

# Location, change and income: The changing regional balance in Denmark endogenous and exogenous drivers

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## Abstract:

*Historical the balance between regions within and between countries has changed for many reasons during the past decades. The drivers behind this process has been various from changes in institutional designs that has changed the geographical division of the regions to internal and external changes in the economic environment. The purpose of the current paper is to identify the determinants and to analyze the mechanisms.*

*The study is based primary on a Danish empirical context, but examples from the European hemisphere will also be considered. The theoretical framework is based on a combination of location theory, new economic growth theory and concepts of economic change, i.e. processes of convergence and divergence. The latter is investigated in a regional set-up including exogenous and endogenous factors.*

*Among the findings are, that different types of regions (peripheral vs. central, or urban vs. regional are affected different) as well as sectoral and demographic factors interfere different depending on type of regions and the economic system and the regional factor endowment. The overall approach of the paper is elaborated in section 2 based on a review of relevant literature.*

*Section 3 provides an overview of the empirical evidence in a European context based on data covering both regions and the indicators identified in the theoretical section covering the period since the breakup of the iron curtain.*

*Section 4 offers an investigation of the change of the regional balance in Denmark with data drawing back to the 1970ties.*

*Regional diversion is observed regarding income as well as population, and the process of divergence is accelerating not only among all municipalities, but also within some regions especially in the Metropolitan area and in the Eastern part of Denmark. The spatial increase in divergence may be a result of the institutional changes resulting from the most recent municipality reform that took place in 2007.*

*Section 5 summarizes the main results with special attention on an evaluation of the spillovers between regional, sectoral and demographic changes on the regional potentials and income creation.*

**Key Words:** - new economic growth theory - typology of regions structural change - medium-size city regions - processes of conversion and diversion - the new regional (im)-balance.

**JEL:** R 1 - R11

## 1. Introduction<sup>1</sup>

The economic and political balance between countries and regions has never been stable; decline and growth has always been the engine of change and development. Even within and between regions in countries change always occurred. The drivers behind this processes varied from changes in institutional designs that has altered the geographical division of the regions to internal and external changes in the economic environment. The purpose of the current paper is to identify and discuss the determinants and to analyze the mechanisms behind. As indicated by the title of the paper the focus is on the impact of structural changes and income on the location of people and economic activity. The aim is to analyses the drivers behind the changing regional balance in Denmark with point of departure in endogenous and exogenous factors.

The analysis is based primary on a Danish empirical context<sup>2</sup>, but examples from the European hemisphere will also be considered, since they form an important part of the exogenous environment. The theoretical framework is based on a combination of location theory, new economic growth theory and concepts of economic change, i.e. processes of convergence and divergence. The latter is investigated in a regional set-up.

Without any doubt the debate on regional (im-)balances has become more intensive and international in the wake of the increased awareness of the consequences of the globalization of business and industry since the turn of the millennium, and after the financial crises 2007-9. Even in a homogenous country with small regional disparities and good accessibility in an international context the issues is on the political agenda<sup>3</sup>.

Alterations of the global system of production (i.e. offshoring or outsourcing of physical production and services) as well as the economic and financial crisis have reintroduced the regional balance issue on the political agenda, not only on the European scene but also within a relative homogenous country like Denmark. The focal point of the current paper is to assess the issue in an economic development perspective with special attention on regional income distribution and the drivers behind the changes in. Section 2 presents the overall approach of the paper based on a review of relevant literature and sketches the conceptual framework. Point of departure is new economic growth theory and the derived development strategies based entrepreneurship, innovation and knowledge based policies.

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<sup>1</sup> This paper is an updated and extended version based on two papers presented at the Special Session IV: 'Regional and local implications of the renewal and structural change of the international economies. Implications on conditions of living and development in non-metropolitan regions', at the *20th Uddevalla Symposium 2017 on: Innovation, Entrepreneurship and Industrial Dynamics in Internationalized Regional Economies* June 15-17, 2017 at University West, Trollhättan, Sweden and the paper '**Regional change and development: Long term trends and short term impacts. Analysis of the inter- and intraregional balance in Denmark**', prepared for the General Theme G02 "*Regional economic development*" at the *57<sup>th</sup> Congress of the European Regional Science Association on 'Social Progress for Resilient Regions'* in Groningen, The Nederland's August 28 – September 1, 2017. The authors would like to thank the participants for their comments and suggestions. Remaining errors and shortcomings are of course our responsibility.

<sup>2</sup> For an assessment in a long-term perspective see Illeris (2010) and so-called 'Barca Report' (European Commission 2009), for the European Perspective of growth and convergence and divergence.

<sup>3</sup> 2 reports from the 1990's illuminates this, an expert Committee to Danish Ministry of the Interior had the task to examine the reasons of the relative poor economic performance of Metropolitan Copenhagen (Hovedstadsregionen) C. Sørensen (ed,) (1997), and 'Den jysk-fynske erhvervsredegørelse' Ministry of Industry (2000).

Section 3 provides an overview of the empirical evidence in a European context. This section provides a brief overview of the general pattern of change in the European economies in the last decade with special attention on the most recent development.

Section 4 offers an investigation of the change of the regional balance in Denmark since the beginning of the 1990's. Regional diversion is observed and the process of divergence is accelerating not only among all municipalities, but also within some regions especially in the Metropolitan area and in the Eastern part of Denmark. The spatial increase in divergence may be a result of the institutional changes resulting from the most recent municipality reform that took place in 2007. More recent impacts of external as well as internal pressure are investigated with point of departure in the context of spatial reform 2007.

Section 5 summarizes the main results with special attention on an evaluation of the spillovers between regional, sectoral and demographic changes on the regional potentials and income creation.

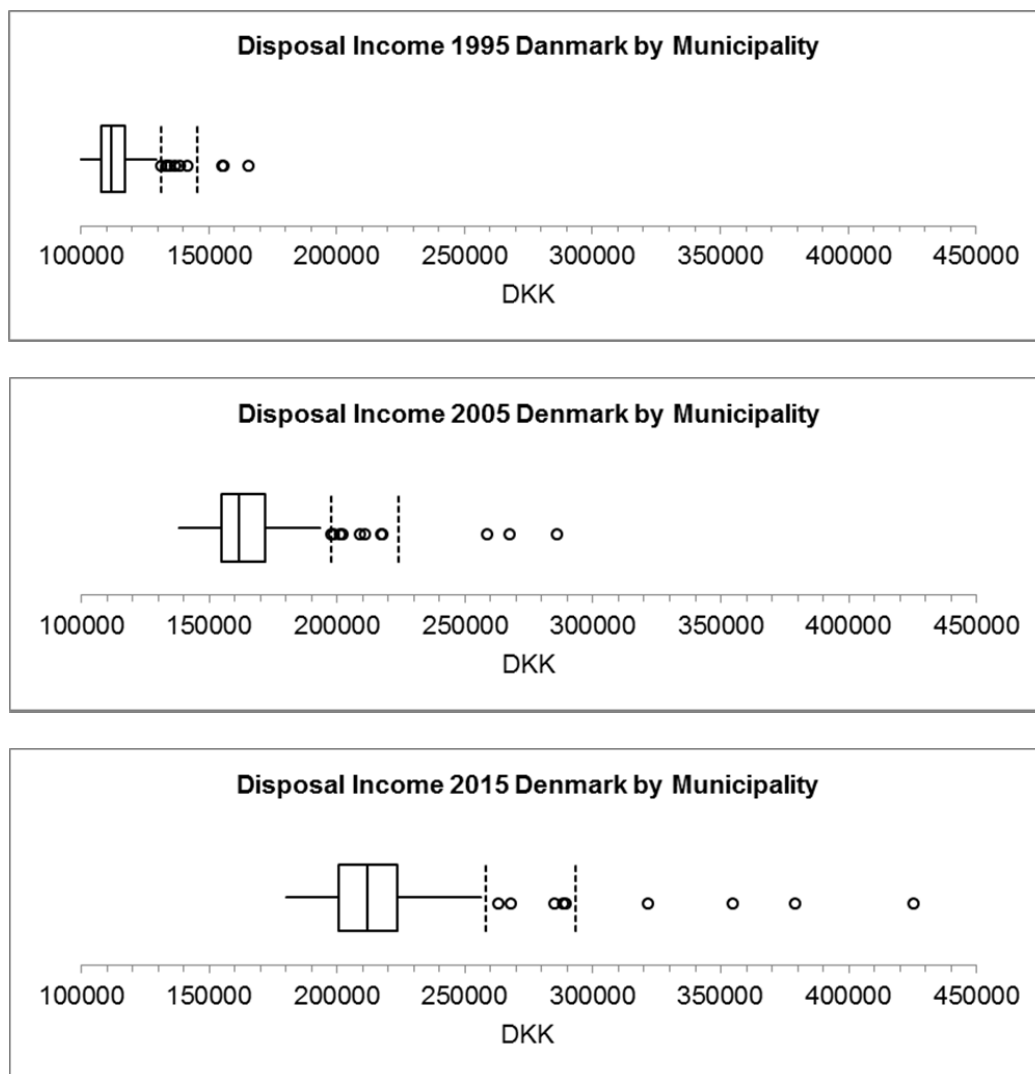
## **2. Conceptual framework and theoretical evidence**

