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# Motorway network effects on local population and employment – the case of Denmark

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## Abstract

The effects of proximity to the motorway system on local employment and population levels is analyzed in Denmark from 1981 to 2013 by the use of regression models correlating the change in the distance of Danish municipalities to the motorway network and their increase or reduction in population, employment and workplaces. The conclusion is that there is an indication of a small, but significant negative impact on local levels of population, employment and workplaces. Thus, motorways seem to support a centralization process rather than sustaining local economic activity.

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## 1.0 Introduction

The construction of motorways as a booster for regional economic growth has been part of the corollary of planners and policy makers internationally. The thought behind this idea is that with faster speeds and increased capacity, the areas which were considered less accessible can be connected to larger centers by motorways thus making them more attractive for the settlement of companies and inhabitants.

Not differently, in Denmark, the discourse on motorway construction is very often centered on the effect on growth and the number of workplaces with an underlying understanding that motorways will support regional and local development. Moreover, there has been in the past decade in Denmark an increased concern about “peripheral areas” (udkantsområder), which have experienced stagnation and/or reduction on their populations and labor market. There have recently been active policies from the Danish national government intending to mitigate these problems, by moving governmental agencies from the Capital Region to peripheral areas and by extending the motorway net closer to them.

Little research has been done in Denmark in order to measure the effects of new motorway construction on local employment and population. Internationally, studies have shown conclusions that seem to be

context based, by detecting positive, negative and mixed effects of new motorway construction on local growth depending of the country or area analyzed. This is what we would expect – local workplaces and population growth depend on many other factors than the distance to the motorway system. Nonetheless, we will try to isolate just this effect and find out which regional differences do apply.

It must be stressed, that this is a study of local and regional effects of motorways. Whether motorway construction has a positive effect on a national level cannot be determined by the approach used in this study.

## 2.0 Past studies

The relation between transport infrastructure and local development in the form of employment and population growth has been studied in the past decades using diverse methods and reaching different results. While some works use a broader frame for transport infrastructure, including rail (Anguera, 2006) and air (Padeiro, 2013); the majority of studies focus on the road network accessibility in relation to local development (Iacono & Levinson, 2015), (Jiwattanakupaisarn, et al., 2009), (Chandra & Thompson, 2000), (Crescenzi & Rodríguez-Pose, 2012), (Giuliano, et al., 2012), (Chi, et al., 2006). The referred studies also differ on the “catchment area” of the measured development or decline, varying from overall national, suburban areas of larger cities and interstate regions.

Recently and on a Danish context, Kaarsen & Weissert (2016), analyzing municipal level population growth and motorway proximity between 1950 and 2000, concluded that the development of the motorway network has not had an influence on the growth of local populations and that the further development of the network cannot mitigate the population reduction in lagging areas.

## 2.1 Observed outcomes

One pattern of outcomes that can be observed in the studies, especially the ones focused on local economic development was described by Kim & Han (2016) by using the concepts of “positive”, “differential” and “straw effect”. The pattern shows that the outcome of motorway network increment on town level population and employment is expected to fit under one of those three categories when observed in relation to regional major cities.

Of particular relevance to this study is the case of the so called “straw effect”, as defined by Behrens & Gaigné (2006) and Ono & Asano in (Kim & Han 2016). The straw effect is one of the possible outcomes that can be observed when a high speed connection is made available linking a smaller town to a larger city. In this case, there is a significant negative impact (population and employment reduction) on town level, especially of lagging areas, and a population, employment and economic activity increase effect in the regional major city by “sucking” workplaces and population from the smaller towns.

The straw effect, as well as other positive or differential outcomes are far from being all encompassing or nuanced, nevertheless, it can be useful as a soft template to guide our observations. As we have claimed in 1.0, the levels of local employment and population growth are expected to depend on many other factors than the distance to the motorway network, thus, when observing the motorway network, population and employment development for a period over 30 years, different outcomes (including the straw effect) can be expected to be observed in different areas and at different periods.

## 3.0 Methods

### 3.1 Metrics

The fundamental unit in this study is the municipality (kommune), as they existed between the administrative reforms of 1970 and 2006. The number of municipalities in Denmark in this period was 275, organized within 14 regions (amter). The municipalities of Copenhagen and Frederiksberg had independent status, not being part of an 'amt'.

The municipalities on islands not connected with fixed links (Bornholm, Ærø, Fanø, Samsø and Læsø) are excluded in this study, making the total number of units in this study 265. The administrative structure is shown in Figure 1.



Figure 1 - The administrative structure from 1970 to 2006 – 275 municipalities within 14 regions. Two municipalities (Copenhagen and Frederiksberg) also had status as regions. Source: © Møllers-Grafisk Tegnestue/Hans Møller i Den Store Danske, as accessed 5.10.2014 at [http://www.denstoredanske.dk/Samfund,\\_jura\\_og\\_politik/Samfund/Danmarks\\_lokalforvaltning/strukturen](http://www.denstoredanske.dk/Samfund,_jura_og_politik/Samfund/Danmarks_lokalforvaltning/strukturen)

### 3.2 Dependent variables

The study includes three dependent variables collected on municipality level each year 1981 to 2013:

- the number of inhabitants (population)
- the number of employed inhabitants (employment)
- the number of workplaces (workplaces)

Thus, for each municipality we have the total number of inhabitants, the number of employed people living in the municipality and the number of people working in the municipality. Data are collected from Danmarks Statistik (Statistikbanken <http://www.statistikbanken.dk/statbank5a/> and special assignment for workplace data). Workplace figures are collected in the form of the number of people employed on an address within each municipality. Danmarks Statistik produces the numbers on the base of reporting from companies. The jobs are allocated to the address of the company. There is a minor source of error here because the physical working place is not necessarily at the address of the company.

