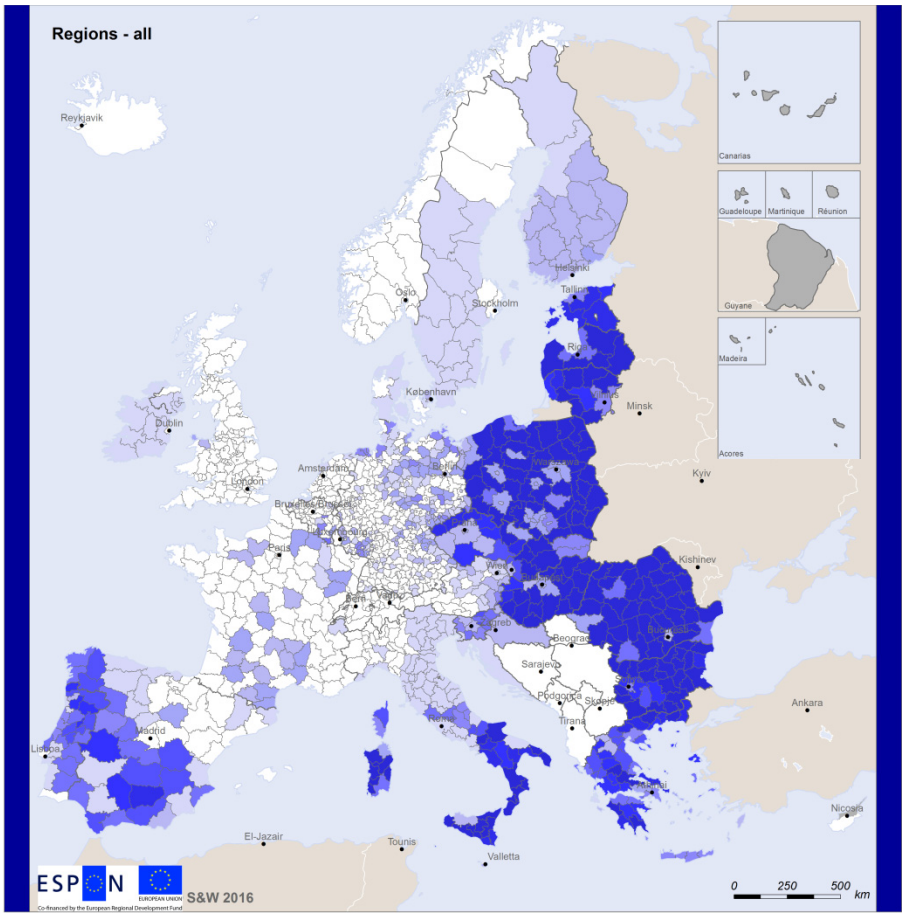


Figure 16.
Less efficient regulation of all transfer policies: Difference in GDP per capita between: Scenario CLr and Scenario CBr (%) 2051

Regional level: NUTS3
Source: S&W (2016)
Origin of data: SASI model 2016





The spatial pattern of regions that would be negatively affected by less efficient regulation of different EU policies suggests that territorial cohesion would also go down with such kind of framework conditions. This can be further analysed by the two most common indicators of spatial cohesion, the coefficient of variation of GDP per capita in Figure 17 and the Gini index of GDP per capita in Figure 18. Both indices measure the degree of disparities between objects of observation, in this case 1,347 NUTS3 regions of the ESPON Space. The higher the indicator values, the greater are the disparities.

