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CENTROPE Regional Development Report 2011

Long Run Growth and Demographic Challenges

Karol Frank (EU-SAV, Co-ordinator),
Peter Huber (WIFO),
Roman Römisch (WIIW)

May 2012

WIFO

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Abstract

Macroeconomic forecasts for Europe and the CENTROPE countries currently suggest that the recovery of the years 2010 and 2011 was only a short-lived interlude both in the CENTROPE countries as well as most other EU countries. The world-wide slowdown in growth will affect the CENTROPE countries and it can be expected that Europe and thus also the CENTROPE regions are currently entering a period of protracted slow growth. The long-run growth prospects of CENTROPE are, however, intact. GVA and in particular productivity growth in the CENTROPE was substantially higher than in other cross-border metropolitan regions and much of the improved growth performance in CENTROPE in the last years was due to a rapid improvement of regional competitiveness. According to an analysis of demographic developments demographic decline seems to be a smaller problem in the CENTROPE than in many other EU regions. Although this again reflects rather positively on CENTROPE in comparison to the EU, ageing of the population, however, is a serious challenge to the economies of CENTROPE, which will necessitate developing long-term and coherent strategies to maintain living standards and quality of life for citizens in all age groups.

CENTROPE Regional Development Report 2011 – Long Run Growth and Demographic Challenges

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1. Introduction

The CENTROPE region represents a unique transnational economic area located at the intersections of Austria, the Czech Republic, Hungary and Slovakia. In spite of the fact that all CENTROPE countries are members of the European Union, the region is still characterised by significant internal disparities but has also experienced substantial structural change and economic growth in the last decade. Given this unique character as well as the important economic changes occurring in this region, one of the objectives of the CENTROPE Regional Development Report project is to provide an annual report on the economic development on this region.

Based on last year's experience, which showed that a substantial improvement in data quality and in particular recency can be achieved if regional indicators are collected in spring of a year, this year's CENTROPE Regional Development Report was divided in two parts. The first part, was already elaborated at the end 2011, and deals with macroeconomic development, long term growth performance and structural change and demographic changes. The second part (published in May 2012) looked into more detail on business cycle developments using the most recent statistical data for the years 2010, estimates for 2011 and forecasts for 2012.

In this report we present results of both these analyses. In the next chapter we present an overview of the recent macro-economic developments and forecast on the individual CENTROPE countries. By contrast, chapter 3 analyses the recent macro-economic development of the CENTROPE region, while chapter 4 analyses the long-run developments with respect to productivity, productivity growth, GVA growth and employment growth in the CENTROPE and its individual regions in detail. This chapter also presents some preliminary evidence on the impact of the economic crisis on these long run trends, and compares CENTROPE to other polycentric cross-border metropolitan regions in the EU.

Chapter five of the report by contrast looks at demographic developments in CENTROPE while chapter six presents a summary of results and policy conclusions.

2. Macroeconomic overview

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2.1.Growth of GDP

In CENTROPE the years 2010 and 2011 meant a more or less pronounced recuperation from the economic recession in 2009. In all four countries the economy started to grow again in 2010, and continued to do so in 2011. Still, economic recovery was quite differentiated between the individual countries. Slovakia tended to grow fastest out of the crisis, at over 4% per year in terms of GDP in 2010, and thus by around 1.5 to 2 percentage points ahead of the Czech Republic and Austria and by almost 3 percentage points faster than Hungary. For 2011 no final numbers are available yet, but estimates are that recovery continued, though a bit slower than the year before in the Czech Republic and Slovakia (by around 1 percentage point in each country), while in Austria and Hungary economic growth in 2011 was, if in the latter case only slightly, higher than in 2010.

Already mid 2011 growth prospects for the year 2012 were rather pessimistic for the CENTROPE countries, as well as for the EU as a whole, while for 2013 a slight upswing was expected. Still, the softening of global markets in addition to the turmoil on the financial markets and the sovereign debt crisis that affected Europe, casting even some doubts on the sustainability of the Euro, led to a further deterioration of the expectations regarding the economic development in 2012. This is also reflected in the movements of the economic sentiment indicator (see figure 2.1), which after constantly improving following the 2009 crisis and reaching its peak around January 2011, tended to fall again in the EU – inclusive all four CENTROPE countries. Within the latter group of countries economic expectations are worst in Hungary followed by Slovakia. As a consequence of this, in spring 2012 revisions of the forecasts made in autumn 2011 had to be made (compare the autumn forecasts in table 2.1 and the revisions in table 2.2).

The latest forecasts suggest that economic growth in the CENTROPE countries is going to be quite anaemic in 2012. Thus EU-Commission estimates are that Slovakia will grow strongest amongst the four countries, but still only by around 1.2%, followed by Austria. For the Czech Republic a stagnation is projected – just as for the EU 27 as a whole – while Hungary is bound to see a decline of its GDP of around 0.1% on a year to year basis.

As economic forecasts always include a certain degree of uncertainty and a mix of assumptions and judgements that differ between institutions and experts, we add to the Commission forecasts the growth estimates for the CENTROPE countries of WIFO and wiiw to show the bandwidth of potential future developments. Overall the forecasts of WIFO and wiiw are different to those by the EU-Commission, yet the extent of the variation is relatively low. Hence, amongst the CENTROPE countries Slovakia's GDP is still projected to grow strongest, at around 1.5% and thus slightly faster than in the Commission forecast. In contrast to the EU wiiw predicts some weak (positive) growth for the Czech Republic of around 0.5%, which is by a margin higher than the growth of Austrian GDP predicted by WIFO. For Hungary wiiw expectations are more negative than those of the EU-Commission as a decline of 1% of GDP is forecast for 2012. For 2013 both institutes project for their respective countries an acceleration of growth with growth rates of around 2% to 3% for Hungary, the Czech Republic and Slovakia and a slightly lower growth for Austria (1.4%).

Table 2.1:   Growth of GDP in CENTROPE, forecast autumn 2011

	avg. 2001-2004	avg. 2005-2008	2009	2010	2011	2012	2013
Austria	1.5	2.8	−3.8	2.3	2.9	0.9	1.9
Czech Rep.	3.4	5.6	−4.7	2.7	1.8	0.7	1.7
Hungary	4.2	2.2	−6.8	1.3	1.4	0.5	1.4
Slovakia	4.5	7.8	−4.9	4.2	2.9	1.1	2.9
EU 27	1.9	2.2	−4.2	2.0	1.6	0.6	1.5

Source: AMECO Database, EU-Commission DG ECFIN, Autumn 2011.

Table 2.2:   Growth forecast revisions, spring 2012

	DG ECFIN		WIFO/wiiw		
	2011	**2012**	**2011**	**2012**	**2013**
Austria	3.1	0.7	3.1	0.4	1.4
Czech Rep.	1.7	0.0	1.8	0.5	2.5
Hungary	1.7	−0.1	1.7	−1.0	2.0
Slovakia	3.3	1.2	3.3	1.5	3.0
EU 27	1.5	0.0			

Source: EU-Commission DG ECFIN, WIFO, wiiw.

Figure 2.1: Economic Sentiment Indicator
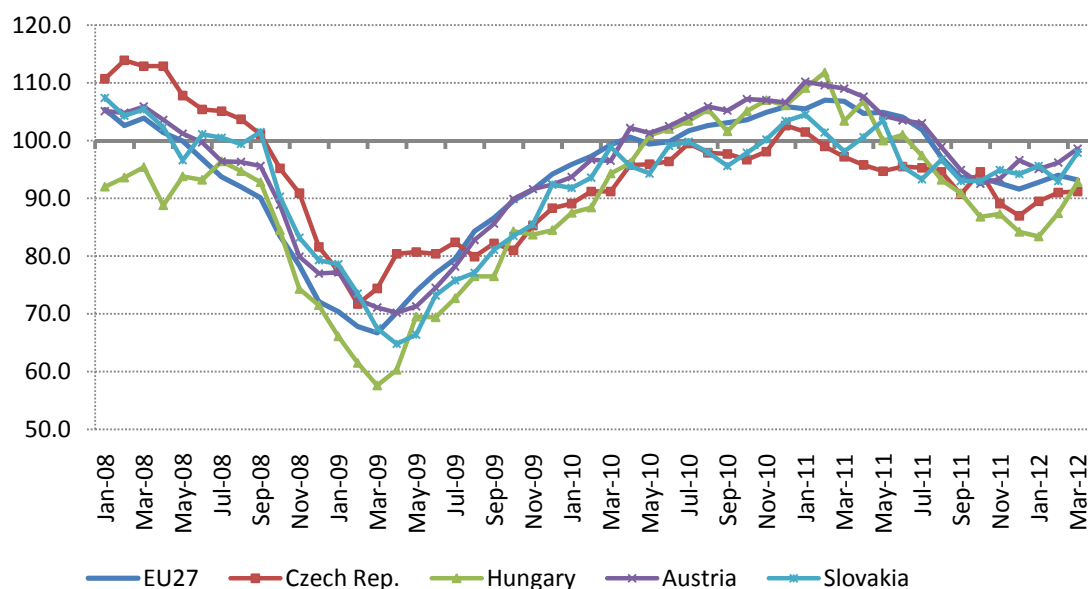
Source: EU-Commission, DG ECFIN.

2.2. Sources of growth

The following section provides a short analysis of the underlying causes of the aggregate economic development in the CENTROPE countries. The first part analyses the role and importance of the individual components of GDP and their contribution to overall growth. For this we make use of the fact that any country's GDP in a given year is the sum of aggregate consumption, investment and net exports (i.e. exports minus imports). Furthermore, to take a closer look on the roles of the private and government sector, respectively, we split both, consumption and investment in consumption/investment of the private and the government sector. The second part will analyse the factors behind the individual components in more detail.

2.2.1. Contributions to growth

Across the CENTROPE countries the contribution of the individual GDP components to the growth of GDP tends to vary widely. For example in Austria it is almost exclusively domestic demand, i.e. consumption and investment, that carries GDP growth. Thus, in

2011 – a year of relatively strong economic growth – investment demand was the main factor behind economic development, contributing 2.3 percentage points to the overall GDP growth of 2.9%. Consumption demand was a bit weaker but still accounted for 1 percentage point, while net exports tended to lower the growth of GDP as imports grew ahead of exports. For 2012 it is expected that the economic downswing in one way or the other affects all components of GDP. In the first place it is investment growth that due to a worsening of expectations will come almost to a standstill and thus will contribute only little to overall growth. Contrastingly, consumption tends to have a stabilising function and will be the main factor behind economic growth this year, despite the fact that the growth of consumption will be a bit lower than last year. As far as exports are concerned the reduction in domestic demand is also reflected in a reduction in a demand for imports. This helps to improve the trade balance, so that as a consequence it exerts some weak positive stimulus to GDP growth. For 2013 it is expected that all components of GDP will gain some momentum and grow stronger than in 2012, leading also to a stronger growth of GDP. [1]

In the Czech Republic and Slovakia the role of the GDP components tends to vary over the years. In 2011 the most important contribution to GDP growth comes from net exports in both countries, and also the growth of investment demand has some positive effects, while there are no stimuli coming from consumption. Contrastingly, in 2012 the main stabilising force behind GDP is consumption, while investment contributes little or even tends to decline as in the Czech Republic, and similar so for net exports. For 2013, quite similar to Austria, it is expected that all components, and especially consumption, gain some momentum and contribute positively to GDP development.

By contrast in Hungary it is more or less only net exports that keep the economy growing in 2011 and 2012, while domestic demand, partly due to a difficult situation regarding the private debt situation, tends to decline.

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[1] The analysis in this part is based on data from the DG ECFIN AMECO database published in autumn last year. As a consequence the GDP growth rates refer to the forecasts made late last year and thus do not correspond to the spring revisions of these growth rates. The reasons behind this are, that firstly the AMECO database offers comprehensive and highly detailed data that allows doing the analysis in this chapter, secondly no later data are available in the AMECO database, and thirdly the spring revisions do not deviate too much from the autumn forecasts, so that the results are highly indicative of current developments in CENTROPE.