Data have been received covering all the years from 1981 to 2013. The data from 2007 to 2013 are reported in the 98 municipalities existing since the last administrative reform. The numbers of employees are allocated to the 'old municipalities' proportional to the distribution in 2006. In the relatively few cases

where one of the 'old municipalities' have been split to go into two of the 'new municipalities' no special adjustment have been made.

Thus having an unbroken series of data from 265 municipalities in 33 years, the data have been normalized in two steps. First, the numbers have been transformed to *relative number of population/employed/workplaces*, measured as part per million (ppm) of total population/number of employed/number of workplaces in Denmark. In this way the long term trends as well as fluctuations are eliminated.

Next, the data from each municipality are normalized to *indices* (of population/employed/workplaces) proportional to *relative population/employed/workplaces* with an average of 100 over the period 1981-2013.

Thus, we have three dependent variables, *index of population*, *index of employment*, and *index of workplaces*.

### 3.3 Proximity to the motorway system

The development of the motorway system from 1981 to 2013 is shown in Figure 3 and shown in a table in Appendix A. The original plan 'the big H' was having two north-south directed motorways one in east and one in Jutland, and connecting them with the east-west transversal motorway between Copenhagen and Jutland over Funen. This part of the system was completed with the opening of the bridges over Storebælt in 1998. Since then several new motorways have been built, making Denmark one of the best covered countries in Europe with respect to motorways. The change in the coverage make it possible to measure effects of the motorway system.

The independent variable in this study is proximity to the motorway system. This has been defined as the non-motorway

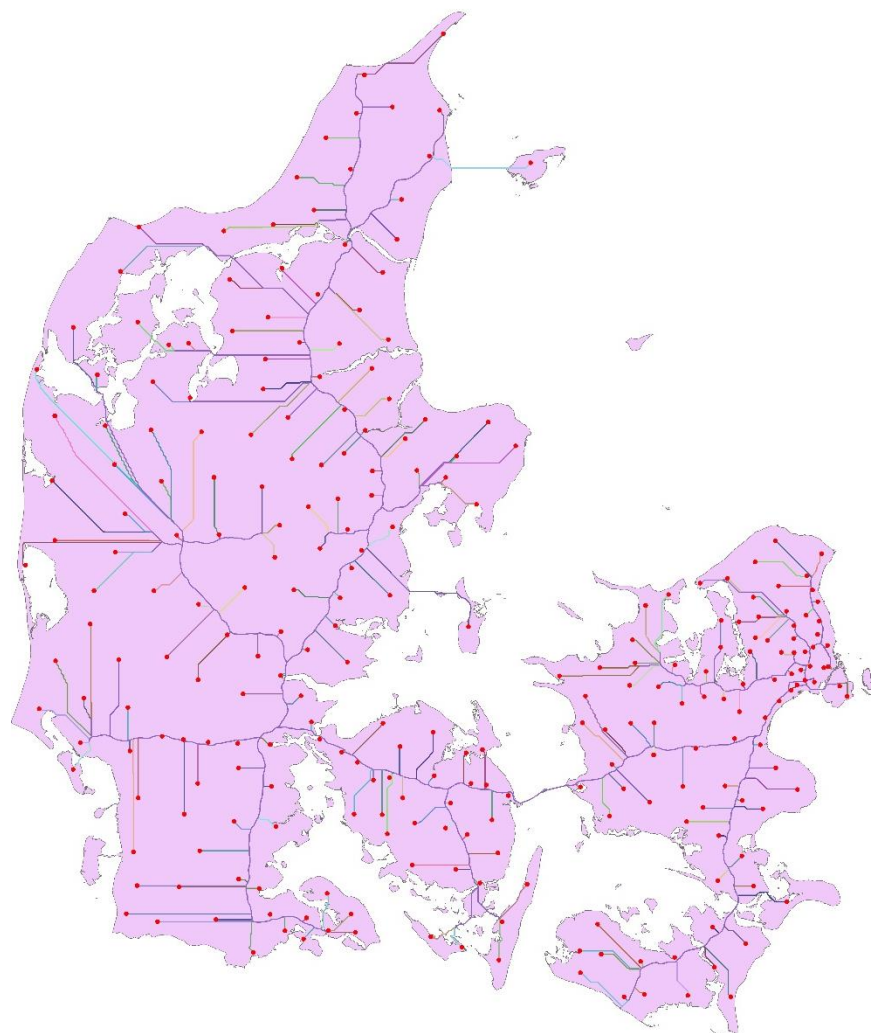


Figure 2 - Gravitational centers of Danish municipalities (before the administrative reform of 2007) and the distance to the nearest motorway (as of 2013). . Municipalities on the non-connected islands of Ærø, Fanø, Samsø and Læsø, as well as Bornholm (not shown) are not used in this study.

distance from the center of gravity of the population in each municipality to Copenhagen.

The center of gravity is calculated based on a disaggregation of the 2001 population data at the municipality level. For the disaggregation, the 2000 CORINE land cover data has been used (European Environment Agency, 2007). The data set and a description of the method is available from EEA.

The Copenhagen Area is defined as a point on the Motorring 3 around Copenhagen. Every municipality which have its center of gravity of population within Motorring 3 is assigned a zero distance to the Copenhagen Area.