The distribution of the population and the nature of the regional economy have always fluctuated, but the speed and the direction of change in Northwestern Europe has probably never been faster than today, maybe with the exemption of the impacts of the huge waves of emigration in second half of the 19<sup>th</sup> century and the early 20<sup>th</sup> century. Contrary to this period the changes nowadays are mainly internal revitalizing the old urban – rural divide in a clearly center periphery context, with significant impacts on the relative distribution of income and the demography.

Figure 1 illuminate the issue in Denmark based on a box-plot diagram for the disposal income after tax based on the current structure of municipalities (98 since 2007) The spread of income (measured in current process) has increased significant from approx. 80 000 DKK in 1995 to 250 000 DKK in 2015. The number of outliers with an average disposal income larger than 2 standard deviations measured from the median income has doubled from 2 to 4. In Figure 2 below illustrate the four main categories of Danish municipalities. The high-income municipalities are typical located in North-East Zealand and central eastern Jutland.

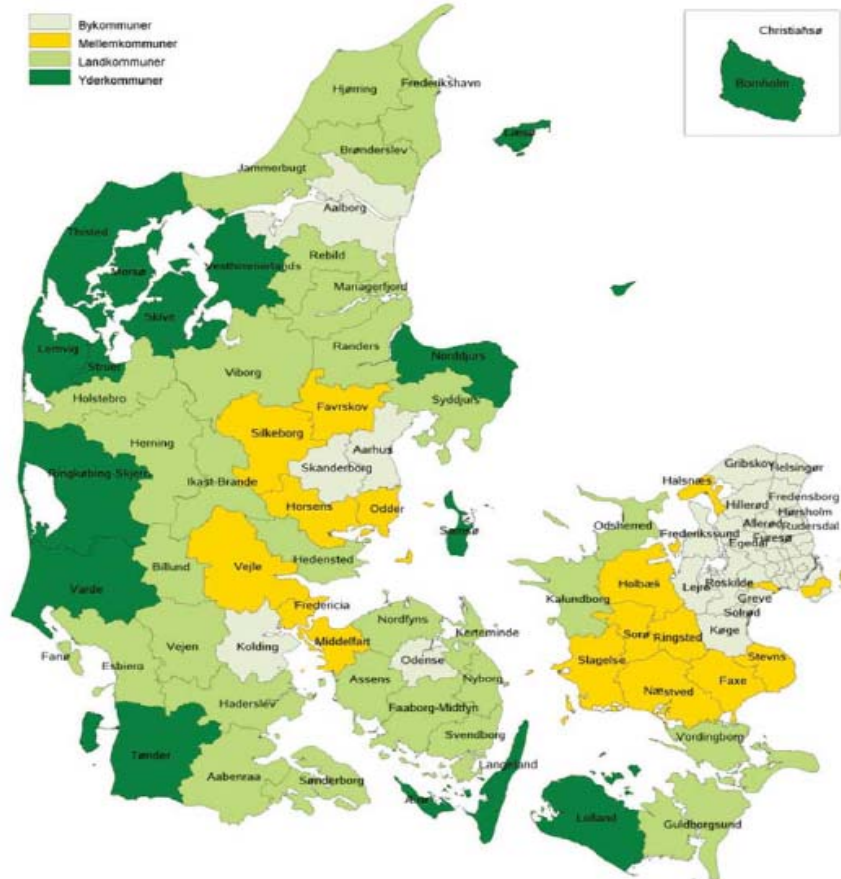
The factors behind this change are complex, and will be assessed in more details in section 4, but already this first examination stresses the importance of industrial change and the development of the local and regional human capital base.

**Figure 1** Shifting long range interregional balance in Denmark 1995 - 2015



**Source:** Danmarks Statistik (2017)

**Figure 2:** Classification of municipalities of Denmark



**Note:** Cities = municipalities with larger urban areas (DK: Bykommuner), Medium = municipalities with some urbanization (DK: Mellekommuner), Rural = municipalities with larger low urbanization (DK: Landkommuner) and Marginal = Municipalities located in large distance from city areas or smaller island (DK: Yderkommuner).

**Source:** Ministry for Cities, Housing and Rural Districts (2012).

## 2.1 Analytical setup: Drivers and levels of analysis

The main factor behind the current change of the inter and intraregional balance is the ongoing alteration of the production system toward increasing international division of task, with fundamental impacts on the location of business and industry as well as the public sector. Production and employment change with regard to location (national and international) and the needed qualifications. Traditional growth factors become obsolete (i.e. skills and industries). New types of activities require human capital not available outside the urban agglomerations.

The conceptual set-up is sketched in figure 3 combining concepts inspired from new economic growth theory<sup>1</sup> and regional development theory<sup>2</sup>. The central hypothesis of this paper is that at least the internal shift of economic growth toward the center regions can be explained by the increasing importance of qualitative (non-linear) growth factors, leading to absolute and relative income growth in those parts of the country. At the same time the traditional economic base of the periphery is eroded by the change in the global division of tasks.

The upper part of the figure summarizes the independent variables of the growth model, is focusing on Human Capital, the Information and Communication Technology and Entrepreneurship and Innovation. The first two factor have been strongly related to the regional factor endowment and skill-level, the last two are clearly also decisive to transfer these potentials into new goods and service leading to economic growth (see Cornett 2013b).

At the right-hand side of the figure welfare service or maybe more general the public sector is added. In the Copenhagen Economy version of the model the variable ICT was replaced by welfare service, stressing the special rule the public sector has in the Nordic countries as provider of most person related services in education, health care and social services and the local institutional setup.<sup>3</sup>. These are usually provided by the decentralized public sector (regions and municipalities). Furthermore, the decentralized public sector also is an important player in the regional business development system; see the lower part of the figure. Triple Helix type of institutions is important on all regional levels of government in most countries. The mentioned reforms of the regional and local public sector have affected the local economic base significant with severe adverse effects in the rural areas and smaller cities, see figure 2.