A common feature in all CENTROPE countries is the weak stimulus coming from the public sphere. All CENTROPE countries' governments are running austerity packages, quite independent of the fact of whether the countries have low levels of debt, like Slovakia and the Czech Republic, or whether such a package could be assumed to be more in place, like in Hungary and Austria. In any case the consequence of this is a low growth or even a decline in public consumption and investment in 2012.

Table 2.3:   Contributions to growth of GDP

	Austria							Czech Republic					
	2008	2009	2010	2011	2012	2013		2008	2009	2010	2011	2012	2013
GDP	1.4	−3.8	2.3	2.9	0.9	1.9		3.1	−4.7	2.7	1.8	0.7	1.7
Consumption	1.4	0.0	1.5	1.0	0.6	0.8		3.3	−0.1	1.8	0.0	0.5	1.0
Private Cons.	0.5	−0.4	1.5	1.0	0.6	0.7		2.7	−1.0	1.4	0.2	0.4	0.7
Public Cons.	0.9	0.4	0.0	0.1	0.1	0.1		0.5	0.9	0.3	−0.2	0.1	0.2
Investment	−0.1	−2.6	1.2	2.3	0.2	0.9		0.0	−6.0	1.7	0.7	−0.4	0.4
Private Inv.	−0.2	−2.6	1.3	2.3	0.2	0.9		−0.5	−6.4	2.4	0.8	−0.4	0.3
Public Inv.	0.1	0.0	−0.1	0.0	0.0	0.0		0.5	0.3	−0.7	0.0	0.0	0.1
Net Exports	0.1	−1.2	−0.3	−0.5	0.1	0.2		−0.2	1.5	−0.8	1.0	0.5	0.4
Exports	1.1	−10.8	4.9	4.6	2.0	3.6		−1.8	−7.5	10.0	7.2	1.3	4.6
Imports	1.0	−9.6	5.2	5.1	1.9	3.4		−1.6	−9.0	10.8	6.2	0.7	4.3
	Hungary							Slovakia					
	2008	2009	2010	2011	2012	2013		2008	2009	2010	2011	2012	2013
GDP	0.9	−6.8	1.3	1.4	0.5	1.4		5.9	−4.9	4.2	2.9	1.1	2.9
Consumption	0.0	−4.0	−1.2	0.2	−0.8	0.6		5.8	2.3	0.2	−0.1	0.9	1.6
Private Cons.	−0.4	−3.3	−0.6	1.0	−0.2	0.5		4.4	0.8	−0.1	0.5	0.7	1.3
Public Cons.	0.4	−0.7	−0.6	−0.8	−0.7	0.1		1.5	1.4	0.4	−0.6	0.1	0.3
Investment	1.3	−6.8	0.7	−0.6	−0.4	0.2		1.5	−8.8	4.5	0.7	0.2	1.0
Private Inv.	2.0	−6.9	0.4	−0.5	−1.4	−0.1		1.3	−9.0	4.1	1.4	0.2	1.2
Public Inv.	−0.7	0.0	0.3	−0.1	1.0	0.3		0.2	0.2	0.4	−0.7	0.0	−0.2
Net Exports	−0.4	4.1	1.7	1.8	1.8	0.7		−1.4	1.6	−0.5	2.3	0.0	0.3
Exports	1.1	−9.3	10.0	7.6	10.3	6.5		1.4	−16.1	13.7	7.8	1.3	4.9
Imports	1.5	−13.4	8.3	5.8	8.5	5.8		2.8	−17.7	14.3	5.5	1.3	4.6

Source: AMECO Database, EU-Commission DG ECFIN, Autumn 2011.

2.2.2. Low consumer confidence, depressed wages and employment reduce consumption, while reduced household savings have partly stabilising effects.

In any country consumption is the most important component in GDP and thus is – at least in the short run – also the main contributor to GDP growth. At the same time consumption is determined by a number of different factors and out of these we pick out some of the

more important ones to illustrate the different patterns of aggregate consumption in the CENTROPE countries.

The first factor is consumer confidence that expresses the households' expectations on future economic development. It may be regarded as being indicative of future private consumption levels, as households tend to adjust their level of spending, depending on the expected future state of the economy. Most probably this is not so much of importance as far as the consumption of every day goods are concerned (at least in the short run), but rather for larger private expenditures (such as the purchase of cars), that in sum have a relatively large share in overall consumption and through their fluctuations exert a significant impact on the level of consumption and hence on the level of GDP.

Figure 2.2: Consumer Confidence Indicator
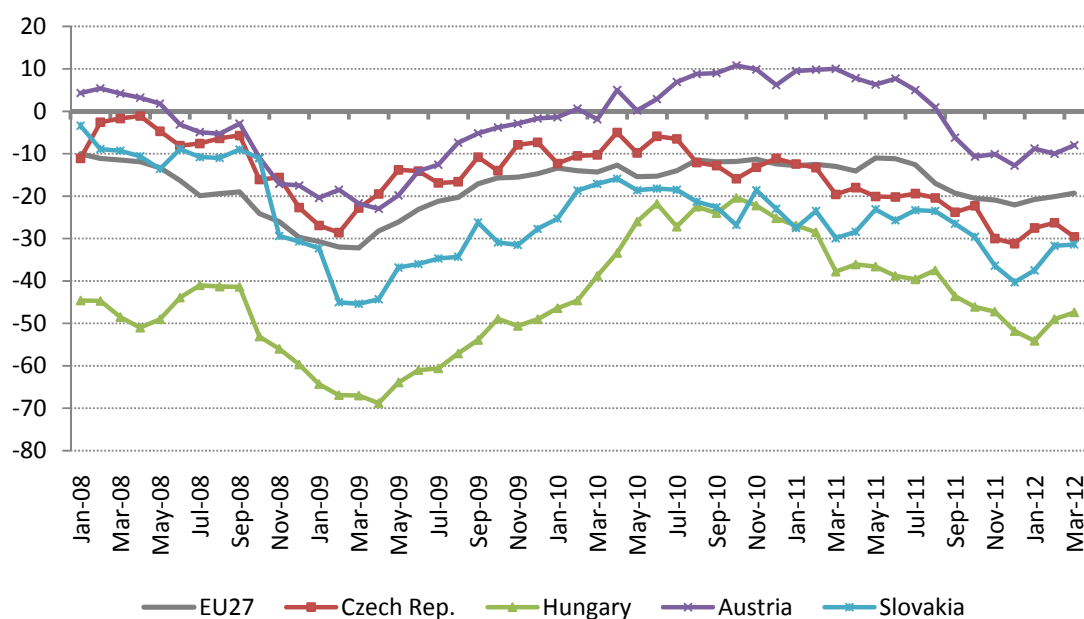
Source: EU-Commission, DG ECFIN.

Looking at the development of the consumer confidence level over time, there is a clear correlation between consumer confidence and the business cycle. Hence, in the crisis year 2009 the consumer confidence indicator reached its lowest levels in years throughout all CENTROPE countries, just to show some signs of improvements as soon as the economy started to recuperate. But already at the begin of 2011 consumer confidence levels started

to drop again and basically continued to do so until January this year, while through February and March some signs of improvements became visible. As far as the individual CENTROPE countries are concerned consumer confidence is by far lowest in Hungary, followed by Slovakia and the Czech Republic, whereby in all three countries confidence levels are lower than in the EU 27 on average. Only Austria sticks out a bit, though still consumer confidence is pessimistic.

Overall the development of consumer confidence corresponds quite well to the aggregate consumption patterns observed in the CENTROPE countries. Given this, the expectations for a rising consumption level in the near future are – as shown above – quite low for all CENTROPE countries and thus also positive effects on GDP growth will be minor.

Secondly, we look at aggregate wage developments as well as on labour market developments. While the analysis of the former allows drawing conclusions on the potential level of consumption (given that the propensity to consume out of wages stays more or less constant over time), the analysis of the latter is complimentary as it is not only the size of wages that determine aggregate consumption but also the number of people employed earning wages.

As far as aggregate wages are concerned (see figure 2.3) we see over the years and until the crisis year 2009 a mixed pattern across the CENTROPE countries. On the one hand Austria and Slovakia showed a constant decline in the share of wages in GDP over time (and a corresponding increase in the share of profits), while in Hungary and the Czech Republic the share of wages tended to increase. These trends were interrupted in 2009, whereby in the same year the share of wages tended to increase, largely due to a drop in profits as an effect of the economic downturn. In the aftermath of the crisis aggregate wages continued to decline (in terms of shares in GDP) in Austria and Slovakia and also began to fall in Hungary. Only in the Czech Republic aggregate wages seem to be more stable.

The reasons for this differ between the individual CENTROPE countries. In some countries like Austria the declining wage share in GDP is due to a relatively weak growth of wages per worker if compared to the growth of GDP, while employment tended to increase quite strongly, but not enough to keep the wage shares from falling. Contrastingly, in Hungary until 2009 wages grew ahead of GDP while employment levels stayed more or less constant. In the Czech Republic and Slovakia, both employment and wages per employed tended to grow until the crisis, with wages growing faster than employment, but only in the

Czech Republic the share of aggregate wages in GDP was more or less constant, while in Slovakia the combined growth of employment and wages per employed was slightly lower than the growth of aggregate output.

After 2009 we observe for all four CENTROPE countries a sluggish development of both employment and wages per employed, leading to a growth of aggregate wages that is lower than the growth of GDP. Certainly, the current economic environment is not conducive to large increases in wages and/or employment. With that, however, comes an equally weak growth in aggregate consumption at least in 2012, and it looks like as some more time is needed for the CENTROPE economies to gain back their stability and self-confidence to allow for a higher growth in wages and employment and as a consequence domestic consumption levels.

Figure 2.3: Compensation of employees, in % of GDP
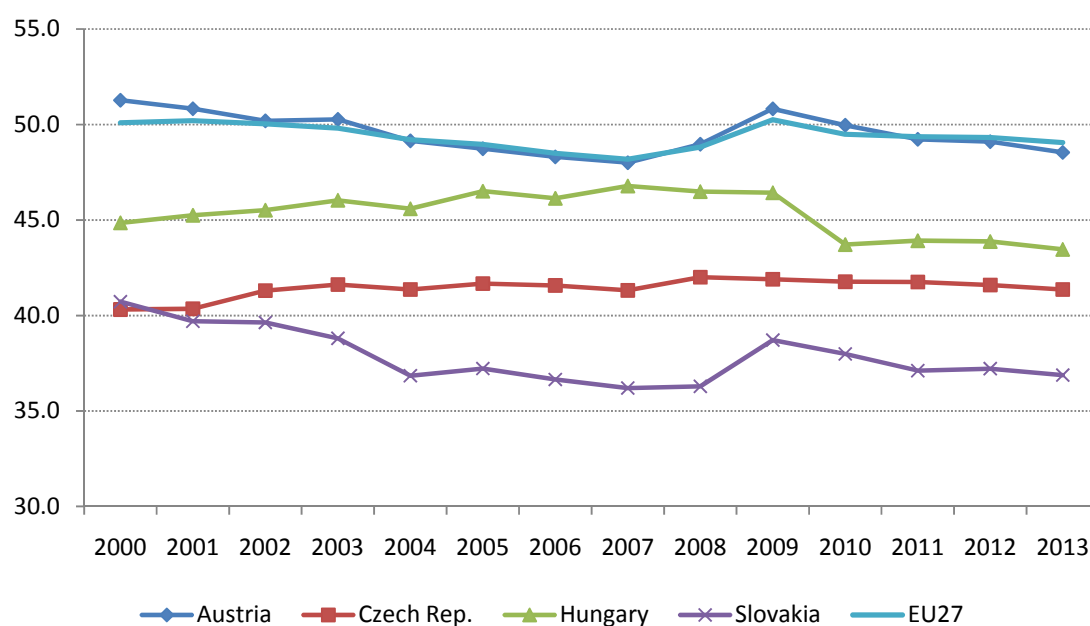
Source: AMECO Database, EU-Commission DG ECFIN, Autumn 2011.