The non-motorway distance is defined as the minimum of a cost-function, where using the motorway cost nothing, and the cost of getting to the motorway and between pieces of motorway is measured as the shortest distance in a grid of 100 by 100 metres,<sup>1</sup>. However, passage over water is not allowed, unless there is a fixed connection, with the exception of the Storebælt connection (explained below).

The map for 2013 shown in Figure 2 is provided with indications for how the distances are found. A special treatment is given to the Storebælt fixed connection. It was opened to car traffic in 1998 and replaced a high frequency ferry connection. As it is a tolled bridge, it cannot be regarded as just another piece of motorway. Instead, dummy variables are put into the model to describe the effect of the Storebælt bridges on the municipalities – one for municipalities west and one for municipalities east of Storebælt.

Similarly, other 'missing links' - the last stretches of motorway on the transverse of 'the big H', on Funen (1985) and Zealand (1993) are described by dummy variables in the east and west of the link, respectively. The reason for this is, that construction of the 'missing link' on Zealand, will reduce the 'non-motorway distance' to Copenhagen by 26 kms. However, it will not be reasonable to say that this will reduce the distance from a municipality in Northern Jutland to the motorway system by 26 kms, as the motorway system is used for making connections to more local centres as e.g. Aarhus.

### 3.4 Descriptive statistics

For each municipality a graph can be drawn illustrating the covariation of *distance to motorway system* with the three indices of population, employment and workplaces. Five examples from the municipalities of Hirtshals, Nykøbing F, Ringkøbing, Silkeborg and Sønderborg are shown.

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<sup>1</sup> The distance between cells is 100 meter for adjacent cells and 141,42 meter for cells only sharing a corner.

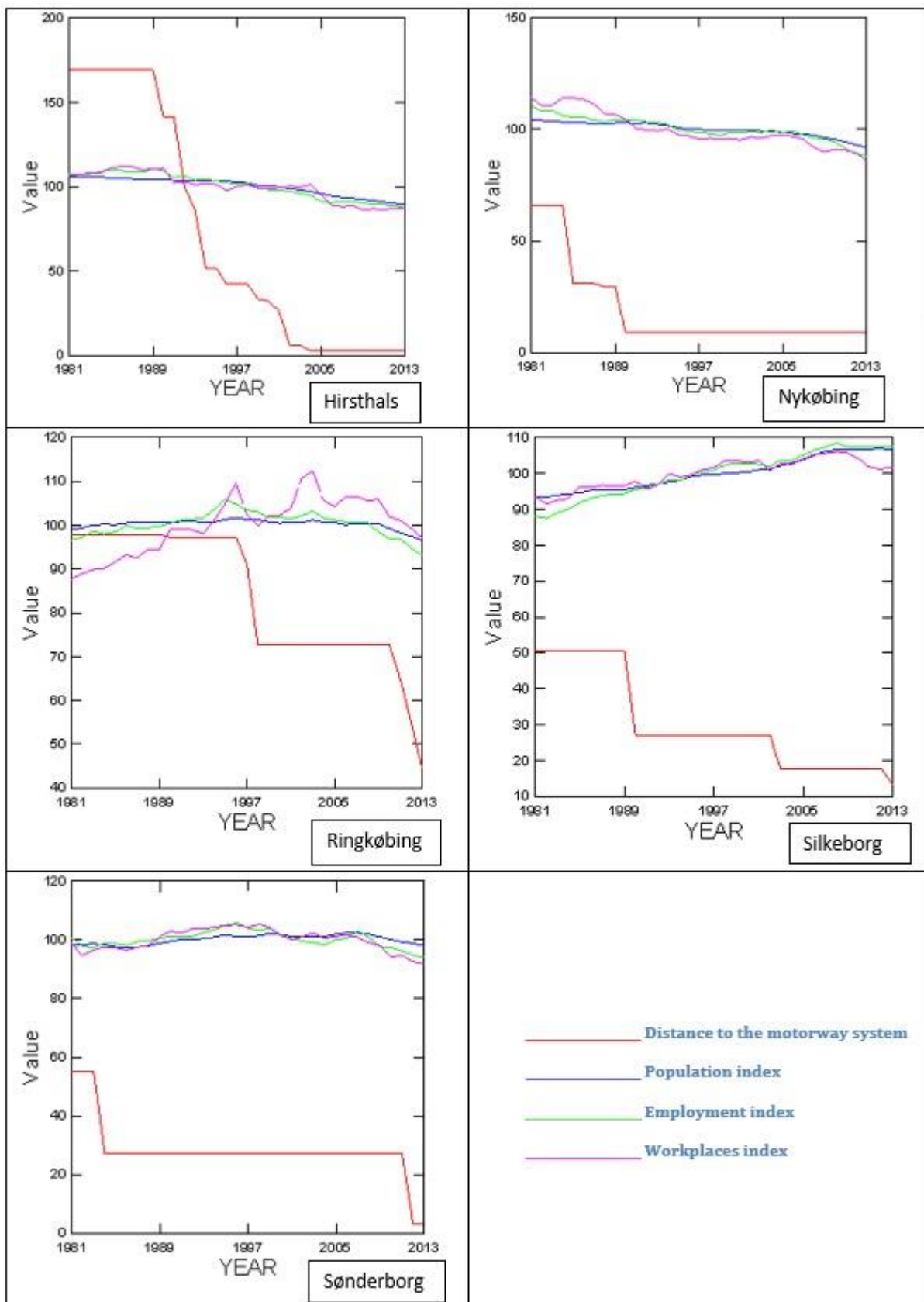


Figure 3 – Covariation of distance to motorway system with population, employment and workplaces



These examples show how diverse the pattern can be. Hirtshals and Nykøbing F have had a decrease in all indices despite very good connections to the motorway system for a long time. Ringkøbing and Silkeborg have not been very well connected to the motorway system, but have had growth in most of the period observed. Growth in Sønderborg, only recently being connected, does not seem to be affected.