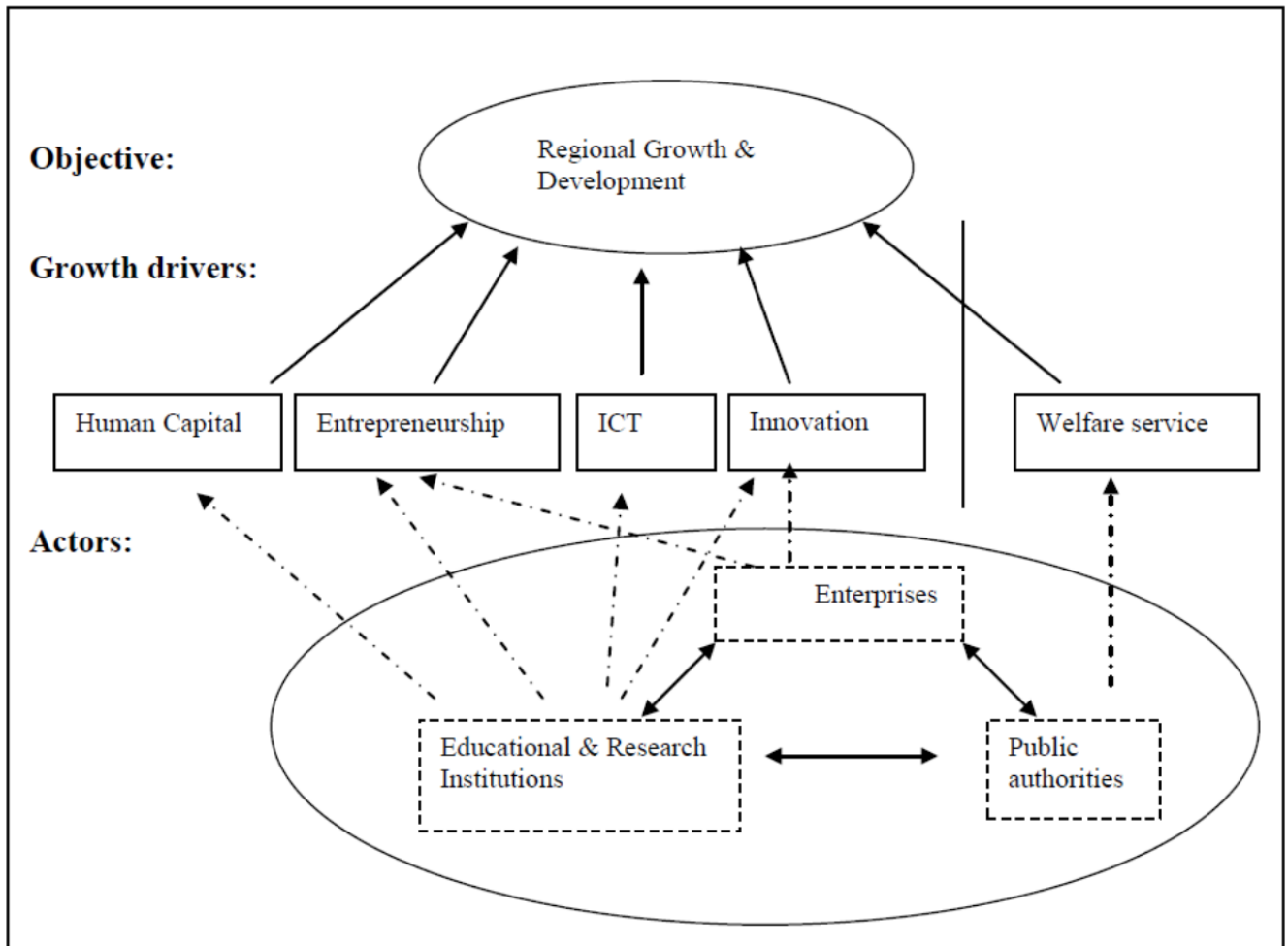
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<sup>1</sup> For an introduction to the theoretical anchors see Journal of Economic Perspectives (1994) and the policy sphere see OECD 2001.

<sup>2</sup> For an introduction see Nijkamp & Abreu (2009).

<sup>3</sup> For an assessment of the importance of institution in regional development in general see Bellini, Danson & Halkier eds. (2012),

**Figure 3:** A regional growth and development concept based on New Economic Growth Theory and the Triple Helix concept as institutional set-up.



**Note:** The growth driver 'Welfare service' has in recent applications of the concept been replaced by the original 'Technology-driver'. The arrows between the 'Triple Helix' actors and the growth drivers represent the principle direction of influence. In practice and in a dynamic perspective feedback forces have to be taken into account as well.

**Source:** Modified figure based on Copenhagen Economics (2004:28) and Etzkowitz & Leydesdorff (2000), here quoted from Cornett & Ingstrup (2010:45).

## 2.2 The problem and research questions

Alteration in the global division of labor and the distribution of tasks in the international system of production affects the regional balance in various ways. First of all, the countries in Europe are influenced differently, with impacts on the overall competitiveness of their economies, and their ability to recover after the shock of the financial and debt crisis, see figure 4 in the next section. Secondly different types of regions face dissimilar challenges; some are winners some must deal with a weakened economic base.

The central research question addressed in this paper is to analyze the uneven development of regions over time to the changes in the global economic system and the regional factor endowment with special attention to the model sketched in figure 3. The central research question investigated is, to what extent the peripheral and rural regions suffer compared to central and urbanized regions. Furthermore, the reasons are analyzed. The analytical point of departure is that they face a combination of external chocks (globalization and alterations of the industrial base between mature industrial countries and the emerging economies), and a domestic toward concentration of the knowledge and innovation based industries in the center regions. This will have significant consequences for income and employment in future.

### **3. The European context<sup>1</sup>**

In an interregional European perspective, the economic crisis has reinforced the North-South divide in Europe, and interrupted the process of convergence between countries<sup>2</sup>. Furthermore, the development initiative based the ideas and concepts derived from non-linear growth drivers sketched in the so-called ‘Barca report’ (Commission 2009) has been weakened in particular in Southern Europe through outmigration of young well-educated people and high unemployment.

In most European countries, the economic development in the past decade has been characterized by two overlapping trends. The long-term trend of a change in the global system of production, away from traditional manufacturing and product sector with low knowledge content, has been visible since the early 1990’s. In Europe, this trend was further powered by the break-up of the Iron Curtain and the introduction of a marked economy in Eastern Europe. This opened not only a new market, but probably more important, a new location for production with a vast number of cheap and well skilled labor. This has become available just outside the doorstep of the industrial centers of Europe. With the financial crisis beginning 2007/2008 and the European debt crisis becoming visible in 2010, this long-term trend was reinforced by a number of short-term chocks, first in the so-called ‘PIIGS’ states (Portugal, Ireland, Italy, Greece and Spain), but becoming an almost All-European problem due to fiscal constraints, reduction of demand caused by increasing unemployment and lack of international competitiveness of many countries.

Turning to the national level the trend toward convergences between the EU member states debilitated (the North South divide among the Euro countries growth deeper) and on the regional level the trend toward divergence continued in most EU countries. The map in figure 4 sheds additional light on the intraregional development within the EU area as a whole. The pattern for the ‘PIIGS’ group is scattered. Common for all is a trend to become more divergent compared to the EU at large. Internal the metropolitan-peripheral divide (see European Union 2010, Cornett & Sørensen 2008) has continued in most cases; see section 4 for an assessment of the alteration of the intraregional balance in Denmark.