With respect to the employment situation, the labour markets tended to improve in all CENTROPE countries except Hungary until 2009. Thus, employment rates (figure 2.4) tended to increase, though being still at relatively low levels in Slovakia and especially Hungary, while unemployment (figure 2.5) tended to fall, in all countries but Hungary. In part the reduction of unemployment was impressive as in the case of Slovakia, where the unemployment rate fell by around 10 percentage points between 2001 and 2008. The crisis interrupted this process and basically reversed the progress made in earlier years. As a consequence unemployment rates increased everywhere immediately after the crisis but tended to stabilise in 2011. For the employment rates only data until 2010 are available, so that we can see only the directly crisis related effects. However expectations are that, in correspondence with the development of the unemployment rate, employment rates have stabilised in 2011.

Figure 2.4: Employment rate, Labour Force Survey, population aged 15-64
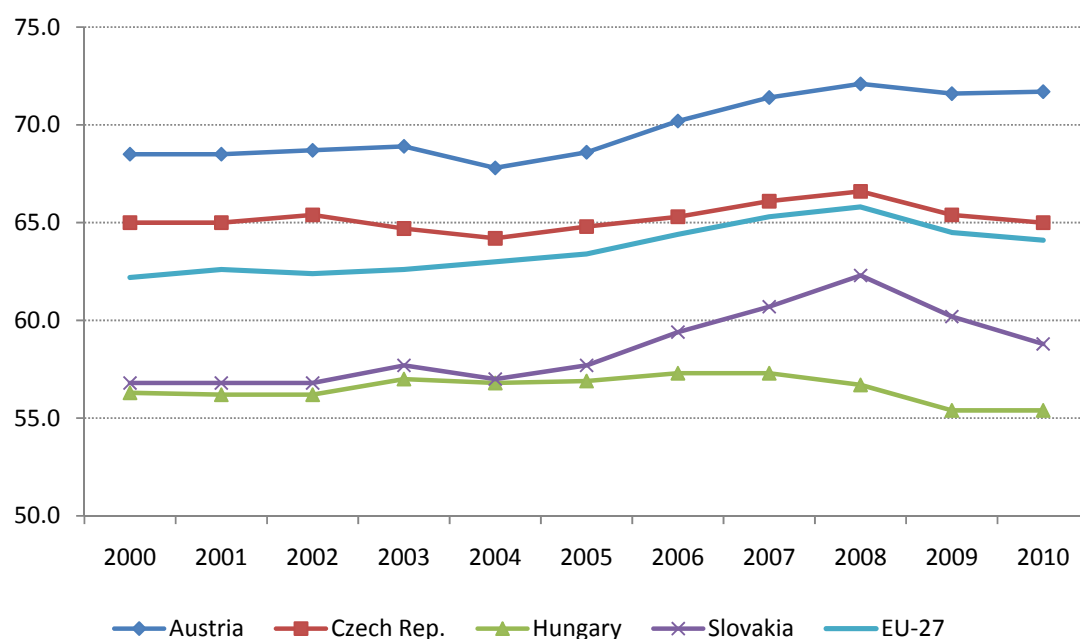
Source: Eurostat.

Figure 2.5: Unemployment rate, Labour Force Survey, population aged 15-74
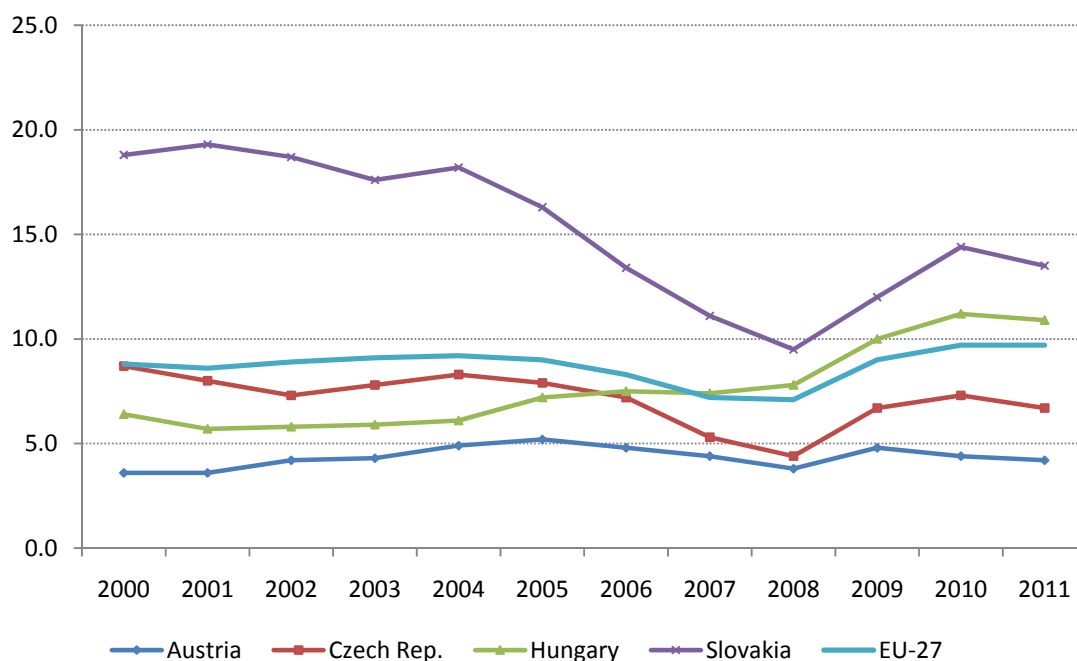
Source: Eurostat.

Finally we take a short look on the savings behaviour of households, as it is indicative of the extent to which households smooth their consumption during (short run) economic downturns and thus help to also smooth overall GDP fluctuations. The underlying hypothesis in this respect is that households tend to keep up their usual consumption patterns during periods of low income growth by reducing the amount they save out of their income. As figure 2.6 shows such a smoothing behaviour seems to be present only in Austria and to some extent in Hungary. There household savings declined in the aftermath of the crisis, partly to keep up consumption levels or in Hungary potentially also because of the strained situation regarding private and household debt. By contrast in the Czech Republic and Slovakia household savings increased (in terms of GDP) after the crisis, which in part explains why private consumption did not grow or even declined in these countries and thus had no positive impacts on GDP growth.

Figure 2.6: Household savings, in % of GDP
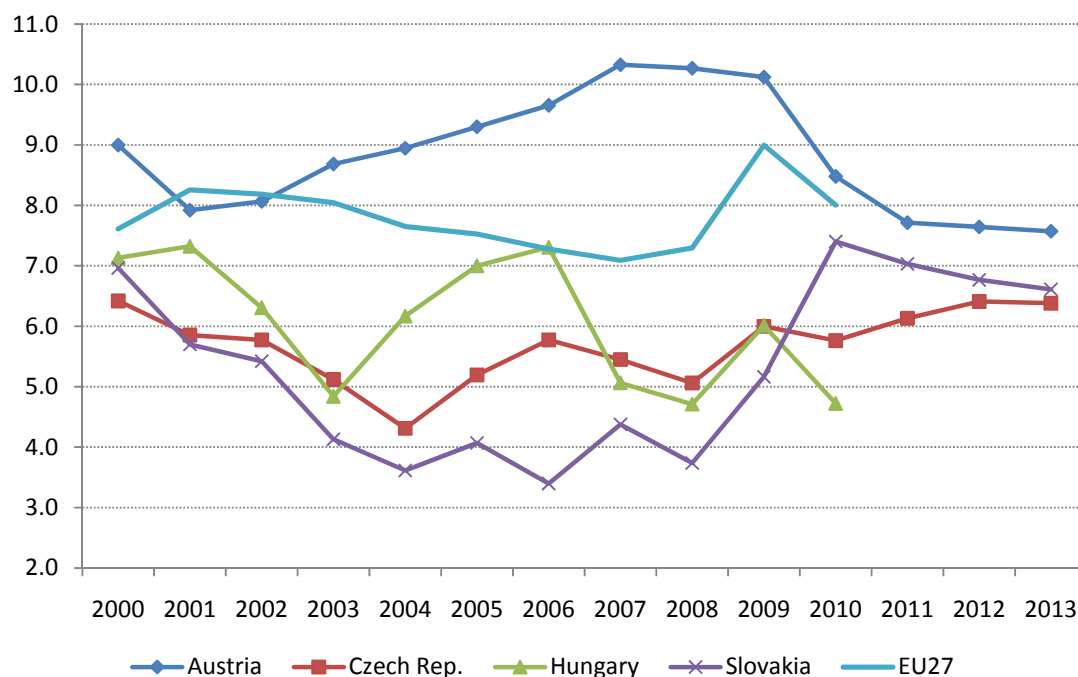
Source: AMECO Database, EU-Commission DG ECFIN, Autumn 2011.

2.2.3. Government debt and deficit levels keep public consumption and investment low

The year 2009 and the following years were marked by high public deficits in the CENTROPE countries, except for Hungary that through one-off effects achieved a temporary budget surplus in 2011. Budget deficits are around 3% to 8% of GDP in 2010 and 2011 and the outlook for the coming years suggests only a moderate decline. Generally, the expected economic slowdown in 2012 will not help to reduce the deficits further. At the same time the rising debt levels urged CENTROPE governments to approve austerity packages to keep budgets somewhat under control and the financial markets happy, yet this also limits public policy options to stimulate the economy. Consequently the level of public consumption and investment is expected to remain low over the coming years. Still, the projections show that despite the curtailing of public expenditures the public debt levels in the CENTROPE countries are going to rise, as economic growth,

which has shown to be a reasonable way to reduce debt levels in other countries, remains to be low for the coming years.

Table 2.4:   **Government deficit and debt, in % of GDP**

	Deficit													
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Austria	−1.7	0.0	−0.7	−1.5	−4.4	−1.7	−1.5	−0.9	−0.9	−4.1	−4.4	−3.4	−3.1	−2.9
Czech Rep.	−3.6	−5.6	−6.5	−6.7	−2.8	−3.2	−2.4	−0.7	−2.2	−5.8	−4.8	−4.1	−3.8	−4.0
Hungary	−3.0	−4.1	−9.0	−7.2	−6.4	−7.9	−9.3	−5.1	−3.7	−4.6	−4.2	3.6	−2.8	−3.7
Slovakia	−12.3	−6.5	−8.2	−2.8	−2.4	−2.8	−3.2	−1.8	−2.1	−8.0	−7.7	−5.8	−4.9	−5.0
EU 27	0.6	−1.5	−2.6	−3.2	−2.9	−2.5	−1.5	−0.9	−2.4	−6.9	−6.6	−4.7	−3.9	−3.2
	Government debt													
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Austria	66.2	66.8	66.2	65.3	64.7	64.2	62.3	60.2	63.8	69.5	71.8	72.2	73.3	73.7
Czech Rep.	17.9	23.9	27.1	28.6	28.9	28.4	28.3	27.9	28.7	34.4	37.6	39.9	41.9	44.0
Hungary	56.1	52.7	55.9	58.3	59.1	61.7	65.9	67.0	72.9	79.7	81.3	75.9	76.5	76.7
Slovakia	50.3	48.9	43.4	42.4	41.5	34.2	30.5	29.6	27.8	35.5	41.0	44.5	47.5	51.1
EU 27	61.9	61.0	60.4	61.9	62.3	62.8	61.5	59.0	62.5	74.7	80.3	82.5	84.9	84.9

Source: AMECO Database, EU-Commission DG ECFIN, Autumn 2011.