### 3.5 Statistical models

Data have been analyzed in models of increased complexity, all with the General Linear Model-option in the SYSTAT program.

#### 3.5.1 Model I: Simple regression

In this model, the three indices of population, employment and workplaces in each municipality are the dependent variables. The only independent variable is *distance to motorway system*, as described above. Dummy variables for ‘the missing links’ are included in the model as well.

Results of Model I	Index		
	Population	Employment	Workplaces
Regression coefficients	0.023	0.013	0.024
Significance	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$
Explanatory power of model (adjusted R <sup>2</sup> )	6.8%	8.5%	2.9%

Table 1

The analysis shows that there is a significant and positive correlation between the three indices and the distance to the motorway system, meaning that the closer a municipality is to the motorway system, the less inhabitants, employed and workplaces there will be. The effects are modest (the indices are normalized to 100), so a new motorway bringing a municipality 10 kms closer to the motorway system will decrease number of inhabitants by 0.23%, the number of employed inhabitants by 0.13% and the number of workplaces by 0.24%.

Even though there is no doubt about the sign of the effect, the explanatory power of the models are modest – between 3 and 9%. Very much higher values would have been surprising, as there obviously are many other factors influencing the demographic development of a municipality.

#### 3.5.2 Model II: Control for time

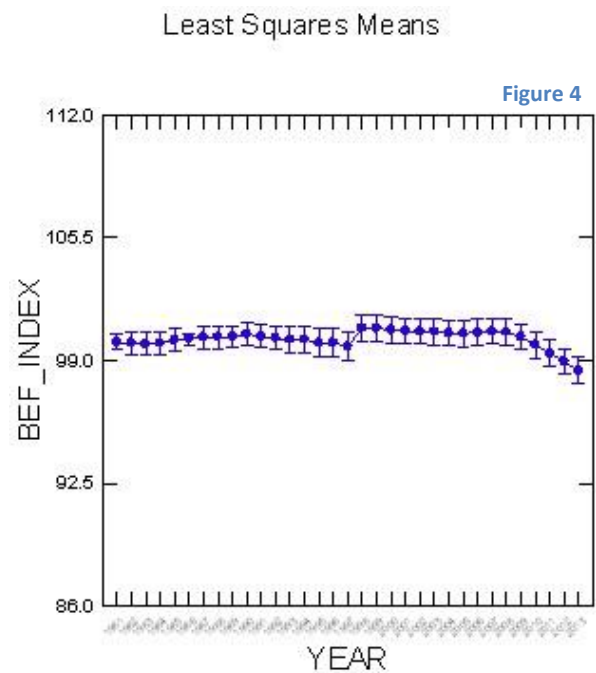
The simple regression model does assume time invariability. A general urbanization trend could thus be the explanation for the effects found with the simple model. In model II time is taken into consideration as the year has been introduced as an independent, categorical variable.

Results of Model II	Index		
	Population	Employment	Workplaces
Regression coefficients	0.023	0.012	0.023
Significance	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$
Explanatory power of model (multiple R <sup>2</sup> )	8.1%	12.8%	4.7%

Table 2

The extra variable improves the explanatory values of the models slightly, but apart from that the results are almost identical to Model I: a negative influence from new motorways on the demographics of the municipalities affected.

In figure 4 the estimated value of the contribution of each year to the population index is shown. When people move from smaller to larger municipalities this will show as a decrease – the index decrease in the small municipality will be numerically larger than the index increase in the larger municipality. It is in other word an indicator for the speed of centralization. As can be seen the centralization process accelerates from around 2007<sup>2</sup>.



### 3.5.3 Model III: Control for time and region

Results of Model III	Index		
	Population	Employment	Workplaces
Regression coefficients	0.034	0.038	0.051
Significance	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$
Explanatory power of model (multiple R <sup>2</sup> )	9.6%	16.6%	6.4%

Table 3

<sup>2</sup> It has been controlled that this is not an artefact due to the numerical treatment of the administrative reform of 2007.



Controlling for regional differences has been introduced in this model in the form of the old regions (amt). The values of the regional parameters describe the general demographic development within the country.

### 3.5.4 Model IV: Control for time and municipality

Finally, a more fine grained regional differentiation has been introduced through the municipalities. This analysis indicate an even greater motorway effect – e.g. almost 0.1% decrease in the number of workplaces for every kilometer distance to the motorway system.