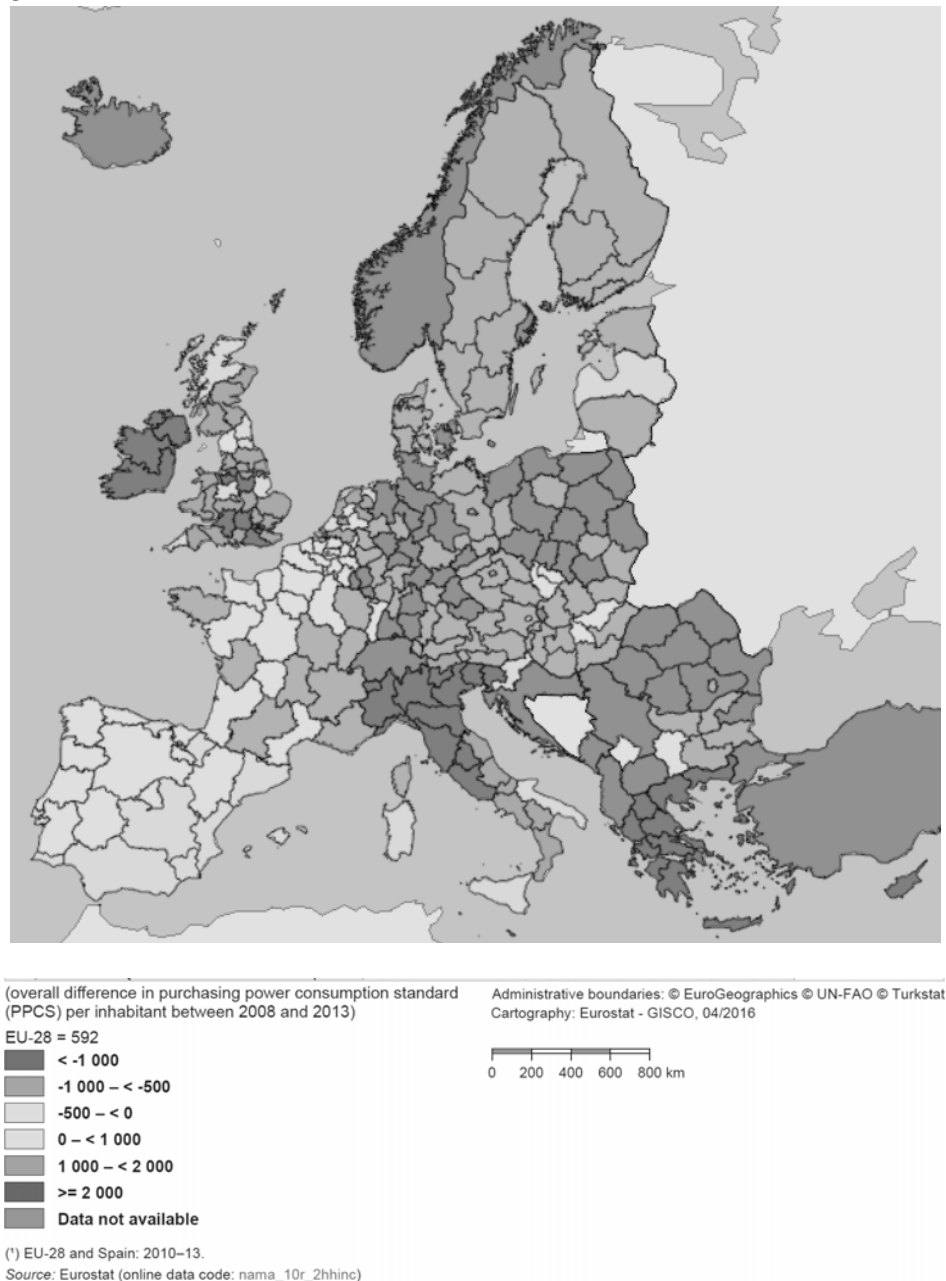
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<sup>1</sup> This section is partly based on Cornett (2013a: 213-15)

<sup>2</sup> For an assessment until the turn of the millennium see Cuadrado-Roura, J.R. & Parellada, M.(eds) (2002) and Cornett & Sørensen (2008) for the period up to the financial crisis.



**Figure 4** Change in disposable income of private households relative to population size, by NUTS 2 regions, 2008–13 <sup>1</sup>



**Source:** Eurostat (2016), Statistical Yearbook [http://ec.europa.eu/eurostat/statistics-explained/index.php/Eurostat\\_regional\\_yearbook](http://ec.europa.eu/eurostat/statistics-explained/index.php/Eurostat_regional_yearbook) (accessed 23-5-2017)

The period since the introduction of the Euro is clearly divided in two parts with regard to economic development and convergence. The period until 2007 was characterized by catching up of the South European countries (and Ireland) and stronger growth among the non-Euro countries. The financial crisis totally changed the picture with shrinking GDP/cap among the ‘PIIGS’ states, and a more stable

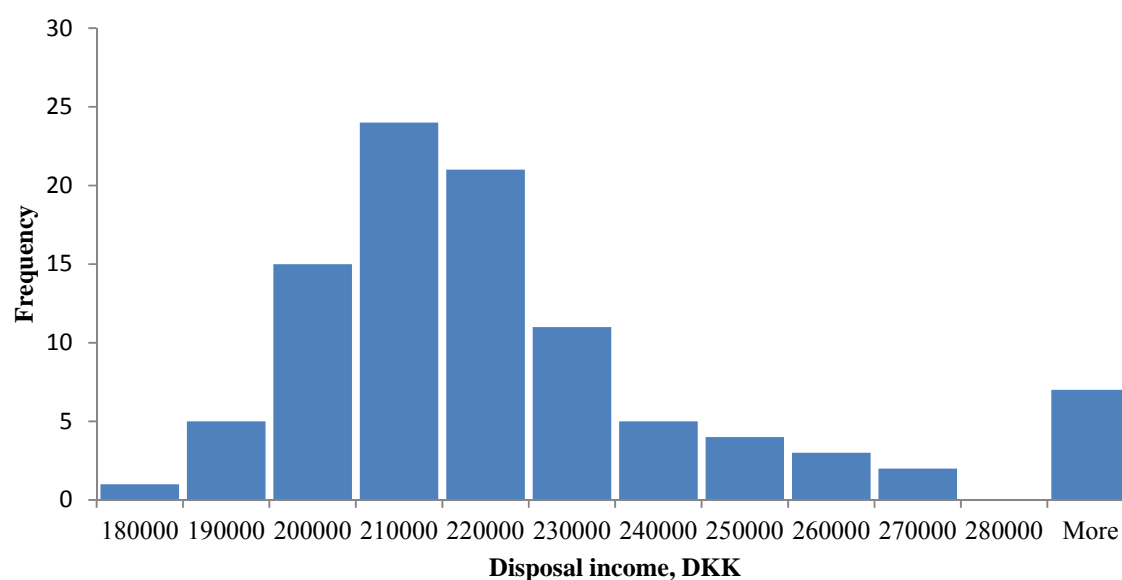
development among the previous slowest growing North European Euro-countries. Since 2014 most of the Southern European countries have improved their situation with exception of Greece. Lack of structural reforms are still a potential threat (i.e. in Italy).

The results of this process are visible in the map displayed in figure 4, showing the change of disposal income in NUTS I region in Europe with declining or stagnating household income in Southern Europe and growth in North Western continental Europe and most of eastern Europe (from a low level). Denmark follows this pattern with the strongest growth in the Metropolitan Copenhagen Region<sup>1</sup> as being elaborated later.