Figure 17.
Coefficient of variation GDP/capita (EU31) 2011-2051

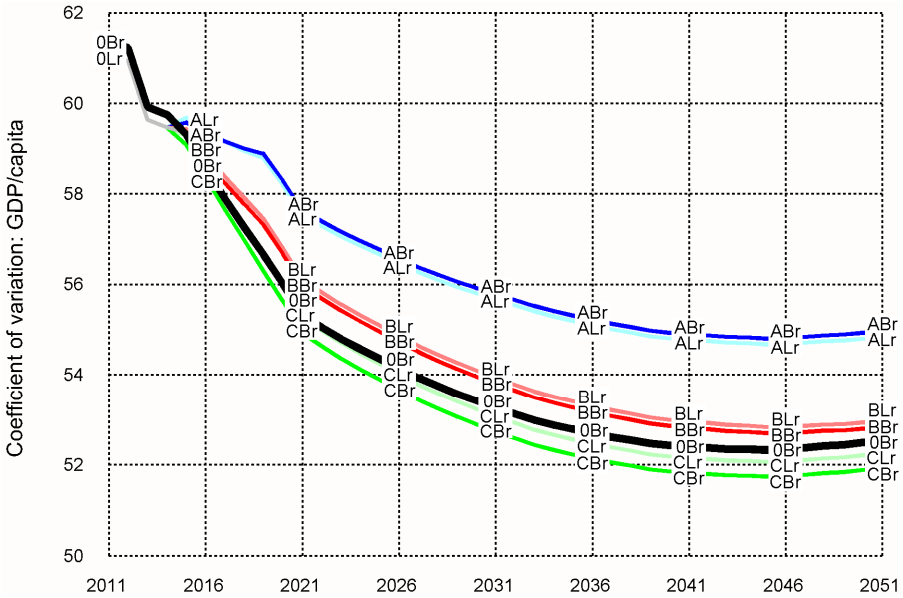
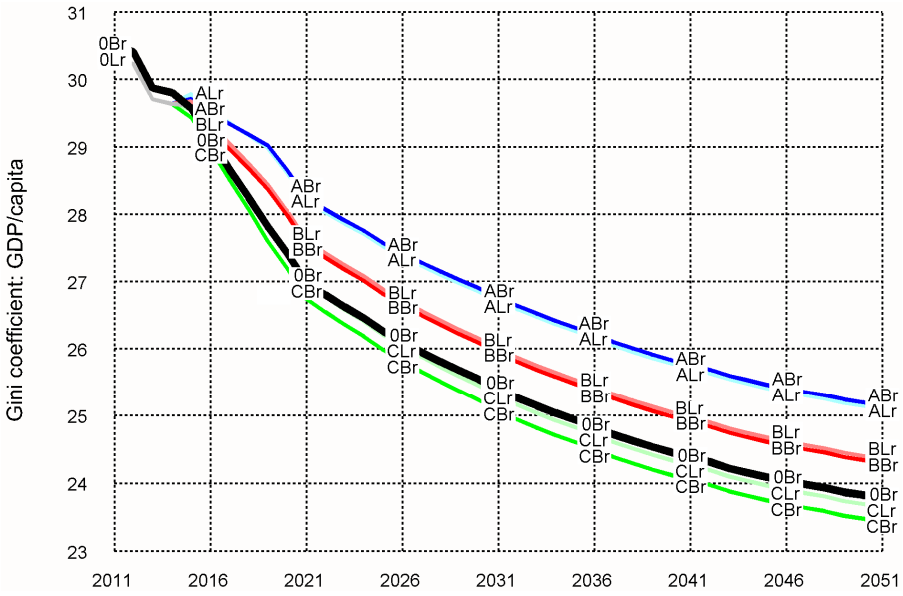


Figure 18.
Gini coefficient GDP/capita (EU31) 2011-2051



The figures show that convergence in economic development between regions in Europe will continue after the recent halt during the economic crisis in all scenarios considered. Convergence is less pronounced in the MEGAs scenarios ABr and ALr and Cities scenarios BBr and BLr compared to the Baseline Scenarios 0Br and 0Lr and the Regions scenarios CBr and CLr. Differences between better regulation and less efficient regulation framework conditions are small when comparing those scenario pairs. This means that the basic territorial orientation of EU poli-

cies is much more relevant for territorial cohesion than the optimisation of those policies. However, if the basic orientation of the policies leads to higher convergence, better regulation further improves territorial cohesion as can be seen for instance by comparing the cohesion effects of Region scenarios CBr and CLr. If the basic orientation of the policies leads to comparable lower convergence as in the MEGAs scenarios, less efficient regulation as in Scenario ALr would work in favour of more territorial cohesion, because policies working against cohesion would be implemented in a poorer way.