Results of Model IV	Index		
	Population	Employment	Workplaces
Regression coefficients	0.064	0.065	0.097
Significance	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$	$p < 5 * 10^{-6}$
Explanatory power of model (multiple R <sup>2</sup> )	12.2%	18.0%	8.1%

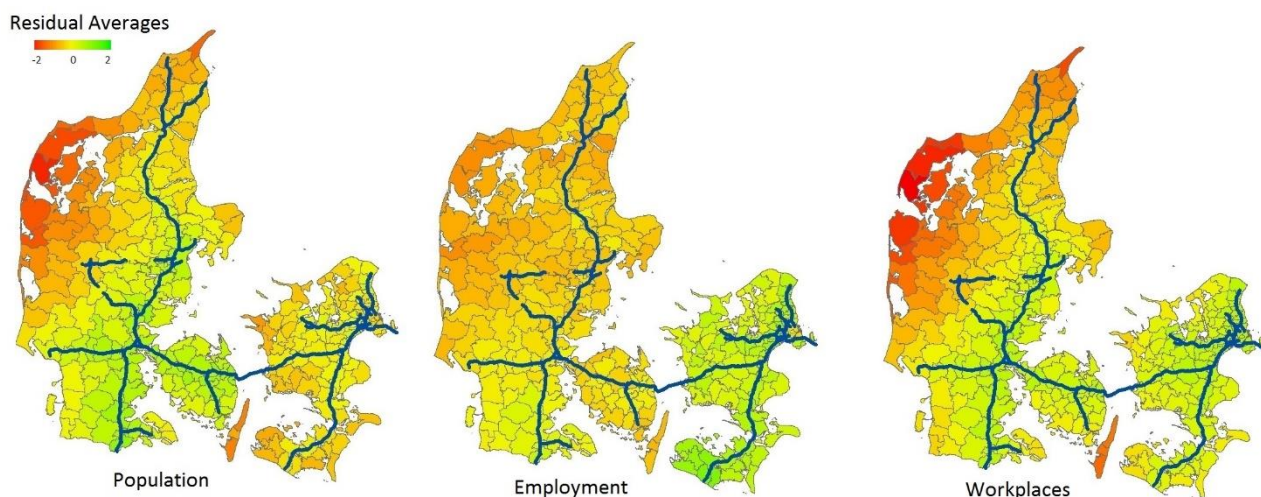
Table 4

Thus, our statistical analysis have consistently undermined the assumption, that motorway construction can be used to support local development. Even though there might be other explanations, which we have not included in our analysis, the indication is rather that motorways do support a centralization and urbanization process.

### 3.6 Residual analysis

Residual analysis has been performed on model II, in order to observe whether there are some motorway related location effects. Model II takes into account development over time, but not any spatial differentiation. The residuals show how much each municipality deviate from the predicted values of the model.

In figure 5 the average value of the model residuals over the full period 1981-2013 has been shown for the three demographic variables.



**Figure 5 - Average model residuals for the population, the employment, and the workplaces index 1981-2013. Green indicates municipalities having performed better than predicted by the statistical model, red worse. Neutral is indicated by yellow. The darkest green indicates 2% more population/employment/workplaces in average than expected**

In interpreting these average residuals, focus should be not on regional differences, but on differences that can be attributed to the motorway system. It should be noted that the residuals describe a very long term development, summing up many different demographical trends.

Some clear patterns can be seen. The population index seem to show that population in municipalities adjacent to the motorway system actually benefit from being close to the infrastructure, the effect seem to be more pronounced in the older parts of the motorway system, and weaker in the new ones in northern, western and southeast Jutland. This seems to indicate that there might be a long-term positive population effect for municipalities very close to motorways – being very close to a motorway seem to be a comparative benefit for attracting new inhabitants.

When it comes to employment, no such motorway related effect seems obvious – rather general regional effects seem to describe the residuals.

Workplaces seem to have a pattern similar to the population: a long-term positive effect for municipalities very close to the motorway system, especially in the older parts of the motorway system.

These results, together with the statistical analysis, might indicate that even though the overall effect of the motorway system is negative, being very close to the motorway in the longer run might be a benefit for the population and the number of workplaces in the municipalities.

As an attempt to dig into this we have computed the average residuals for three eleven year periods, 1981-1991, 1992-2002 and 2003-2013. In figure 6 we show the results related to the workplace index.

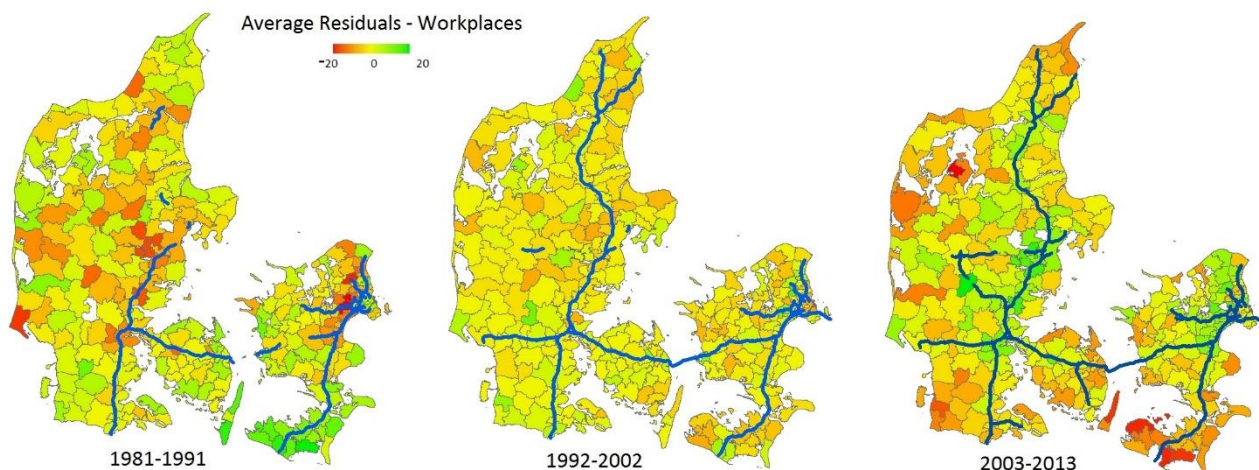


Figure 6 - Average residuals of the workplace index in model II, divided into three time periods. The motorway system of the final year of the time periods have been drawn.