#### 4. Reforms and Regional Economic Change in Denmark

In order provide an in-depth investigation of the change in the regional balance in Denmark an investigation of the nominal disposal income by municipality is undertaken. The present dataset covers the period from 1991 to 2015 and data are divided into the 98 Danish municipalities. The present Danish municipality structure was implemented in 2007, and involved at reduction of the number of municipalities from 275. The statistical material is grouped such that the reduction in the number of municipalities consistently is incorporated in the new municipality structure.

**Figure 5:** Distribution of disposal income by municipality, Denmark, 2015

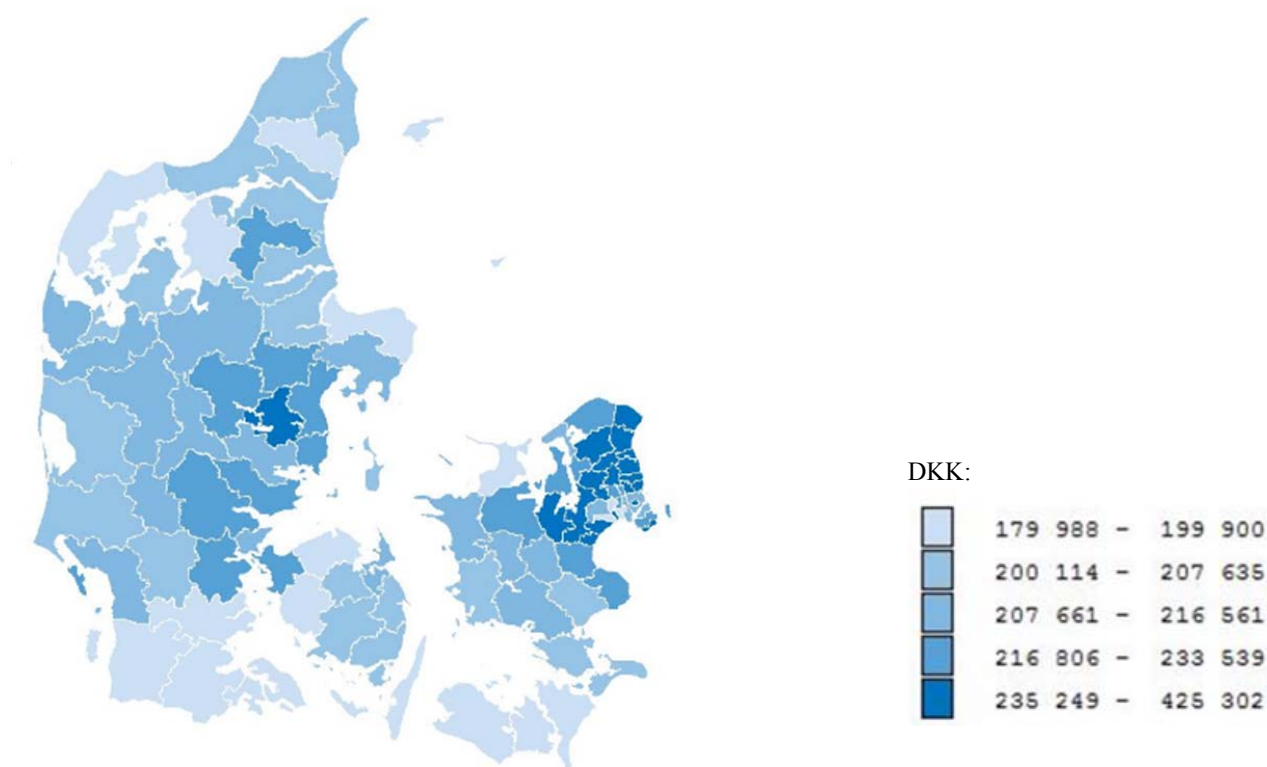


**Source:** Own calculations based on data from Danmarks Statistik (2017).

<sup>1</sup> The relative strong performance of Zealand compared to the figures reported in Figure 1 and section 4 is due to the place of residence concept used in the Eurostat data.

Figure 5 and 6 illustrates the distribution of the disposal income by a histogram in 2015, mean disposal income equaled about 220,000 DKK or about 29,300 €. Over the period 1991 to 2015 the mean growth equaled 3.0 percent. The figure show the typical right skewed distribution with a few outliers of high disposal income levels all located the Northern part of greater Copenhagen namely the municipalities Gentofte (425, 5.0%), Rudersdal (379, 4.5%), Hørsholm (354, 4.0%), (Lyngby-Taarbæk 321, 4.3%) and Dragør (289, 3.8%). The numbers in the parenthesis reports the disposal income in 1,000 DKK and annual growth rate for the period 1991 to 2015. In the other end with low disposal income levels the island municipalities of Bornholm (189, 3.1%), Læsø (189, 3.2%), Ærø (189, 3.1%), Lolland (185, 3.1%) and Langeland (180, 3.1%) are located. See also the map in figure 2 in section 2.

**Figure 6:** Distribution of disposal income by municipality, Denmark, 2015



**Note:** Exclusive Bornholm.

**Source:** Own calculations based on data from Danmarks Statistik (2017).

The geographical dimension is further elaborated in the figure 6 and 2 above. The map in figure 6 shows the distribution of disposal incomes. It is evident that the highest levels of disposal income are present North of Copenhagen and along a band in Eastern Jutland from Kolding in the South to Randers in the North. This structure of disposal income also has an impact on the planning issues. Figure 2 reports the classification of municipalities according to the Ministry for Cities, Housing and Rural Districts (2012). The municipalities are classified into four categories namely: cities i.e. municipalities with larger urban

areas (DK: Bykommuner); Medium i.e. municipalities with some urbanization (DK: Mellemkommuner); Rural i.e. municipalities with low urbanization (DK: Landkommuner) and Marginal municipalities i.e. located in large distance from city areas or smaller island (DK: Yderkommuner).

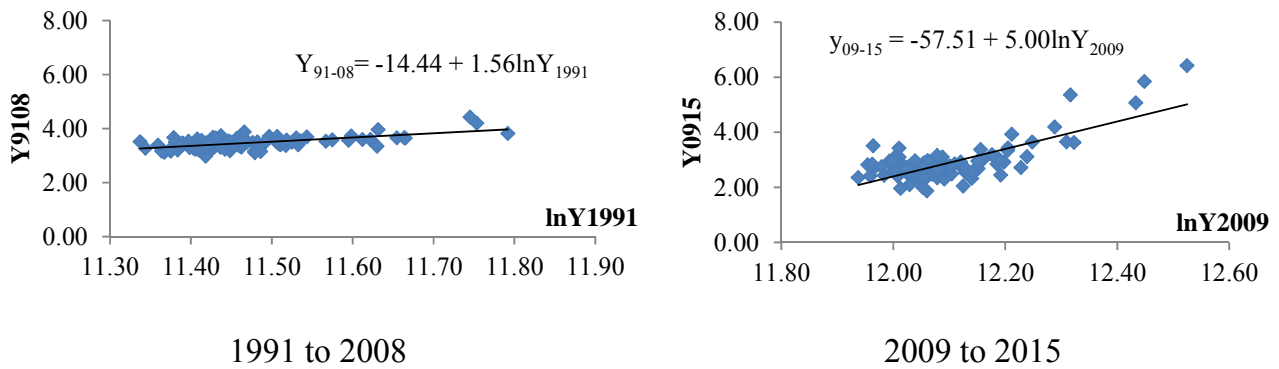
A main hypothesis addressed in this paper is that the regional balance is at change. This is not only a Danish perspective. Although, economic convergence is present in the European Union among all regions this is rarely the case at the national levels. A series of papers Cornett & Sørensen (2008, 2009, 2012 & 2015) investigated this issue and found that economic divergence were present in many countries at the regional level. This was especially the case for many Scandinavian and Eastern European countries.