4. Conclusions

The analysis of the impacts of less efficient regulation with respect to Structural Funds subsidy absorption and transport project implementation compared to situations with better regulation is based on a couple of assumptions how less efficient regulation might work. This is reflected in assumptions about lower absorption rates of EU subsidies in some member states and less efficient use of subsidies for regional development and transport projects in certain regions based on aggregate indices describing very abstractly the quality of the regional governance system and availability of human capital.

It has been shown that the total impacts of less efficient regulation are not really large at the European scale but substantial in the member states in Eastern Europe and the Mediterranean which more strongly depend on European solidarity payments. Those regions receive the highest subsidies relative to their GDP per capita and have at the same time more deficits regarding administrative capacity and efficiency.

Negative regional economic impacts of less efficient regulation occur much less in the core areas and to higher degrees in other parts of Europe. This occurs independently of the territorial orientation of the scenario policies. The negative effects of less efficient regulation in transport policies are spread beyond the regions directly affected due to network effects.

Because of the limited proportion of EU funds compared to the total European economy, the impacts of less efficient regulation on indicators of territorial cohesion are small compared to those of different patterns of spatial distribution of subsidies in the three spatial scenarios examined. However, better regulation, in particular introduced in lagging regions, has a positive effect on European territorial cohesion supporting a better overall balance between European regions.

However, the results presented here refer only to two European policies and their implementation at the national level. If one considers that these represent only a small portion of the political action and administration in the member states, and if the indicators used in this analysis are representative for their whole political and administrative system, the positive effects of better regulation may be much larger, in particular in regions that are depending to a higher degree on European policy programmes.

4.1 Limitations

Because of the focus of the SASI model on spatial development not all aspects of the "better-regulation" initiative can be addressed in the scenarios. The SASI model deals with movements of goods and services and regional economic development, territorial cohesion and sustainability of transport, but does not forecast impacts on the digital single market, public procurement and concessions and consumer acquis (Pataki, 2014).. Nor does it deal with emissions other than those of transport or with the European financial system (FLAGSHIP, 2013)..

In addition, immigration control, as it is practiced by a growing number of member states to cope with the increasing inflow of refugees from the Middle East and Africa, cannot be modelled with the present version of the model. That would require the extension of its present net migration

model by the interregional migration flows model applied in ESPON 1.4.4 (2007) taking account of country-to-country immigration restrictions and cultural and language barriers. However, the reactivation of this extended version would mean to rerun the previous ESPON ET2050 scenarios and was therefore not possible in this project.

Another limitation is that the model as used in ESPON ET2050 is based on the system of NUTS-3 regions of 2006 before the accession of Croatia to the European Union. To update the model to the most recent region system including Croatia would require its complete re-calibration, something also not possible in this study. In order to ensure comparability of the new scenarios with the existing ones therefore requires the continued use of the existing region system, including Croatia but with fewer regions.

The conclusion is that probably the analysis of economic effects using a regional economic model like SASI is not sufficient to assess the real impacts of less efficient regulation. A much more ambitious objective would be to investigate the impacts of inefficient government on more comprehensive dimensions of quality of life, such as basic human needs, wellbeing and opportunity, as considered in the new Social Progress Index under development by DG Regio. However, this would require different methods, including expert interviews and surveys, to capture the full range of impacts of good or bad government.

4.2 Potentials

Having these limitations in mind, the additional SASI scenarios provide useful information on the benefits of better regulation in the field of territorial development, in particular with respect to better co-ordination of Structural Funds subsidies and trans-European network infrastructure investments between the EU and its member states.

The main advantage of the scenarios is their high spatial resolution down to the NUTS-3 level and their dynamic nature, which does not only give static pictures for one year but considers the long-range effects of better regulation of Structural Funds and trans-European network investments on regional economic development, territorial cohesion and transport sustainability.

Finally, the scenarios might contribute to the promotion of the most promising of the four global legal scenarios proposed by HiiL (Zouridis et al., 2014), the *Global Constitution* or *Public Integrated Legal and Governance Mechanisms* scenario supporting the desirable and necessary shift from a predominantly national to a predominantly international legal environment (FLAGSHIP, 2013, 9-19). Thus the scenarios might help to raise awareness for the need for a better co-ordination of spatial planning in Europe.