We see a very diverse development over time. In the first period 1981-1991 it is very hard to recognize any motorway related pattern. The development 1992-2002 shows very little differentiation. Only in the final period 2003-2013, the association between increase in workplace index and being adjacent to the motorway system is more clear. This seems to indicate that we cannot find an immediate positive effect of connecting a municipality to the motorway system, and maybe that the effects of the motorway system first shows when there is a general centralization and urbanization trend as we have seen it in the last decade.

The trend for the population index is very much the same as the workplace index, the trend seems to be further supported by the time differentiated employment residuals in figure 7.

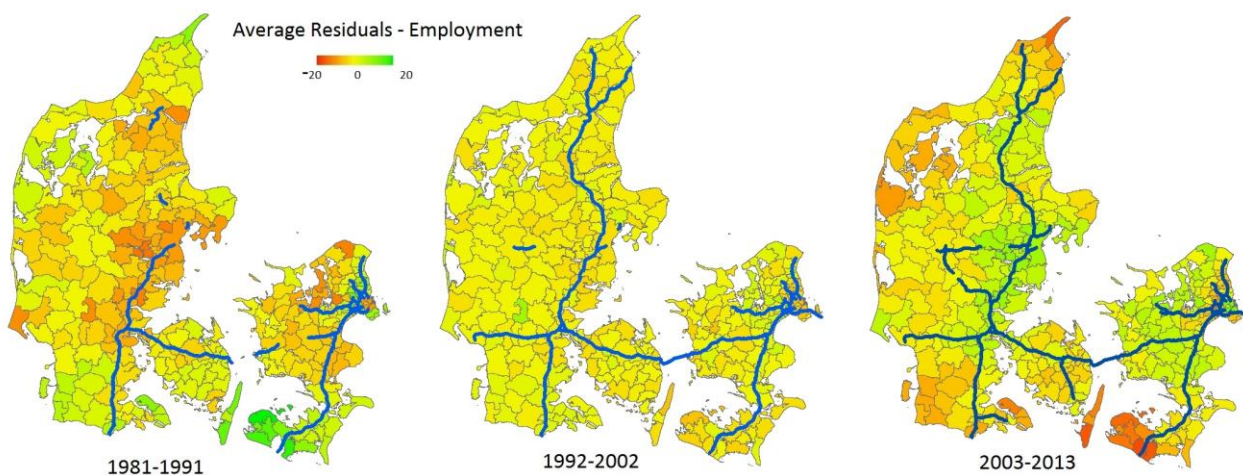


Figure 7 - Average residuals of the employment index in model II, divided into three time periods. The motorway system of the final year of the time periods have been drawn.

Even though we could not see a clear, motorway related pattern in the 33 year-average of the residuals, the temporal differentiation gives the impression, that being adjacent to a motorway was no advantage for a municipality in the early years, and that the positive effect first has appeared in the later years.

## 7.0 Conclusions

The construction of new motorway infrastructure is often supported by cost benefit analysis, showing that the project on a national level contributes to economic growth. From this, it is often assumed that improved road infrastructure for peripheral regions is also supporting local economic activity.

This study does not support this hypothesis. On the contrary, there seem to be a small, but significant negative local influence on both population, employment and workplaces from new motorway infrastructure. An estimate of the effect is that a municipality getting 10 kms closer to the motorway system will lose 0.6-0.7% of its population, the same percentage of its employed population and almost 1% of its workplaces.

Overall, this seem to support that there is some degree of what has been termed the 'straw effect' (Kim & Han, 2016), that new motorways somehow is contributing to the centers 'sucking' economic activity out of the periphery. This is of course also what is happening in general centralization and urbanization processes, but by controlling for time and regional/local differences, there still seem to be an effect that can be attributed to motorway construction. Thus, motorways seem to contribute and accelerate the centralization processes going on.

This does not contradict the results of cost-benefit type analyses. It might even explain some of the benefits, as centralization typically will support agglomeration and other dynamic effects having positive effect on the economy (Produktivitetsskmissionen, 2014).

For municipalities lying very close to the motorway there seems, however, to be a more positive effect as concerns population and workplaces.

Looking at the development over time, the motorway system seems to have different functions – in the centralization process of the recent years the motorway system has apparently had a supporting role.

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## Appendix A – Extensions in the Danish Motorway system

Chronological list of all extensions except for

- Small projects which do not contribute to the length of the motorway system ([udfletninger o.l.])
- Extension of existing motorways with extra lanes
- 

‘Motortrafikveje’ are not included except for Ønslev-Sakskøbing which was built as a ‘motortrafikvej’ in 1988 and extended to a motorway in 2007.

Source: Vejdirektoratet, based on [http://vejdirektoratet.dk/da/viden\\_og\\_data/statens-veje/vejenes\\_historie/sider/default.aspx#.VDFu6PI\\_t8M](http://vejdirektoratet.dk/da/viden_og_data/statens-veje/vejenes_historie/sider/default.aspx#.VDFu6PI_t8M) , accessed on 3.10.2014