To investigate this issue they calculated the  $\beta$ -convergence by regions. Traditional, the literature of convergence, see for example Abreu, De Groot and Florax (2005) for a detailed discussion has focused on the concept of  $\beta$ -convergence. This type of convergence is derived from the neoclassical model of economic growth developed by Solow. Assuming steady-state growth and a Cobb-Douglas production form, the model can be made dynamic by a Taylor approximation around the growth path. By solving this system, a linear approximation is found on the following form<sup>1</sup>:

$$Gy_{t,i} = \beta_0 + \beta_1 \ln y_{0,i} \quad i = 1, \dots, n$$

Where  $Gy_{t,i}$  is the growth rate in disposal income from period 0 to t,  $\beta_0$  is a constant and  $\beta_1$  is an estimate of the speed of convergence. The  $\ln y_{0,i}$  is the logarithm to the disposal income in the base year. Finally,  $n$  is the number of regions.

**Figure 7:**  $\beta$ -Convergence of disposal income among by Danish municipalities, 1991 to 2015



**Source:** Own calculations based on data from Danmarks Statistik 2017.

<sup>1</sup> For a detailed deviation of the expression of  $\beta$ -convergence, see for example Cornett and Sørensen (2012), appendix.

If  $\beta_I$  is significantly negative, then convergence is present. If  $\beta_I$  is positively significant, divergence is present. This model can be consistently estimated by use of OLS. Further  $i$  denotes a region, and  $n$  is all regions. The model is then estimated on cross-section data.

The constant term  $\beta_0$  is among other things an indicator of technology, and is assumed exogenous to the model. Therefore, technology and other effects embodied in the constant term cannot be separated. The exogenous treatment of the relation among technology and the growth pattern is a very strong restriction to the model.

**Table 1:**  $\beta$ -Convergence of disposal income among Danish municipalities by type of urbanization

		Constant, $\beta_0$			$\beta_1$ -coefficient			$R^2$	Standard Error	Obs.
		Coef.	Std.dv.	P-value	Coef.	Std.dv.	P-value			
Municipality	Period 1991 to 2015									
Total	D	−19.93	3.04	0.00	2.03	0.27	0.00	0.38	0.23	98
Cities	D	−29.62	6.86	0.00	2.87	0.59	0.00	0.41	0.34	35
Medium	D	−10.40	8.02	0.22	1.12	1.71	0.10	0.17	0.15	16
Rural	I	−10.49	20.88	0.62	1.16	1.83	0.53	0.01	0.28	32
Marginal	I	−4.72	10.27	0.65	0.70	0.90	0.45	0.04	0.15	15
Municipality	Period 1991 to 2008									
Total	D	−14.44	2.22	0.00	1.56	0.19	0.00	0.40	0.17	98
Cities	D	−14.37	4.41	0.00	1.56	0.38	0.00	0.33	0.22	35
Medium	I	−3.93	6.05	0.53	0.65	0.53	0.24	0.10	0.12	16
Rural	I	−4.17	9.47	0.66	0.66	1.83	0.43	0.02	0.13	32
Marginal	I	−6.66	11.58	0.57	0.88	1.02	0.40	0.05	0.17	15
Municipality	Period 2009 to 2015									
Total	D	−57.51	5.58	0.00	4.99	0.46	0.00	0.48	0.55	98
Cities	D	−95.64	7.90	0.00	8.11	0.65	0.00	0.83	0.45	35
Medium	D	−87.86	11.45	0.00	7.48	0.95	0.00	0.82	0.19	16
Rural	I	24.96	17.04	1.15	−1.84	1.42	0.20	0.05	0.27	32
Marginal	I	10.22	19.22	0.60	−0.63	1.60	0.70	0.01	0.37	15

**Note:** C = convergence, D = divergence and I = inclusive. If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level).

Classification of municipalities: Cities = municipalities with larger urban areas (DK: Bykommuner), Medium = municipalities with some urbanization (DK: Mellemkommuner), Rural = municipalities with larger low urbanization (DK: Landkommuner) and Marginal = Municipalities located in large distance from city areas or smaller island (DK: Yderkommuner). Classification according to the Ministry for Cities, Housing and Rural Districts (2012).

**Source:** Own calculations based on data from Danmarks Statistik(2017).

Data are divided into two sub periods namely from 1991 to 2008 and from 2009 to 2015. This division is undertaken for two reasons. First, the municipality reform in 2007 is considered as a year of transmission. Second, the recession in 2008 make this a good place to split data. Results of the regressions for the classification provided by the Ministry for Cities, Housing and Rural Districts (2012) for the full period and sub periods are reported in table 1 as well as in figure 7.

Over the full period from 1991 to 2015 the rate of divergence equaled 2 % as evident from table 1. This is precisely revers to the overall rate of convergence as reported by Cornett & Sørensen (2008). Table 1 also reports the rate of divergence on the four classifications of municipalities reported in figure 2. The rate of divergence is larger in the cities and equaled 2.87 %. For the medium group of municipalities the rate of divergence equaled 1.12 %. For the remaining two groups the pattern is inclusive.

The implication is that the distance between the wealthy and the poor municipalities has increased. Further, this process especially took place in the city and medium classified municipalities. So for example in Greater Copenhagen the distance in disposal income has increased. For example the wealthiest municipality in Greater Copenhagen and in Denmark is Gentofte, whereas the poorest municipality in Greater Copenhagen Ishøj in 2015 was ranked as number 90 out of the 98 municipalities in Denmark. However, the distance between the two municipalities is only about 25 kilometers.

**Table 2:**  $\beta$ -Convergence of disposal income among the Danish municipalities by region

		Constant, $\beta_0$			$\beta_1$ -coefficient			$R^2$	Standard Error	Obs.
		Coef.	Std.dv.	P-value	Coef.	Std.dv.	P-value			
Region	Period 1991 to 2015									
Municipalities sum	D	−19.93	3.04	0.00	2.03	0.27	0.00	0.38	0.23	98
Copenhagen	D	−47.78	13.31	0.00	4.44	1.15	0.00	0.50	0.40	17
North Zealand	D	−31.67	7.12	0.00	3.04	0.61	0.00	0.73	0.20	11
East Zealand	D	−11.12	6.40	0.16	1.25	0.55	0.09	0.56	0.11	6
West & South Z	I	−14.06	10.72	0.22	1.51	0.94	0.14	0.21	0.10	12
Fuen	D	−30.98	16.40	0.10	3.00	2.09	0.07	0.35	0.12	10
South Jutland	I	−21.18	18.49	0.28	2.14	0.22	0.22	0.15	0.16	12
East Jutland	I	−10.19	14.39	0.50	1.20	1.26	0.37	0.09	0.15	11
West Jutland	I	2.13	20.98	0.92	0.10	0.06	0.97	0.01	0.08	8
North Jutland	I	−15.98	16.69	0.36	1.69	1.47	0.28	0.13	0.10	11

**Note:** C = convergence, D = divergence and I = inclusive. If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level). Z = Zealand.

The region of Bornholm consisting of a single municipality is included under Eastern Zealand.