2.2.4. Low business confidence and difficult financing situation have negative effects on private investment.

Over the coming years private investment is going to exert only weak positive impulses to GDP growth in the CENTROPE countries. One reason for this is a deterioration of the business confidence level indicating a worsening of the investment climate (see figure 2.7). After the crisis in 2009, when business confidence was at its lowest levels for years, it recuperated relatively quickly up to the point where the sovereign debt crisis including rising uncertainties about the sustainability of the Euro were on the horizon. From that point on business confidence tended to decline, reaching its temporary minimum around the end of last year. The latest numbers suggest that confidence has stabilised at relatively low levels given a considerable extent of uncertainty regarding future developments. Overall this tends to keep private investment levels low in the CENTROPE countries.

Figure 2.7: Business confidence indicator
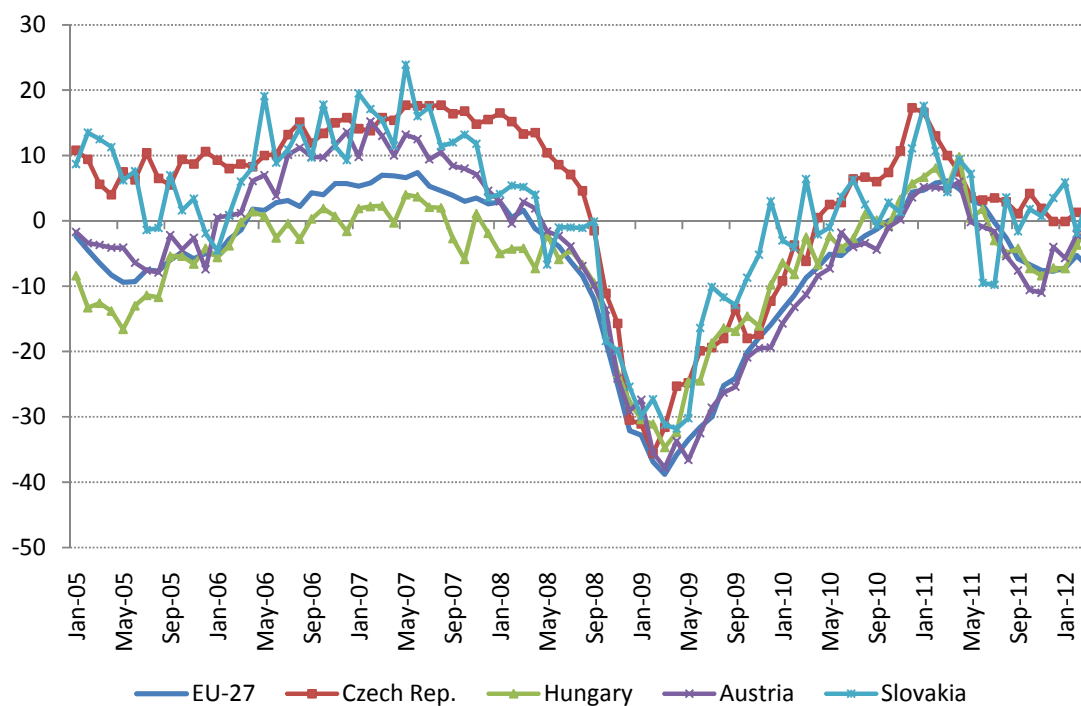
Source: EU-Commission, DG ECFIN.

Another factor that limits private investment is the difficult financing situation of private companies in the CENTROPE countries. To illustrate this we use information on the private debt levels (of companies and households), as unlike in the US or the UK, where the main form of company financing is through capital markets, the main form of finance in Central Europe is via the banking system. Thus, the crisis related shocks to the banking systems led to widespread attempts of commercial banks to deleverage, which has some severe repercussions on the real sector as companies find it more difficult to finance their operations and investments via bank loans.

Table 2.5:   Private debt in % of GDP

Czech Republic						
	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Private debt	68.6	72.1	78.3	76.4	84.8	85.1
Private debt (loans)	63.0	66.5	72.6	69.6	76.4	75.8
Non-financial corporations	36.8	38.4	38.6	36.9	38.2	38.2
Other financial intermediaries*	6.9	6.7	7.8	6.8	7.3	6.4
Financial auxiliaries,	1.6	0.9	1.0	1.0	0.8	0.5
Insurance corporations and pension funds	0.1	0.0	0.0	0.0	0.0	0.0
Households; non-profit institutions serving households	17.6	20.4	25.2	24.9	30.1	30.7
Private debt (securities other than shares)	5.6	5.6	5.7	6.9	8.4	9.4
Hungary						
	2005	2006	2007	2008	2009	2010
Private debt	98.0	112.4	120.5	144.2	166.1	144.1
Private debt (loans)	95.9	110.2	118.4	141.8	163.9	141.1
Non-financial corporations	64.7	73.6	78.7	96.0	112.9	91.6
Other financial intermediaries*	8.0	8.9	9.6	11.2	11.3	10.1
Financial auxiliaries,	0.1	0.2	0.1	0.0	0.0	0.0
Insurance corporations and pension funds	0.0	0.0	0.0	0.1	0.1	0.1
Households; non-profit institutions serving households	23.0	27.5	30.0	34.6	39.6	39.3
Private debt (securities other than shares)	2.1	2.1	2.1	2.4	2.2	3.0
Slovakia						
	2005	2006	2007	2008	2009	2010
Private debt	55.7	63.5	63.2	70.0	73.1	72.4
Private debt (loans)	44.9	53.3	54.7	64.5	68.9	67.7
Non-financial corporations	23.0	25.5	25.2	30.3	30.0	28.7
Other financial intermediaries*	5.4	5.7	4.8	4.7	3.8	3.0
Financial auxiliaries,	.	.	.	.	.	.
Insurance corporations and pension funds	0.1	0.1	0.1	0.1	0.1	0.1
Households; non-profit institutions serving households	16.4	22.0	24.7	29.4	35.0	35.9
Private debt (securities other than shares)	10.8	10.2	8.5	5.5	4.2	4.7
Austria						
	2005	2006	2007	2008	2009	2010
Private debt	145.5	150.9	152.2	160.1	167.8	167.5
Private debt (loans)	131.0	136.9	137.3	144.6	149.1	147.7
Non-financial corporations	67.3	67.2	69.0	72.3	76.4	76.5
Other financial intermediaries*	8.6	14.2	13.5	16.7	15.2	13.9
Financial auxiliaries,	0.0	0.0	0.0	0.0	0.0	0.0
Insurance corporations and pension funds	1.0	1.0	1.0	1.0	1.0	0.6
Households; non-profit institutions serving households	54.1	54.5	53.8	54.6	56.5	56.8
Private debt (securities other than shares)	14.5	14.0	15.0	15.5	18.7	19.8

Source: Eurostat, national statistics, wiiw. – * except insurance corporations and penison funds.

Concerning the CENTROPE countries this deleveraging process is especially strong in Hungary. To illustrate, table 2.5 indicates a strong reduction in loans to non-financial corporations in Hungary, from a level of around 113% of GDP in 2009 to around 92% in 2010. In contrast to the pre-crisis period where there was a constant build up of debt, the year 2009 brought a significant change in the financing environment for Hungarian firms as commercial banks became much more reluctant to lend money in order to consolidate their balances. Such a process occurred also in the other CENTROPE countries, but obviously to a much lesser extent, as the level of company loans decreased but only by a margin.

To some extent these differences in financing conditions between Hungary and the other three CENTROPE countries is also reflected in the behaviour of private investment analysed above, as Hungary is the only country where in 2010 and 2011 private investment decreased, while in the other countries it kept growing, if only slightly.

2.2.5. Devaluation of the currency and decreasing unit labour costs support Hungary's exports

As shown above foreign demand for the exports of the CENTROPE countries is an important source for economic growth, especially for Hungary and to a lesser extent also for the Czech Republic and Slovakia. A key factor for this are the developments of the exchange rate. As the main trading partner of the CENTROPE country is the EU 27 and especially Germany we concentrate on the exchange rate vis-à-vis the Euro and that is on the Czech Republic and Hungary only (see figure 2.8). From this point of view it can be seen that exchange rate developments clearly favoured Hungarian exports, as the Hungarian Forint tended to be in a constant process of devaluation after the crisis, making Hungarian exports cheaper and at the same imports more expensive and thus – ceteris paribus – leading to an improvement in the trade balance. By contrast the Czech currency tended to appreciate between 2008 and 2009, stayed constant for a number of subsequent quarters and only during the last month a further appreciation was observed.

Though this might have reduced Czech exports, the Czech Republic is still a net exporting country, which indicates a fairly high degree of competitiveness. This is corroborated by the fact that during the same period of the time the Czech unit labour costs (see figure 2.9), which is another indicator of price competitiveness, tended to increase in the Czech Republic. The same holds for Slovakia. Thus both countries were able to remain

competitive on European or global markets despite a rise in production costs. By contrast, in Hungary the decline of the unit labour costs gave an additional boost to the country's exporting sector so that as a result net exports will grow strongly in 2012 and thus provide at least one source of economic growth for the Hungarian economy.

Figure 2.8: Exchange rate development, index: 2007 = 100
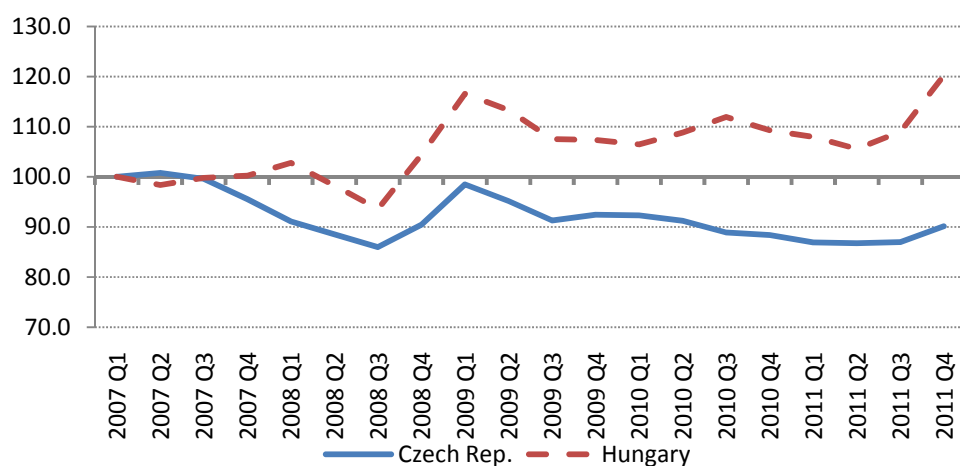
Source: wiiw.

Figure 2.9: Real unit labour costs, relative to 35 industrial countries, index: 2000 = 100
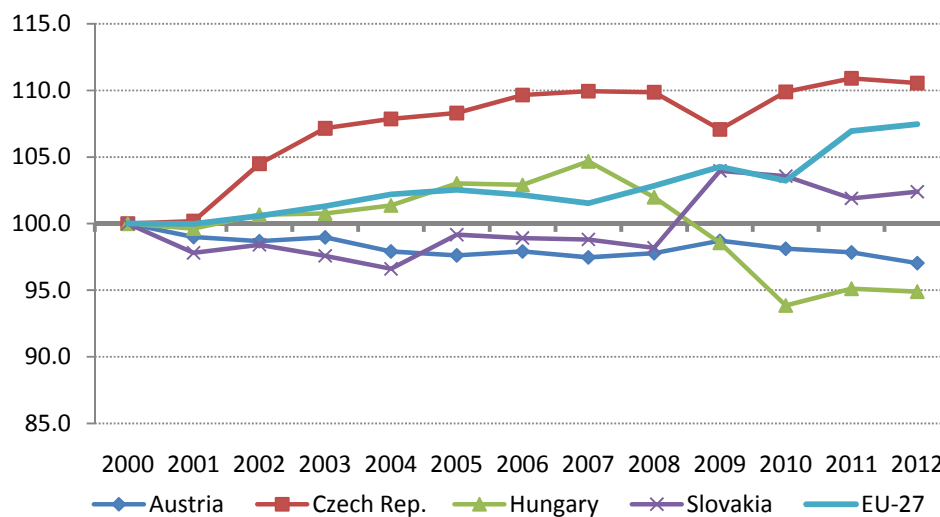
Source: wiiw.