References

Becker, S.O. (2012): EU Structural Funds: Do They Generate More Growth? The CAGE–Chatham House Series, No. 3. London: Chatham House. https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/International%20Economics/1212bp_becker.pdf

Bubbico, R.L., De Michelis, N. (2011): The financial execution of Structural Funds. Regional Focus 03/2011. Brussels: European Union, Regional Policy. http://ec.europa.eu/regional_policy/sources/docgener/focus/2011_03_financial.pdf

DG Regio (2016): The EU Regional Social Progress Index: Methodological Note. Brussels: European Commission, Directorate General Regional and Urban Policy. http://ec.europa.eu/ regional_policy/sources/information/maps/methodological_note_eu_spi.pdf

ESPON 1.4.4 (2007): Preparatory Study on Feasibility of Flows Analysis. Final Report of ESPON 1.4.4. Dortmund: Spiekermann & Wegener Urban and Regional Research. http://www.espon.eu/export/sites/default/ Documents/Projects/ESPON2006Projects/StudiesScientificSupportProjects/Flows/fr-1.4.4_revised_23-3-2007.pdf.

European Commission (2008): SFC2007 Database: System for Fund Management in the European Community: Structural Funds Allocations Estimates NUTS-2 2007-2013. http://ec.europa.eu/employment_social/sfc2007/index_en.htm.

European Commission (2013): Cohesion policy: Strategic report 2013 on programme implementation 2007-2013. Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2013) 210 final. http://ec.europa.eu/regional_policy/how/policy/doc/strategic_report/2013/strat_report_2013_en.pdf

European Commission (2015a): Provisional text of the proposed Institutional Agreement on Better Law-Making. Brussels: European Commission. http://ec.europa.eu/smart-regulation/better_regulation/documents/20151215_ iia_on_better_law_making_en.pdf.

European Commission (2015b): Better regulation guidelines. Commission staff working document. COM(2015) 215 final, SWD(2015) 110 final. http://ec.europa.eu/smart-regulation/better_regulation/documents/com_2015_215_en.pdf

European Commission (2016): European Structural and Investment Funds (ESIF). https://cohesiondata.ec.europa.eu/

European Court of Auditors (2012): Effectiveness of EU-supported public urban transport project. Special Report 01. Luxembourg: Publications Office of the European Union. http://www.eca.europa.eu/Lists/ECADocuments/SR14_01/QJAB14001ENC.pdf

FLAGSHIP – Forward Looking Analysis of Grand Societal Challenges and Innovation Policies (2013): European Policy Brief. Brussels: European Commission, DG RTD. http://flagship-project.eu/wp-content/uploads/2015/03/ FLAGSHIP_PB_Oct132.pdf.

Katsarova, I. (2013) The (low) absorption of EU Structural Funds. Library Briefing. Library of the European Parliament. http://www.europarl.europa.eu/eplibrary/The-low-absorption-of-EU-Structural-Funds.pdf

Pataki, Z. (2014): The Cost of Non-Europe in the Single Market. Brussels: Added Value Unit, European Parliamentary Research Service. http://www.europarl.europa.eu/RegData/etudes/STUD/2014/510981/EPRS_ STU(2014)510981_REV1_EN.pdf.

Spiekermann, K., Wegener, M. (2014): Integrated Spatial Scenarios until 2050. ET2050 Scientific Report Volume 6. Dortmund: Spiekermann & Wegener Urban and Regional Research. http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/ET2050/FR/ET2050_FR-03_Volume_6_-_Integrated_Spatial_ Scenarios.pdf.

Wegener, M. (2008): *SASI Model Description*. Working Paper 08/01. Dortmund: Spiekermann & Wegener Urban and Regional Research. http://www.spiekermann-wegener.de/mod/pdf/AP_0801.pdf.

Zouridis, S., Andrade, N., Kistemaker, L., Muller, S. (2014): Global Legal Governance Scenarios and Indicators. FLAGSHIP Deliverable D6.1. The Hague: The Hague Institute for the Internationalisation of Law. http://flagship-project.eu/wp-content/uploads/2015/03/D6.1-Legal-Governance-and-Indicators.pdf.

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