Motorway System Extension Query			
Motorway	Section	Opening date	Length (kms)
Helsingørmotorvejen	Jægersborg - Brådebæk (Hørsholm S) (rute 19, E47)	23/01/1956	11.3
Helsingørmotorvejen	Brådebæk - Brønsholm (E47)	23/03/1957	5.5
Fynske motorvej	Knudshoved Havn-Hjulby	27/05/1957	8.1
Vestmotorvejen	Vemmelev-Halsskov	27/05/1957	9.6
Øresundsmotorvejen	Amager Landevej-Kastrup Lufthavn	28/06/1960	1.2
Øresundsmotorvejen	Kastrup Lufthavn-Englandsvej	01/07/1960	1.4
Holbækmotorvejen	Nord om Hedehusene (rute 21)	04/07/1960	6.4
Hillerødmotorvejen	Mørkhøjvej - Ring 3	04/07/1960	1.2
Sydmotorvejen	Sakskøbing-Rødby Havn	14/05/1963	28.5
Holbækmotorvejen	Syd om Roskilde (rute 21, rute 23)	01/02/1965	5
Vestmotorvejen	Skovse-Vemmelev	01/05/1965	11.4
Motorring 3	Jægersborg - Buddingevej	01/05/1966	2.6
Fynske motorvej	Gribsvad-Nørre Åby	01/07/1968	13.4
Motorring 3	Buddingevej - Kagså (Ringvej B3)	01/11/1968	3.7
Hillerødmotorvejen	Ring 3 - Skovbrynet	01/11/1968	3.8
Holbækmotorvejen	Vigerslev - Ring B3 (rute 21)	01/11/1968	5.6
Nordjyske motorvej	Aalborg - Nørresundby (inklusive Limfjordstunnelen)	06/05/1969	4



### Motorway System Extension Query

Motorway	Section	Opening date	Length (kms)
Holbækmotorvejen	Dyvetslyst - Langerød (rute 21)	10/12/1969	12.5
Køge Bugt motorvejen	Jersie (Cordoza) (i dag Solrød S.) -Ølby	17/12/1969	6.1
Sydmotorvejen	Ølby-Dyrehavehus	17/12/1969	15.5
Sønderjyske motorvej	Nr. Stenderup - Bramdrupdam, inklusiv Kolding ekspresvej	02/03/1970	6.9
Taulovmotorvejen	Lillebælt-Sønderjyske Motorvej	02/03/1970	11.5
Fynske motorvej	Nørre Åby-Lillebælt - inklusiv den ny Lillebæltsbro	21/10/1970	14
Nordjyske motorvej	Nørresundby - Bouet	01/12/1970	4.5
Fynske motorvej	Korsebjerg-Gribsvad	01/11/1971	9.8
Nordjyske motorvej	Vest om Randers	01/11/1971	10
Motorring 3	Kagså (Ringvej B3) - Jyllingevej	01/12/1971	4.8
Nordjyske motorvej	Bonderup - Aalborg	01/12/1971	14
Holbækmotorvejen	Roskilde - Dyvetslyst (Kr. Sonnerup) (rute 21, rute 23)	22/11/1972	15.1
Køge Bugt motorvejen	Ring 3-Jersie (Cordoza) (i dag Solrød S.)	12/12/1972	19.2
Motorring 4	Ishøj Stationsvej – Køge Bugt Motorvejen	12/12/1973	0.9
Sønderjyske motorvej	Bramdrupdam - Harte	17/12/1973	2.8
Hillerødmotorvejen	Skovbrynet (Ring B4) - Farum	01/03/1974	8.1
Holbækmotorvejen	Ring B3 - Tåstrup (rute 21)	10/07/1974	6.8
Motorring 4	Roskildevej - Ishøj Stationsvej	10/07/1974	4.6
Helsingørmotorvejen	Brønsholm - Kvistgård (E47)	08/08/1974	10
Helsingørmotorvejen	Kvistgård - Mørdrup (E47)	11/10/1974	2.5
Sydmotorvejen	Dyrehavehus-Rønnede	30/10/1974	12.4
Helsingørmotorvejen	Hans Knudsens Plads - Jægersborg (rute 19)*	01/11/1974	6.3
Sønderjyske motorvej	Harte - Christiansfeld	06/11/1974	17.7

Motorway System Extension Query			
Motorway	Section	Opening date	Length (kms)
Hillerødmotorvejen	Mosesvinget - Mørkhøjvej	01/04/1975	2.3
Vestmotorvejen	Ølby-Ringsted	29/10/1976	22.8
Holbækmotorvejen	Tåstrup - Hedehusene (rute 21)	29/10/1976	7.2
Motorring 3	Jyllingevej - Brøndby (Holbækmotorvejen)	01/09/1977	7
Østjyske motorvej	Nybro (Skanderborg) - Viby Ringvej	01/10/1977	23.4
Århus Syd motorvejen	Nybro (Skanderborg) - Viby Ringvej *	01/10/1977	23.4
Motorring 4	Ballerup - Tåstrup	01/12/1977	5
Nordjyske motorvej	Mariendals Mølle og Sønderbroindføringen til Aalborg	13/06/1978	4.1
Sønderjyske motorvej	Rise Hjarup - Frøslev	13/06/1978	32.5
Hillerødmotorvejen	Farum - Allerød	15/06/1978	3.9
Frederikssundmotorvejen	Ring 3-Motorring 4	15/06/1978	2.8
Djurslandmotorvejen	Skødstrup-Løgten	13/10/1978	4.6
Østjyske motorvej	Nørre Stenderup - Vejle N (inklusive Vejlefjordbroen)	01/07/1980	20.5
Fynske motorvej	Hjulby-Langeskov	01/09/1980	12.5
Østjyske motorvej	Horsens - Nybro (Skanderborg)	01/10/1980	12
Køge Bugt motorvejen	Motorring 3-Vallensbæk	01/11/1980	2.8
Motorring 3	Brøndby (Holbækmotorvejen) - Gl. Køge Landevej	01/11/1980	3
Sønderjyske motorvej	Skovby - Rise Hjarup	26/06/1981	10.5
Amagermotorvejen	Gl. Køge Landevej-Avedøre Havnevej	25/11/1983	2
Sønderjyske motorvej	Christiansfeld - Skovby	24/09/1984	23
Sydmotorvejen	Udby-Ønslev (inklusive Farøbroerne)	04/06/1985	29.5
Helsingørmotorvejen	Afslutning ved Mørdrup (E47)	01/07/1985	0.4
Fynske motorvej	Langeskov-Korsebjerg	28/08/1985	24