2.3.Conclusions

A country level analysis therefore highlights the difficult macro-economic environment in which the CENTROPE countries are currently operating. The economic crisis, culminating in a quite dramatic recession in 2009, left its traces, and the recuperation phase in 2010 and 2011 appears to be of little stability. Thus, after the economic downturn in 2009 in all four countries of CENTROPE the economy started to grow again in 2010, and continued to do so in 2011. Still, economic recovery was quite differentiated between the individual countries. Slovakia tended to grow fastest, at over 4% per year in terms of GDP in 2010, and thus by around 1.5 to 2 percentage points ahead of the Czech Republic and Austria and by almost 3 percentage points faster than Hungary. For 2011 estimates are that recovery continued, though a bit slower than the year before in the Czech Republic and Slovakia (by around 1 percentage point in each country), while in Austria and Hungary economic growth in 2011 was, if in the latter case only slightly, higher than in 2010.

As a matter of fact, growth prospects in the last quarter of 2011 already started to deteriorate, due to a softening of global demand, widespread fiscal consolidation measures as a more or less rational reaction to the sovereign debt crisis, a tightening of credit conditions and a generally low level of consumer and business confidence. As a consequence current forecasts suggest that economic growth in the CENTROPE countries will be anaemic in 2012. Again, Slovakia will be the fastest growing country, but still GDP is expected to grow only by around 1.5%. Austria and the Czech Republic will see some positive economic growth, at around 0.5% on a year by year basis, while the Hungarian economy is bound to decline by 1%.

For 2013 more stability in financial as well as global markets is expected, which should have some positive impacts on the confidences levels, leading to higher growth of GDP, fuelled by a rebounding consumption and investment demand as well as by an increase in net exports. Consequently, GDP growth is expected to be around 2% to 3% in the EU 10-CENTROPE countries and around 1.4% in Austria.

One source of the weak growth in 2012 is the low level of internal demand. Consumer and business confidence currently is low (despite some improvements in the latest months), which might depress investment and consumption expenditures. Additionally, employment levels are decreasing – and unemployment levels increasing – leading to a reduction in aggregate wages, which also dampens private consumption. Contrastingly counter-cyclical

movements of household savings, as households tend to smooth their consumption over the business cycle, keep demand levels from falling too low. At the same time financing conditions for enterprise investments are much more difficult than before the crisis given the commercial banks' attempts to deleverage. In sum this will result in low growth of both, private consumption and private investment levels in CENTROPE in 2012, whereby in Hungary even a decline is projected.

No economic stimulus is to be expected from the government side, as all CENTROPE countries' governments are running austerity packages, quite independent of the fact of whether the countries have low levels of debt, like Slovakia and the Czech Republic, or whether such a package could be assumed to be more in place, like in Hungary and Austria. In any case the consequence of this is a low growth or even a decline in public consumption and investment in 2012.

Finally foreign demand is subdued due to a weakening of global markets, so that the contributions from net exports to GDP are in most cases moderate, too. The exception to this is Hungary, where a devaluating currency plus an improvement in unit labour cost (relative to the main competitor countries) is beneficial for the exporting sector, so that as a result net exports will grow strongly in 2012 and are also the only source of economic growth of the Hungarian economy in this year.

3. Economic Development of the CENTROPE Region

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The business cycle analysis of the CENTROPE region in the 2010 Regional Development Report 2010 was limited to some extent by severe data constraints. In the current report data for most of the macroeconomic indicators (e.g. GDP, Gross value added etc.) are available for at least up to 2009 with additional preliminary estimates available for 2010 to 2011 and forecasts reaching until 2014. This makes it possible to analyse and interpret the impact of economic and financial crisis on the CENTROPE region, as well as individual regions of CENTROPE. The chapter focuses on an analysis and interpretation of recent developments in CENTROPE with an emphasis on GDP, GVA, productivity and labour market developments. We put particular emphasis on the developments in the years 2009 to 2011 which have not yet been analysed in the CENTROPE Regional Development Report project. For 2009 we have final data on GDP available from EUROSTAT sources, while for the time period 2010 to 2011 we use preliminary data available from Cambridge Econometrics. For labour market data, by contrast we have official series available from EUROSTAT until 2010 for most indicators. Great care was also taken to provide NUTS 3-data wherever possible. In some cases, where important information was available on NUTS 2-level only (with respect to wage developments and some information on the structure of unemployment), we, however decided to also use this information.

Figure 3.1: GDP per capita 2009 at PPS by NUTS 3-regions in the CENTROPE
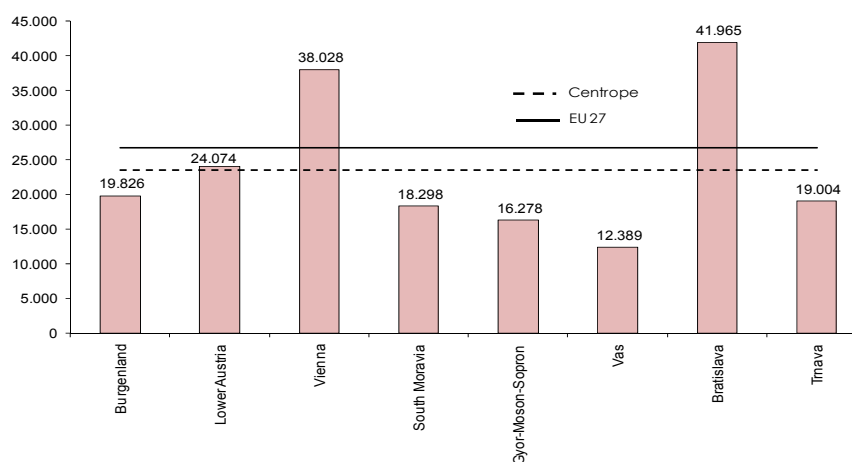
Source: Eurostat, own calculations.

3.1. Economic Growth

Relative to 2007 GDP per capita at PPS increased in all regions of CENTROPE with the exception of Vienna and the Slovak region of Trnava until 2009. The most significant growth has been recorded in the Bratislava region, which is reflected in the highest level of GDP per capita at PPS in the whole CENTROPE region. Due to the impact of economic and financial crisis, especially the Trnava region recorded a decline of GDP per capita in PPS from €20,402 to € 19,004 in 2009. The decline in the Trnava region has been caused by a decline in the main industrial sectors especially the automotive sector. The decline in foreign demand of major trading partners was only temporary and already in 2010 and 2011 export industry had recovered again.

Figure 3.2: GDP per capita 2011 at PPS by NUTS 3-regions in the CENTROPE (preliminary forecast)
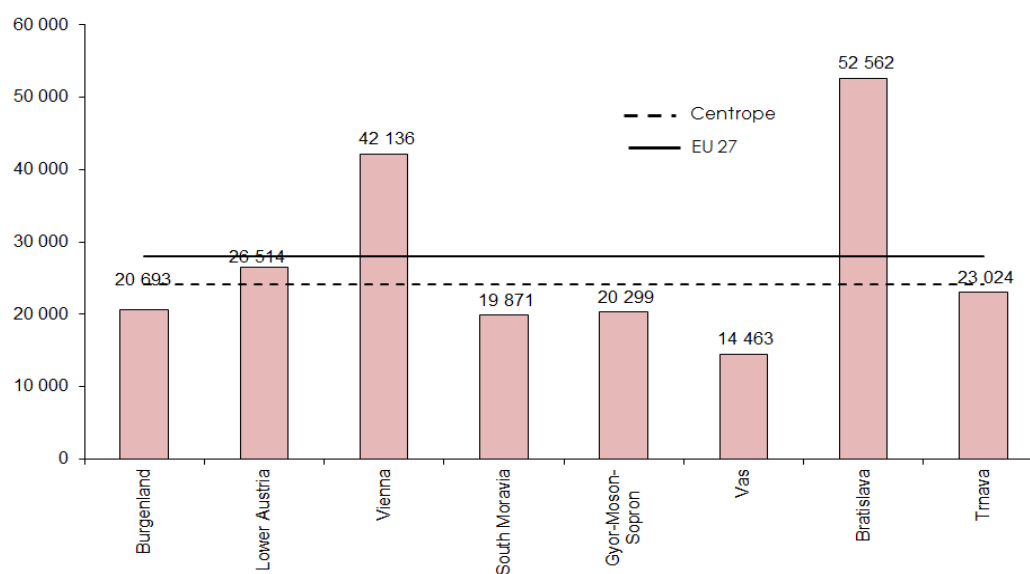
Source: Eurostat, Cambridge Econometrics, own calculations.

This is also supported by preliminary estimates of the GDP per capita in PPS level in 2011, where all of the regions of the CENTROPE recorded and increase relative to 2009 (figure 3.2). The growth rate in the CENTROPE region remains still well above the EU-average. For example in the period of 2004 – 2009 the CENTROPE region has grown by an average of 3.0% compared with 2.1% in the EU 27-average.

Furthermore, a more detailed look at the individual CENTROPE regions suggest that the best performing regions are located in the Slovak Republic. Between 2004 to 2009 nominal GDP of Bratislava grew by an impressive 9.1% and Trnava region by 8.1%. By contrast, the region of Vas experienced a decline. Since 2004, that is even in the pre-crisis period Vas has recorded declines in nominal GDP per capita (figure 3.3).

The start of the economic and financial crisis in 2008 manifested itself in a general decline of average nominal growth rates of GDP in all of the individual CENTROPE regions. The negative economic development in the world economy started to become noticeable in CENTROPE at the end of 2008 and beginning of 2009 and also had a noticeable influence also on the development in subsequent years. However, due to existing economic disparities within CENTROPE the impact of crisis and the subsequent recovery different substantially among individual CENTROPE regions (figure 3.3).

Figure 3.3: Nominal GDP growth in the CENTROPE by NUTS 3-regions 1996-2011

Average annual change in%

	Burgen-land	Lower Austria	Vienna	South Moravia	Gyor-Moson-Sopron	Vas	Bratislava	Trnava		Centrope	EU average
1996/2000	5,5	5,8	4,6	2,0	12,3	7,9	6,5	4,7		5,1	5,7
2000/2004	4,2	2,8	2,6	5,0	3,3	3,2	7,0	6,8		3,6	3,6
2004/2009	1,4	2,0	1,1	4,6	1,0	-2,4	9,1	8,1		3,0	2,1
2009/2011	1,7	2,2	2,3	1,1	3,4	-1,3	5,3	3,3		2,4	1,9
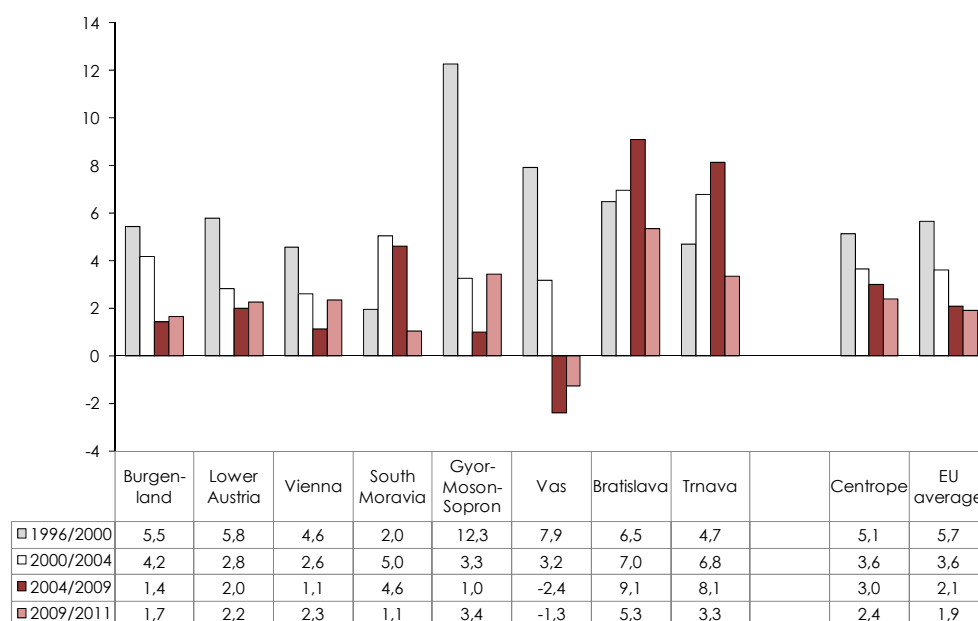
Source: Eurostat, Cambridge Econometrics, WIFO-calculations, Note figure shows average annual growth of GDP at market prices. Data for 2010 and 2011 based on preliminary estimates.