**Source:** Own calculations based on data from Danmarks Statistik (2017).

For the rural and marginal municipalities, the situation is different. Here the disposal income has neither converged nor diverged. Structural these municipalities have remained the same.

Figure 7 and the lower part of table 1 provide an analysis on the two sub periods. From figure 3 it can be observed that the rate of divergence has increased from 1.56 % during the period from 1991 to 2009 to 5 % for the period ranging from 2009 to 2015. So, the combination of the international recession and the Danish municipality reform has increased this process. For the cities, the rate of divergence over the latter period equaled 8.11 % and for the medium classified municipalities the rate equaled 7.48 %. Again, the pattern for the rural and marginal municipalities is inclusive.

There is a close connection between the classification of municipalities in Denmark provided by the Ministry for Cities, Housing and Rural Districts (2012) and the geographical location. This motivates a calculation of the rate of divergence on regional regions or provinces. This task is undertaken in tables 2 through 4. There are two messages from these estimations.

**Table 3:**  $\beta$ -Convergence of disposal income among the Danish municipalities by region

		Constant, $\beta_0$			$\beta_1$ -coefficient			$R^2$	Standard Error	Obs.
		Coef.	Std.dv.	P-value	Coef.	Std.dv.	P-value			
Region	Period 1991 to 2008									
Municipalities sum	D	−14.44	2.22	0.00	1.56	0.19	0.00	0.40	0.17	98
Copenhagen	D	−22.94	8.67	0.02	2.30	0.75	0.01	0.38	0.26	17
North Zealand	D	−12.86	5.13	0.03	1.43	0.44	0.01	0.54	0.14	11
East Zealand	D	−15.31	5.98	0.06	1.65	0.52	0.03	0.71	0.10	6
West & South Z	D	−32.31	10.36	0.01	3.12	0.91	0.01	0.54	0.10	12
Fuen	I	−4.68	22.90	0.84	0.71	2.01	0.73	0.02	0.17	10
South Jutland	I	−27.26	23.25	0.27	2.68	2.03	0.22	0.15	0.20	12
East Jutland	I	−17.16	13.35	0.23	1.81	1.17	0.16	1.14	0.21	11
West Jutland	I	21.09	27.44	0.47	−1.55	2.40	0.54	0.06	0.10	8
North Jutland	I	17.68	17.69	0.27	2.13	1.55	0.20	0.17	0.11	11

**Note:** C = convergence, D = divergence and I = inclusive. If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level). Z = Zealand.

The region of Bornholm consisting of a single municipality is included under Eastern Zealand.

**Source:** Own calculations based on data from Danmarks Statistik (2017).

First, the rate of divergence is significant for all regions located on Zealand with and single exception for West and South Zealand for the period of 1991 to 2015 and for Fuen also over the full period. The process of divergence is then to a large extent a phenomenon taking place in the Eastern part of Denmark. Here the economic distance between the metropolitan area and the hinterlands is larger than

in the Western parts of Denmark. In this part of Denmark, the economic structure between the larger cities and the hinterlands is more balanced.

Second, if the statistical material is decomposed into the two sub periods then it is evident that the rate of divergence is larger in the latter period ranging from 2009 to 2015 than in the first period ranging from 1991 to 2008. So, the recession and the Danish municipality reform have contributed to an increase in divergence.

**Table 4:**  $\beta$ -Convergence of disposal income among the Danish municipalities by region

		Constant, $\beta_0$			$\beta_1$ -coefficient			$R^2$	Standard Error	Obs.
		Coef.	Std.dv.	P-value	Coef.	Std.dv.	P-value			
Region	Period 2009 to 2015									
Municipalities sum	D	−57.51	5.58	0.00	4.99	0.46	0.00	0.48	0.55	98
Copenhagen	D	−109.48	11.79	0.00	9.25	0.97	0.00	0.86	0.48	17
North Zealand	D	89.80	13.26	0.00	7.63	1.08	0.00	0.85	0.41	11
East Zealand	I	−46.48	26.64	0.16	4.07	2.19	0.14	0.42	0.46	6
West & South Z	I	−9.44	15.35	0.55	1.00	1.27	0.45	0.06	0.20	12
Fuen	I	−21.87	25.06	0.41	2.03	2.08	0.36	0.11	0.29	10
South Jutland	I	34.50	19.29	0.10	−2.64	1.60	0.13	0.21	0.34	12
East Jutland	I	−8.74	17.02	0.62	0.96	1.41	0.51	0.05	0.25	11
West Jutland	I	85.40	63.00	0.22	−6.85	5.23	0.24	0.22	0.32	8
North Jutland	I	7.72	22.29	0.74	−0.41	1.18	0.83	0.01	0.22	11

**Note:** C = convergence, D = divergence and I = inclusive. If the P-value is less than 0.10 weak significance is observed (10 % level), if the P-value is less than 0.05 significance is observed (5 % level), and if the P-value is less than 0.01 strong significance is observed (1 % level). Z = Zealand.

The region of Bornholm consisting of a single municipality is included under Eastern Zealand.

**Source:** Own calculations based on data from Danmarks Statistik (2017)

Processes of divergence are not new phenomena at the municipality level in Denmark. It has properly been the case for around 25 years. However, this is contrary to an earlier finding by Dilling-Hansen et.al. (1994). Their main finding was that a process of convergence in the regional level in the former countries had taken place since the Second World War. They also argued that the Copenhagen area at that point of time still was the leading region in Denmark. Nordstrand et.al. (2001) analyzed the regional development of income and employment at the municipality level. They concluded that the period from 1970 to 1992 was characterized by convergence where the agricultural and industrial concentrated areas in the Western part of Denmark experienced at process of catch-up relative to the Greater Copenhagen area. Concentration especially took place in the Eastern part of Jutland. However, from 1993 to 2000 the process was reverse. This analysis coincides very well with the present analysis starting in 1991 to 2015. What happened around 1993 in Denmark? One answer could be that a new



government came in office. This government stimulated growth by an expansion of the service sector and this sector was especially concentrated in the larger cities and in the Greater Copenhagen area.

In order to examine the long run perspective, inspect table 5 that is an extract from Dilling-Hansen (1994). The table presents lev levels of taxable income by regions relative to Denmark equal to 100 for a period ranging from 1940 to 1990. It is evident that the areas around Copenhagen always have been the wealthiest with the highest income levels. However, over the period convergence is observed. The index value for the Copenhagen areas decreases and the levels for the other regions increase. In addition the standard deviation reported in the bottom line decreases.

**Table 5:** Taxable income per capita by Region in Denmark, entire country = 100

	1940	1950	1960	1970	1980	1990
Copenhagen & North Zealand	137	129	129	125	118	117
East Zealand	90	94	84	87	92	89
West & South Zealand	84	88	85	93	95	95
Fuen	88	93	90	89	93	92
South Jutland	91	93	84	84	90	90
East Jutland	90	92	92	90	93	95
West Jutland	80	82	80	83	87	89
North Jutland	81	80	82	81	88	88
Standard deviation	18.4	15.2	16.0	14.1	9.9	9.5

**Note:** The region of Bornholm is included under Eastern Zealand.

**Source:** Own extraction based on data from Dilling-Hansen et.al. (1994).

The concentration of the higher incomes in the more urbanized areas can also be related to the evaluation of the population growth in Denmark. This issue is considered in table 6 bringing the mean population growth in Denmark by regions and urbanization.