Motorway System Extension Query			
Motorway	Section	Opening date	Length (kms)
Amagermotorvejen	Avedøre Havnevej-Amager	06/08/1987	5
Sydmotorvejen	Ønslev-Sakskøbing (inclusiv Guldborgsundtunnelen)	07/06/1988	13.8
Østjyske motorvej	Vejle N - Horsens	08/06/1990	27.5
Sydmotorvejen	Rønnede-Udby	22/06/1990	21.4
Nordjyske motorvej	Årestrup - Bonderup	17/06/1992	16.4
Nordjyske motorvej	Hobro syd - Årestrup	19/10/1992	30.9
Vestmotorvejen	Ringsted-Skovse	17/06/1993	26.4
Nordjyske motorvej	Randers nord - Hobro syd	27/06/1993	15.5
Østjyske motorvej	Børup-Herslev	21/06/1994	9
Nordjyske motorvej	Århus syd - Randers syd	27/06/1994	40.2
Esbjergmotorvejen	Holsted V-Vejen V	20/06/1996	18.9
Hirtshalsmotorvejen	Hjørring - Bjergby	25/10/1996	12.1
Frederikshavnmotorvejen	Sæby-Frederikshavn	25/10/1996	9.6
Esbjergmotorvejen	Esbjerg-Skads	20/06/1997	11.4
Esbjergmotorvejen	Skads-Holsted V	08/09/1997	18
Amagermotorvejen	Kalveboderne-Kastrup	27/09/1997	2.6
Øresundsmotorvejen	Kastrup-Kalveboderne	27/09/1997	6
Esbjergmotorvejen	Vejen V-Kolding	18/09/1998	20
Frederikshavnmotorvejen	Vodskov-Jyske Ås	17/10/1999	19
Frederikshavnmotorvejen	Jyske Ås-Sæby	07/10/2000	19
Midtjyske motorvej	Brande Omfartsvej	30/10/2000	8
Hirtshalsmotorvejen	Nørresundby - Brønderslev	06/10/2001	23
Hirtshalsmotorvejen	Brønderslev - Hjørring	28/09/2002	21
Herningmotorvejen	Herning-Bording	04/11/2002	18

**Motorway System Extension Query**

<b>Motorway</b>	<b>Section</b>	<b>Opening date</b>	<b>Length (kms)</b>
Herningmotorvejen	Låsby-Aarhus	08/11/2003	17
Midtjyske motorvej	Riis-Ølholm	12/08/2004	13
Hirtshalsmotorvejen	Skagensvej - Hirtshals Havn (hovedlandevej)	09/10/2004	4.2
Hirtshalsmotorvejen	Bjergby - Skagensvej	09/10/2004	5.6
Holbækmotorvejen	Langerød - Tuse N (rute 21)	15/08/2006	5
Svendborgmotorvejen	Odense-Ringe	16/09/2006	14
Svendborgmotorvejen	Ringe-Kværndrup	16/09/2006	5
Midtjyske motorvej	Vardevej-Herning Ø	07/10/2006	4
Midtjyske motorvej	Sundsvej-Høgild	07/10/2006	2.1
Messemotorvejen	Motorvejskryds Herning syd - Vardevej	07/10/2006	4
Midtjyske motorvej	Høgild-Brande	08/10/2007	14
Sydmotorvejen	Ønslev-Sakskøbing,udvidelse	02/11/2007	13.8
Midtjyske motorvej	Vibjerg-Riis	19/11/2007	2
Djurslandmotorvejen	Skejby-Skødstrup	05/09/2008	12
Midtjyske motorvej	Give-Vibjerg	23/10/2008	3
Svendborgmotorvejen	Kværndrup-Svendborg	26/09/2009	16
Djurslandmotorvejen	Søften-Skejby	27/08/2010	2
Midtjyske motorvej	Brande-Give	11/11/2011	8
Sønderborgmotorvejen	Klipleve-Sønderborg	31/03/2012	26
Esbjergmotorvejen	Esbjergmotorvejen-Esbjerg Havn (hovedlandevej)	21/06/2012	3
Helsingørmotorvejen	Vintapperrampen	08/08/2012	
Herningmotorvejen	Bording-Funder	31/08/2012	12
Midtjyske motorvej	Riis - Ølholm (udbygning)	17/09/2012	10

**Motorway System Extension Query**

<b>Motorway</b>	<b>Section</b>	<b>Opening date</b>	<b>Length (kms)</b>
Kalundborgmotorvejen	Elverdam (Holbækmotorvejen) - Ringstedvej (Regstrup)	27/08/2013	6.5
Vestmotorvejen	Slagelse Omfartsvej	28/09/2013	9
Midtjyske motorvej	Ølholm - Vejle	30/09/2013	14
Holbækmotorvejen	Holbæk-Vig , udvidelse (rute 21)	29/11/2013	20
Frederikssundmotorvejen	Motorring 3-Ring 3	12/11/2014	6