For example, as already in the previous period (2004-2009) the region of Vas experienced negative economic growth in from 2009 to 2011. This reduction was, however, lower by

1.1 percentage points than the decline before the crisis. By contrast the other Hungarian CENTROPE region of Györ-Moson-Sopron grew throughout the whole last decade and experienced a substantial increase in growth in 2009 to 2011. This suggests that the problems of the Hungarian economy in the last years were much more strongly felt in Vas, which generally is slightly more rural, than in Györ-Moson-Sopron, where a larger share of more modern and export oriented industries are located (Rozmahel et al. 2010).

Similar observations also apply to the Austrian regions of CENTROPE. They too recorded higher average nominal growth rates in the post crisis period than before the crisis, and thus proved to be more resilient to crisis than other parts of CENTROPE.

By contrast South Moravia and the Slovak regions of CENTROPE grew at substantially lower rates in the post crisis period (2009 – 2011) than before. But despite this effect of the financial crisis, the Slovak regions have been able to maintain their well above average nominal growth rates, both relative to the CENTROPE and EU average.

In aggregate, therefore, the average growth of CENTROPE was higher than the EU average both before the crisis (2004-2009) as well as after (2009-2011). In the most recent period, however – based on preliminary data – the growth rate advantage of CENTROPE over the EU 27-average reduced slightly. Between 2004 and 2009 CENTROPE grew by 0.9 percentage points faster than the EU-average, between 2009 and 2011 this advantage was only 0.5 percentage points.

The development also suggests that the existing regional disparities measured by GDP per capita in PPS are still present. The economic performance of the urban (metropolitan) regions is still significantly better, with in particular Vienna showing a noticeably improved relative growth performance in the 2009 to 2011 period.[2] The rest of the individual regions are slowly converging to the EU and/or the CENTROPE average. Due to the specific nature of the two urban regions of Bratislava and Vienna this should, however, not be considered a significant problem. Most regions, with the exception Vas, have been able to remain on a long term positive growth trajectory even after the crisis, so that although growing at a slower pace the regions cannot be said to have seen a fundamental shift in their long term growth perspectives. This also applies to trends in regional differentiation. As already mentioned in the previous RDR report, the division line between Austrian and

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[2] This is primarily due to the fact that Vienna was already less strongly affected by the crisis in 2009, on account of a low share of export intensive industries.

new member state regions in CENTROPE is becoming increasingly blurred, the second division line – between large urban agglomerations, industrial regions and rural–peripheral regions – is becoming increasingly important (Rozmahel, et al, 2010). Again this tendency has continued on in the years since 2008 on account of the rapid growth of Bratislava and the improved performance of Vienna.

3.1.Productivity

The impact of the economic and financial crisis has also significantly influenced labour productivity as measured by GDP at market prices per person employed. In pre-crisis period from 2004 to 2008 labour productivity in CENTROPE grew by an average of 3.5%. In the period 2004 to 2011 productivity growth slowed down to only 0.5% in average, and was even slightly below the EU-average in this period. This thus suggests that labour productivity growth has reduced substantially in CENTROPE since the times of economic crisis.[3] Again, the contribution of Slovak regions and Vienna helped to offset the negative development in the rest of CENTROPE and contributed to positive average productivity growth of CENTROPE in this period. The strongest average growth was recorded in Bratislava region (2.0%), Trnava region (1.1%) and Vienna (0.1%). The rest of the regions experienced stagnation or even a decline (in Vas by 2.1% and in Burgenland by 0.2%). In the case of Slovak regions, the increase of labour productivity has been achieved due to the reduction of jobs especially in the export oriented industries in 2009.

The average productivity levels of CENTROPE in percent of the EU-average reached 103.1% in the period 2004-2008. Preliminary estimates, however, suggest that since the crisis the catch-up process of CENTROPE has become much slower and the preliminary estimates presented in table 3.1 suggest that this process has been reversed recently. In 2004-2008 the CENTROPE region recorded an increase by 2.8 percentage points in productivity relative to the EU-average. In the following period 2008-2011 labour productivity relative to the EU-average in the CENTROPE decreased by 0.2 percentage points. [4]

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[3] This is primarily due to the impact of 2009. In chapter 4 we show that productivity growth was higher than the average by 0,1 percentage point than the EU-average.

[4] It should be pointed out that this finding is based on estimates only, and that other sources (e.g. those used in the next chapter) indicate a slightly above average productivity growth (of 0.1 percentage points above average). All sources used, however, suggest that the productivity catch-

Again, only the Slovak regions experienced convergence to the EU-average. The Bratislava region grew by 1.7 percentage points and Trnava region by only 0.5 percentage points in 2008-2011 (table 3.1). By contrast the Austrian regions and Vas were most strongly affected by the economic crisis. Despite this, however, the Austrian regions Lower Austria and Vienna together with Bratislava still have a labour productivity levels above the EU-average, while all other regions are below it.

Table 3.1:   Productivity* development in the CENTROPE 2002-2007 by NUTS 3-region

	2004	2008		2004-08	2008-2011
	Absolute			Average annual growth	
South Moravia	31.578	39.253		5,6	−0,0
Györ-Moson-Sopron	38.784	42.579		2,4	−0,0
Vas	30.749	33.339		2,0	−2,1
Burgenland	46.777	48.427		0,9	−0,2
Lower Austria	53.127	58.219		2,3	−0,0
Vienna	68.065	72.515		1,6	0,1
Bratislava region	43.898	59.612		8,0	2,0
Trnava region	33.809	49.743		10,1	1,1
CENTROPE	49.343	56.538		3,5	0,5
EU-average	49.182	54.848		2,8	0,6
	EU=100			Change in percentage points	
South Moravia	64,2	71,6		7,4	−0,5
Györ-Moson-Sopron	78,9	77,6		−1,2	−0,7
Vas	62,5	60,8		−1,7	−2,6
Burgenland	95,1	88,3		−6,8	−2,2
Lower Austria	108,0	106,1		−1,9	−2,1
Vienna	138,4	132,2		−6,2	−2,0
Bratislava region	89,3	108,7		19,4	1,7
Trnava region	68,7	90,7		21,9	0,5
CENTROPE	100,3	103,1		2,8	−0,2

Source: Eurostat, Cambridge Econometrics, WIFO-calculations, *GDP at market prices per person employed. Note: 2002 is the first year where data is complete for all NUTS 3-regions in the EU.

up process that has characterized the growth performance of the CENTROPE for most of the 2000s has slowed down substantially in the period since 2008.

Figure 3.4: The contribution of productivity and employment growth to GDP growth by NUTS 3-regions of the CENTROPE (in percentage points)

2004-2008

■ Productivity   ■ Employment

2008-2011
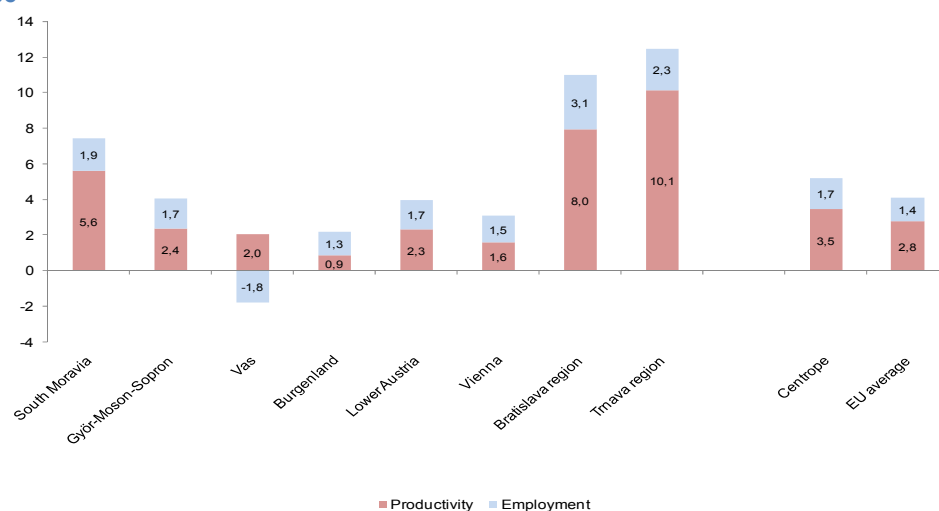
■ Productivity   ■ Employment
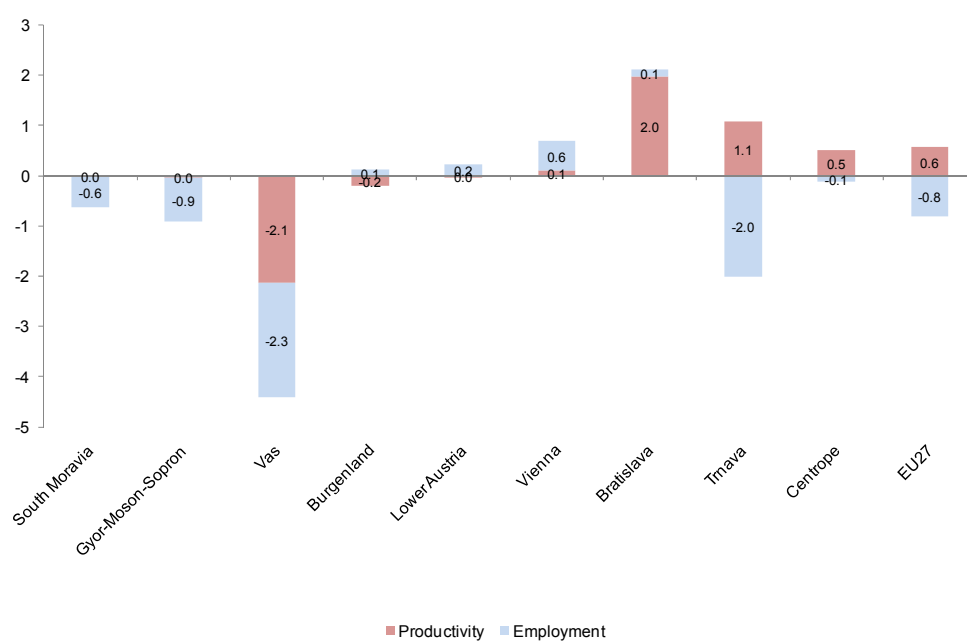
Source: Eurostat, Cambridge Econometrics, WIFO-calculations, Productivity=GDP at market prices per person employed.

The negative development in labour productivity are also reflected in the contribution of productivity and employment growth to aggregate GDP growth. In 2004 – 2008 productivity growth still contributed more to aggregate GDP growth than employment growth in all of CENTROPE regions except Vas and Burgenland. In 2008 – 2011 employment growth negatively contributed to GDP growth in South Moravia, the Hungarian CENTROPE and in Tranava (figure 3.4). The strongest contribution of productivity growth to GDP growth was recorded in Bratislava region (2.0 percentage points) and Trnava region (1.1 percentage points) followed by Vienna (0.1 percentage points).