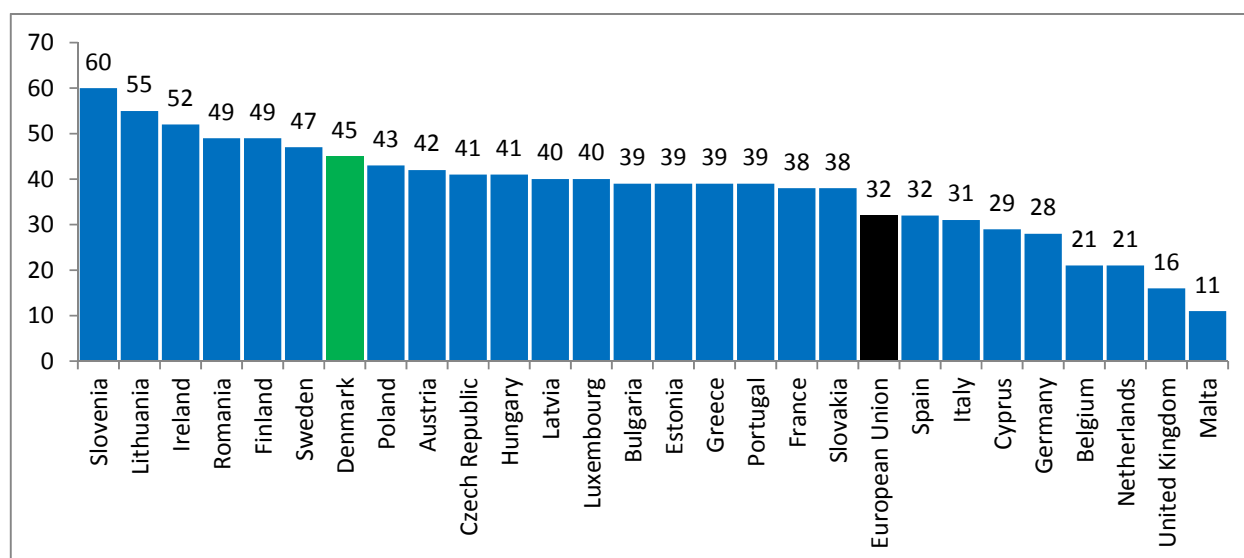
The table illustrates a shift in the localization of the population growth in Denmark. Up to around 1990 the population decreased in the inner as well as in the outer Copenhagen area. Since the Millennium the population growth has increased in the same regions and it is now the highest in Denmark and equaled 1.7 percent over the period 2010 to 2016. A similar pattern is also observed for the region of Eastern Jutland. Here the second largest city of Denmark Aarhus is located. These findings are further underlined from the three bottom lines in the table bringing the population growth rates by degree of urbanization. Here it is visible that the population growth is taking place in the urban areas with more than 10,000 inhabitants. Interestingly, the population has decreased in the rural districts during the full period since 1970, but the highest rate of depopulation took actually place in the 1970ties where the rate of depopulation hit 1.7 percent.

**Table 6:** Mean Population Growth in Denmark by Regions and Urbanization, 1970-2016

	1970-1979	1980-1989	1990-1999	2000-2009	2010-2016
Denmark, total	0.3	0.0	0.4	0.4	0.5
Standard deviation	1.1	0.4	0.3	0.3	0.7
<b>Regions</b>					
Copenhagen, city	-1.9	-0.6	0.6	0.6	1.7
Copenhagen, suburbs	0.0	-0.5	0.2	0.2	0.8
North Zealand	2.0	0.3	0.7	0.5	0.4
Bornholm	0.0	-0.4	-0.3	-0.5	-1.0
East Zealand	2.6	0.7	0.7	0.6	0.7
West & South Zealand	0.5	0.0	0.3	0.4	-0.1
Fuen	0.4	0.1	0.3	0.3	0.8
South Jutland	0.5	0.1	0.3	0.2	0.1
East Jutland	0.7	0.3	0.6	0.8	0.8
West Jutland	0.7	0.1	0.3	0.3	0.0
North Jutland	0.4	0.0	0.2	0.1	0.2
<b>Land/Urban areas</b>					
Cities > 10,000 inhabitants	0.0	0.0	0.2	0.9	1.0
Cities < 10,000 inhabitants	2.5	0.3	0.8	0.1	0.0
Rural districts	-1.7	-0.7	0.2	-0.9	-0.8

**Source:** Own calculations based on Statistics Denmark (2017) and Andersen and Christensen (2016).

**Figure 8:** Share of population in primary rural district in the European Union 2011



**Source:** Eurostat (2012).

Combining the information on the disposal income with the population statistics it is obvious that the regional balance in Denmark has moved towards the cities due to reforms in combination with a change in the infra structure towards the service sector. This pattern is also observed in many other countries, but how significant is the Danish evolution.

Consider figure 8 to make an international perspective. Here the share of population living in the rural districts is displayed for the European Union members according to the definitions used by Eurostat. The share of the Danish population in the rural districts is ranking 7<sup>th</sup> in a European perspective with a share equal to 45 percent. That is way above the European average that equaled 32 percent. In Denmark, the share of the population that is mostly urbanized equaled 24 percent whereas this share for the European Union in sum equaled 35 percent. So, Denmark is a nation with a change in the regional balance, but which still experience a relative large share of the population on the countryside. This pattern can be explained by a well-developed infrastructure that allows large commuting areas combined with the geographical spread of the larger cities such as Copenhagen (on Zealand), Odense (on Funen) and Aarhus (on Jutland).

## **5. Summary and Perspectives**

Since the beginning of the 1990s a process of regional economic divergence in the disposal income has taken place at the regional level in Denmark. This is a common phenomenon for other Scandinavian and European nations, see figure 4 for NUTS 2 regions in Europe. The overall rate of divergence is about 2 % between all Danish municipalities.

However, within the different classification of municipalities the degree of divergence differs considerably. This is especially the case within the city areas and the municipalities classified as medium urbanized. The process of divergence accelerates after 2008. For the city areas, the rate of convergence equaled about 1.5 % during the period from 1991 to 2008. However, this rate increased to 8.11 % from 2009 to 2015. This is partly a result of the Danish municipality reform launched in 2007 and consequence of the worldwide economic crisis. The highest rate of divergence is found in the cities, and in the Eastern regions of Denmark. This supports the central research question investigating, to what extent the peripheral and rural regions suffer more compared to central and urbanized regions. Data indicate in the Danish case that non-urban regions (category 3 and 4 in figure 2) are hidden both by the global shocks (financial crisis and change in the international division of tasks) and the structural changes in the domestic economy toward knowledge and innovation intensive activities. The factor endowment of the peripheral and rural areas are typically less suited for these activities. Furthermore, the centralization of the public sector including the educational system seems to make this inadequacy permanent. The result is that the rebound caused by the combination of external shocks (globalization and alterations of the industrial base between mature industrial countries and the emerging economies), and a domestic trend toward concentration of the knowledge and innovation based industries in the center regions, will result in significant consequences for income and employment in future.

As mentioned earlier studies have shown that from the end of the Second World War until around 1990 a process of convergence took place at the regional level in Denmark. Here the rural and outskirt areas caught up on the Metropolitan region. The present process of divergence has several consequences:

- First, the rural and hinterland districts are getting poorer and less attractive. The significance of center municipalities will become less visible. Urbanization has become more significant also concerning the concentration of the population.
- Second, the city areas will become more diverse with and increased economic gap between rich and poor city municipalities.
- Finally, this will challenge the regional political agenda, but and will probably need more than the current initiative like relocation of state agencies only rarely into the most threatening areas or liberalization of the spatial planning restriction and zoning rules in rural areas (Ministry of Industry 2017:17-22).

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