Table 3.2:   Compensation per Employee (in € per year) by NUTS 2-regions in the CENTROPE

	2004	2008		2004-2008	2008-2011
	Absolute			**Average annual growth**	
Burgenland	30,537	33,189		2.1	2.1
Lower Austria	32,524	36,125		2.7	2.1
Vienna	40,019	45,198		3.1	2.0
South East	8,751	14,464		13.4	1.5
West Transdanubia	10,149	11,876		4.0	0.6
Bratislava region	9,633	16,829		15.0	9.7
Western Slovakia	6,279	11,052		15.2	6.7
CENTROPE	20,255	24,908		5.3	.
	Purchasing power corrected			**Change in percentage points**	
Burgenland	29,415	30,434		0.9	
Lower Austria	31,329	33,130		1.4	
Vienna	38,549	41,451		1.8	
South East	16,449	19,779		4.7	
West Transdanubia	17,041	18,043		1.4	
Bratislava region	18,824	25,633		8.0	
Western Slovakia	12,271	16,834		8.2	

Source: Eurostat, Cambridge Econometrics, WIFO-calculations. – Note: Top panel of table reports figures at market prices, bottom panel reports compensation per employee adjusted by the ratio of GDP at market prices to GDP at purchasing power standards.

3.2. Compensation of employees

The nominal compensation per employee implies that there are still substantial differences among the individual CENTROPE regions. Although this indicator is available only on NUTS 2-level, it still provides important information on the still existing significant wage differences within CENTROPE. In nominal terms the Austrian CENTROPE is still well ahead the rest of the average of CENTROPE. The difference is especially visible in the case of Bratislava region and Vienna. Although there is convergence in terms of GDP and productivity, the level of convergence related to nominal compensation per employee is still lagging behind. In nominal terms the average growth of compensation per employee was highest in the Slovak CENTROPE since 2009. Especially Bratislava region grew with an average growth rate of 9.7% followed by Western Slovakia (by 6.7%) between 2008 and 2011. By contrast, wages in West Transdanubia have lost momentum and the average nominal compensation per employee recorded only a modest (0.6%) increase in the period from 2008 to 2011. In the case of Austrian regions, the average annual growth remained relative stable, with the exception of Vienna, where the annual growth rate declined by 1.1 percentage points in 2008 – 2011 relative to 2004 – 2008.

While, the top part of the table calculates the wages at current exchange rates and does not account for the substantial purchasing power differences in new member states. The adjustment by the differences in purchasing power parity as in the bottom part of table 3.2, suggests that purchasing power differences can explain only part of the wage differentials. Even after this correction the average employee in the region with the highest purchasing power adjusted compensation per employee of the EU 10-parts of CENTROPE (Bratislava region) earns only about 62% of the amount earned by an employee in the Austrian CENTROPE with the highest purchasing power adjusted compensation per employee being reached in Vienna. In general the economic crisis resulted in decrease of average annual growth of compensation per employee especially in EU 10-parts of CENTROPE, although again the Slovak CENTROPE has been somewhat of an exception, since also nominal wage growth remained high in the Slovak CENTROPE also after crisis.

3.3. Gross value added

According to Eurostat methodology the gross value at market prices is output at market prices minus intermediate consumption at purchaser prices; it is a balancing item of the national accounts' production account. GVA can be broken down by industry. The sum of

GVA at basic prices over all industries plus taxes on products minus subsidies on products gives gross domestic product. Gross value added of the total economy usually accounts for more than 90% of GDP. By subtracting consumption of fixed capital from GVA the corresponding net value added (NVA) is obtained. NVA can also be measured at producer prices or basic prices or factor costs.

Until 2007 the CENTROPE as a whole can be characterized as a region with high growth rates of GVA, employment and productivity whereby all indicators showed tendencies of convergence and little sign of any negative impact of enlargement on regional development on any part of the region. However, at the end of 2008 and throughout 2009, the worldwide economic crisis also hit CENTROPE (Rozmahel et al., 2010).

The impact of economic and financial crisis on sectoral growth of GVA in the CENTROPE region is shown in table 3.3. The table is divided in two time periods, reflecting the development patterns during the crisis according to preliminary data for 2008-2011 and forecasts for the development 2011 to 2014.

Table 3.3: Average annual predicted sectoral growth of GVA in CENTROPE (2008-14, NUTS 3-level, in%)

	Agriculture		Manufacturing		Construction		Personal Services[2]		Financial Services[3]		Non-Market Services[1]	
	2008-2011	2011-2014	2008-2011	2011-2014	2008-2011	2011-2014	2008-2011	2011-2014	2008-2011	2011-2014	2008-2011	2011-2014
Burgenland	−0.6	0.3	0.2	4.3	−4.8	0.9	−0.9	0.8	1.2	1.6	1.4	−0.4
Lower Austria	−0.7	0.3	0.4	4.3	−4.7	1.0	−0.8	0.9	1.6	1.7	1.9	1.0
Vienna	−0.5	0.3	−0.1	4.1	−5.1	0.8	−0.8	0.9	1.4	1.7	2.8	2.1
South Moravia	9.4	−0.4	−3.3	3.6	1.0	3.8	0.0	5.0	0.5	4.2	0.1	1.3
Gyor-Moson-Sopron	−11.4	0.5	0.6	5.5	−1.8	4.1	−3.6	1.1	−0.6	1.3	−0.4	1.6
Vas	−12.2	1.6	−4.3	−0.2	−0.4	2.1	−2.6	1.7	−2.4	−0.5	0.0	2.0
Bratislava region	−2.2	1.0	−0.1	4.9	0.8	5.7	−0.8	4.1	6.2	4.2	6.0	3.2
Trnava region	−4.1	−0.3	−1.9	5.3	−3.1	1.9	−1.8	3.3	6.2	4.7	4.2	3.0
CENTROPE	−1.4	0.3	−0.4	4.3	−4.0	1.6	−0.8	1.6	1.7	2.0	2.5	1.8
EU	0.6	1.0	−1.4	3.1	−2.3	1.9	−0.4	2.5	0.2	2.6	0.9	1.0

Source: Cambridge Econometrics, WIFO-calculations. – *excluding extra-territorial organizations and bodies.
[1]) Public Administration, Education, Health Services, Other Public and Private Services, Private Households.
[2]) Trade, Hotels & Restaurants, Transport & Communication. [3]) including real estate.

The impact of the economic crisis differs substantially across individual sectors as well as individual CENTROPE regions. In 2008 – 2011 CENTROPE as an aggregate recorded negative growth of GVA in all sectors except financial services and non-market services. The most significant decrease in GVA was recorded in the construction sector (–4.0%) and in agriculture (–1.4%). Especially the Hungarian regions have been hard hit by the economic crisis in the agricultural sector (table 3.3). Also the Slovak regions, especially the Trnava region experienced negative growth of GVA in agriculture by –4.1% in this period. Surprisingly the South Moravian region experienced high growth of GVA by 9.4% in this period.

The impact of the crisis on manufacturing has again differed among the individual CENTROPE regions. From 2008 to 2011 the Austrian regions except Vienna maintained at least a minor growth of GVA. The most heavily affected regions were South Moravia (–3.3%), Vas (–4.3%) and Trnava region (–1.9%). However, the decrease of GVA growth in the CENTROPE region (–0.4%) was still below the EU-average (–1.4%). The predictions for 2011-2014 are even more optimistic. The CENTROPE region is expected to increase its GVA growth in manufacturing to 4.3% compared with 3.1% in the EU-average. The most significant increase is expected in all regions except the Hungarian Vas region.

Another most heavily affected sector during the crisis from 2008 to 2011 was the construction sector. Especially in the Austrian regions negative GVA growth was the highest of all CENTROPE regions. On the other hand, only South Moravia and Bratislava region maintained GVA growth in construction with 1.0% and 0.8% respectively. The negative GVA growth in construction was also higher than the EU-average (with –4.0% in CENTROPE compared to –2.3% in the EU). The forecasts for 2011-2014 predict a slight recovery of GVA growth in construction. Especially in the EU 10-parts of CENTROPE. This is especially visible in Bratislava region, Gyor-Moson-Sopron, South Moravia and Vas. In these regions the construction sector is also expected to grow faster than in the Austrian regions.

The development of the service sector in the 2008-2011 period, especially the personal services (Trade, Hotels & Restaurants, Transport & Communication), was negatively in all CENTROPE regions. The aggregate decline of GVA by -0.8% was 0.4 percentage points higher than the EU-average (–0.4%). The Hungarian regions Gyor-Moson-Sopron and Vas were among the most negatively affected regions in this period. The prediction for 2011-

2014 indicates a different pace of recovery in this sector. The South Moravian region and Slovak regions are expected to be the best performing regions in this period.

The financial services and non-market services are sector, by contrast, have been less affected by the economic crisis. In all individual regions of CENTROPE except the Hungarian regions, the growth of GVA remained positive from 2008 to 2011. The forecasts indicate that the positive growth of GVA in these service sectors is expected to continue also in the time period from 2011 to 2014.

In sum therefore crisis has been associated with substantial structural change, which, however, has followed rather different patterns in the individual regions of CENTROPE. The development of GVA by sectors shows the following development patterns:

- A significant impact of the crisis on agriculture in the Hungarian CENTROPE and Trnava region, construction in the Austrian CENTROPE and manufacturing in Vas, South Moravia and Trnava region.
- Tendencies towards recovery of sectoral GVA growth in 2011 – 2014, although with different rates in individual regions.
- A strong resilience of financial services and non-market services, which recorded positive GVA growth also during the crisis in all regions except the Hungarian regions and the highest growth rates in Bratislava and Trnava region .
- An adverse effect on personal services (Trade, Hotels & Restaurants, and Transport & Communication) of the economic crisis which should, however, be reversed according to forecasts for 2011 – 2014 especially in the Slovak and Czech parts of CENTROPE.

3.4. Forecasts

While therefore sector developments are rather mixed and show a great heterogeneity among regions, forecasts of the aggregate growth performance in terms of GVA at market prices as well as of employment growth, assume a continued although slightly smaller growth advantage of CENTROPE for the next years. According to Cambridge Econometrics GVA is expected to increase by 2.3% in 2012 in the CENTROPE aggregate in 2012 and by 2.4% in the two subsequent years. Therefore over the next three years a cumulated growth advantage of 0.1 percentage points over the EU 27-average is expected. Similarly, employment is expected to grow by 0.8% next year and by 1.1% in the

subsequent two years in the subsequent years in CENTROPE and therefore at an about equal rate as the EU-average in the next three years.

On a regional level these forecasts assume a growth rate of GVA in excess of 4% for the Slovak CENTROPE, of between 3% to 4% in South Moravia and Györ-Moson Sopron and of somewhere between 1% and 2% in the Austrian CENTROPE. So that the above average growth of the CENTROPE average is once more going to be solely due to rapid growth in EU 10-parts of CENTROPE. The only region with a very low growth rate forecast, however, is Vas. Employment growth rate forecasts differ from this pattern only in that employment growth in Austria is expected to be even lower than in Vas (table 3.4).

Table 3.4:   Forecast employment and GVA growth 2008-2014 (in %, NUTS 2-level)

	2012	2013	2014	ø 2012-14
GVA Growth[1]				
EUROPEAN UNION	2.1	2.3	2.4	2.3
CENTROPE	2.3	2.4	2.4	2.4
South Moravia	3.0	3.9	4.0	3.9
Gyor-Moson-Sopron	3.5	3.6	3.5	3.5
Vas	0.7	0.8	0.7	0.8
Burgenland	1.4	1.4	1.5	1.5
Lower Austria	2.1	2.1	2.1	2.1
Vienna	1.9	1.9	1.9	1.9
Bratislava region	4.1	4.3	4.2	4.2
Trnava region	4.3	4.4	4.5	4.5
Employment Growth				
EUROPEAN UNION	0.7	1.1	1.1	1.1
CENTROPE	0.8	1.1	1.1	1.1
South Moravia	0.7	1.0	1.0	1.0
Gyor-Moson-Sopron	1.0	1.6	1.5	1.5
Vas	0.8	1.6	1.6	1.6
Burgenland	0.4	0.4	0.4	0.4
Lower Austria	0.6	0.6	0.6	0.6
Vienna	0.7	0.8	0.8	0.8
Bratislava region	1.5	2.4	2.4	2.4
Trnava region	1.6	2.1	2.0	2.1

S: Cambridge Econometrics. – [1]) forecast growth rate of GDP at market prices, ø=average annual values.

3.5.Labour Market Development

3.5.1. Unemployment Rates

Also data on the labour market indicators of CENTROPE suggests that during the crisis the labour market situation continued to be more favourable in this region than in the EU 27-average (table 3.5). [5] In 2008 all of the NUTS 2-regions of CENTROPE had unemployment rates below the EU 27 average. Vienna, Vas and Trnava region had unemployment rates between 5% and 7%, with Vienna showing an unemployment rate of 6.7% and Trnava region – which still had double digit unemployment rates in 2004, – of 5.5%. All other CENTROPE regions had unemployment rates substantially below the EU-average, ranging between 3% and 4% (Rozmahel et al, 2010).

Table 3.5:   Unemployment rates, population aged 15-64 years (%)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	3.5	3.6	4.0	4.3	4.9	5.2	4.7	4.4	3.8	4.8	4.4
--Burgenland	3.2	4.1	4.3	4.2	5.6	6.0	5.0	3.7	3.6	4.6	3.9
--Lower Austria	3.0	3.2	3.5	3.5	4.2	4.3	4.0	3.6	3.4	4.3	3.6
--Vienna	5.8	5.9	7.2	7.8	8.9	9.1	8.8	8.3	6.7	7.5	7.3
Czech Republic	8.8	8.2	7.3	7.8	8.3	7.9	7.1	5.3	4.4	6.7	7.3
--South Moravia*	-	-	-	8.1	8.4	8.1	8.0	5.4	4.4	6.8	7.6
Hungary	6.4	5.7	5.8	5.9	6.1	7.2	7.5	7.4	7.8	10.0	11.2
--Gyor-Moson-Sopron*	4.3	4.2	3.9	3.3	3.8	4.3	4.3	3.6	3.5	6.3	6.3
--Vas*	4.6	5.1	4.8	5.1	5.8	7.9	7.4	6.8	5.5	10.2	10.1
Slovakia	18.8	19.3	18.7	17.6	18.2	16.3	13.4	11.1	9.5	12.0	14.4
--Trnava region*	16.6	18.1	16.2	13.3	12.6	10.5	8.8	6.5	5.9	9.1	9.9
--Bratislava region	7.3	8.3	8.7	7.1	8.3	5.3	4.6	4.3	3.4	4.6	6.2
EU 27	9.0	8.4	9.0	9.1	9.2	8.9	8.4	7.2	7.0	8.9	9.6
CENTROPE	6.0	6.5	6.8	6.7	7.4	7.0	6.6	5.6	4.7	6.4	6.5

Source: EU Labour Force Survey *2010 = estimates based on NUTS 2-level development and national statistics.

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[5] The analysis in this part of CENTROPE RDR is based on Eurostat data, and is closely related to the in depth analysis based on most recent data in the Focus Report on Human Capital and Education.

The impact of economic crisis negatively influenced the positive development on the labour market and most of the regions experienced substantial increases in unemployment rates from the record low levels of 2008. The average unemployment rate reported by Eurostat in 2010 in CENTROPE reached 6.5% which was 3.1 percentage points below the EU 27 average of 9.6% but also by 1.8 percentage points higher than the record low level of 2008. A more detailed look at the data shows that this privileged position of CENTROPE applies to almost all of its regions. Only 2 regions (Trnava and Vas) recorded an above EU 27 unemployment rate in 2010.

The increases in the crisis have, however also differed substantially among regions. Especially the Bratislava region, with traditionally low unemployment rates experienced an increase of unemployment by 2.8 percentage points between 2008 and 2010. Moreover, the most unfavourable development has been recorded in the Trnava region, where the unemployment rate went up by from 5.9% (in 2008) to 9.9% (in 2010). The main reason for this increase in unemployment was the decline of external demand of in export oriented industries localised in this region. Similarly high increases of unemployment have been recorded in Vas (by 3.3 percentage points), South Moravia (by 3.2 percentage points) and Gyor-Moson-Sopron (by 2.8 percentage points). By contrast, the Austrian CENTROPE regions experienced only minor increases in Vienna (by 0.5 percentage points), Burgenland (0.3 percentage points.) and in Lower Austria (by 0.2 percentage points). Thus on the labour market the Austrian CENTROPE regions have proven to be substantially more resilient to crisis than the other regions of CENTROPE.

Despite these regional disparities in the increases in unemployment rates, CENTROPE in average has also been less strongly affected by the crisis than the EU 27 and also has recovered more quickly. Unemployment increased substantially in 2009. Nonetheless in aggregate the increase in the unemployment rate of 1.7 percentage points in the CENTROPE average was slightly more moderate than in the EU 27. Similarly in 2010 – although unemployment increased or stagnated in all CENTROPE regions with the exception of the Austrian CENTROPE, where unemployment rates declined – the aggregate increase in unemployment rates of CENTROPE was only 0.1 percentage points as opposed to 0.7 percentage points in the EU average. Thus despite substantial variations across regions in aggregate CENTROPE has proven to be more resilient to the crisis than the EU 27 in terms of unemployment.

Table 3.6:   **Gender differences in the unemployment rate**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	−0.5	−0.4	0.1	0.1	−0.9	−0.6	−0.9	−1.1	−0.5	0.4	0.4
--Burgenland	−0.4	−0.3	−1.0	−0.5	−1.4	−2.5	−1.9	−0.8	0.1	−0.4	−0.4
--Lower Austria	−1.0	−0.2	−0.3	−0.4	−1.5	−1.0	−1.0	−1.0	−1.1	0.5	0.4
--Vienna	1.4	1.5	2.3	2.2	0.9	2.3	1.5	0.4	0.4	2.2	–
Czech Republic	−3.1	−3.1	−3.1	−3.7	−2.8	−3.3	−3.0	−2.5	−2.1	−1.9	−2.1
--South Moravian	–	–	.	−3.3	−2.4	−3.2	−3.3	−2.4	−2.4	−1.5	–
Hungary	1.5	1.3	0.8	0.5	0.0	−0.4	−0.6	−0.6	−0.5	0.6	0.9
--Gyor-Moson-Sopron	−0.6	−0.4	0.0	0.2	−0.8	−0.3	−2.4	−1.5	−2.8	−1.8	–
--Vas	−0.3	2.9	1.6	0.8	−1.9	−0.9	−2.2	−3.6	−1.6	2.2	–
Slovakia	0.3	1.1	−0.1	−0.3	−1.8	−1.7	−2.4	−2.8	−2.5	−1.4	−0.4
--Bratislava region	−1.2	−0.5	−1.0	−2.2	−1.9	−1.8	0.3	−1.2	0.0	1.6	–
--Trnava region	−1.9	−0.7	−4.0	−1.6	−3.4	−4.2	−4.9	−4.4	−3.0	−2.2	–

Source: EU Labour Force Survey, Differences between male and female unemployment rate.

The crisis of 2009 has, however, also had a sizeable impact on the structure of unemployment. This can be seen from the development in gender differences in the unemployment rate published by EUROSTAT. From this data (see table 3.6) it is clear that gender differences, which were to the favour of men in all regions (except for Vienna) and years before 2009, improved in the favour of women. This is a consequence of the fact that industrial employment (which is traditionally dominated by males) suffered more from the crisis than did service employment. Therefore men seem to have lost more jobs during the recession of 2009 than females

The increase in unemployment rates in the CENTROPE region also resulted in a growing share of long term unemployed in total unemployment. From 2009 to 2010 the share has grown by 10.4 percentage points to 46.7%, which is 6.6 percentage points above the EU 27 average of 40.1%. An increase in the share of long term unemployed was observed in all CENTROPE regions except Lower Austria. Especially in Western Slovakia long-term unemployment remains to be very high with 64.5% followed by West Transdanubia with 49.4% share of long-term unemployed on total unemployment (table 3.7). This implies that a large number of unemployed persons is not able to find appropriate jobs within one year and remain dependent on the unemployment and social benefits from the social system with all social and economic consequences.

Table 3.7:   Share of long-term unemployment in total unemployment in the CENTROPE regions (2007-2010, in%, NUTS 2-level)

	2007	2008	2009	2010
EU 27	43.1	37.4	33.5	40.1
Burgenland	26.0	30.8	20.6	26.5
Lower Austria	29.5	29.9	23.8	23.6
Vienna	34.4	30.3	29.4	31.0
South East	52.6	47.7	30.6	40.9
West Transdanubia	44.3	39.0	36.5	49.4
Bratislava region	53.6	44.8	21.5	40.6
Western Slovakia	69.8	65.7	52.4	64.5
CENTROPE	48.7	44.5	36.3	46.7

Source: Eurostat, WIFO-calculations. – Note: Table reports share of persons unemployed for more than one year in total unemployment.

Figure 3.5: Unemployment rate of the Younger 2010 Aged 15 to 24, in%, NUTS 2-level
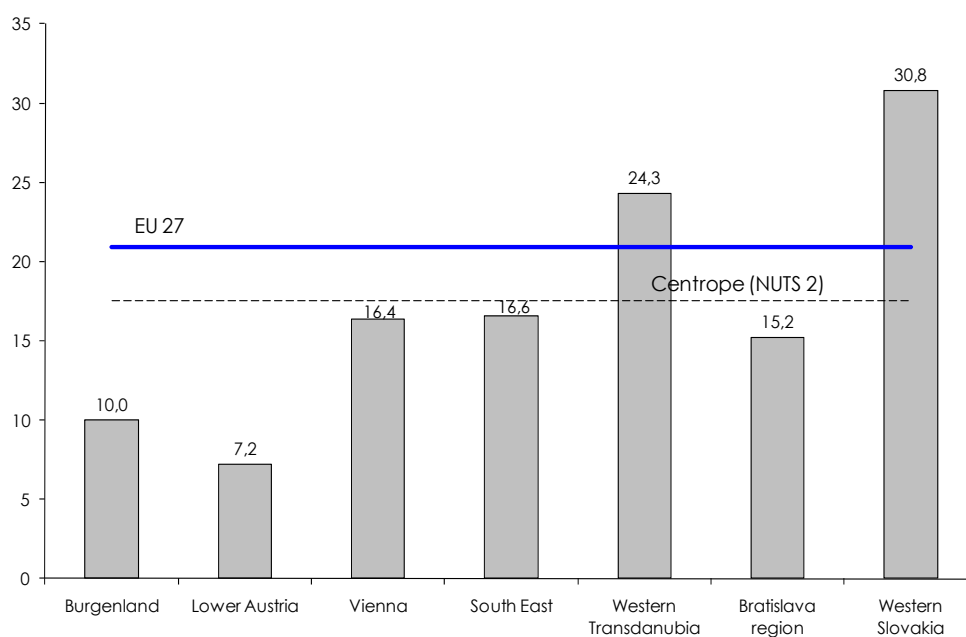
Source: Eurostat, WIFO-calculations.

The unemployment of young people aged 15-24, by contrast, is below the EU-average in most of the regions of CENTROPE. The only regions with higher unemployment rates of young people are Western Transdanubia and especially Western Slovakia (figure 3.7). This indicates problems of the qualifications of the unemployed with the requirements of prospective employers. This development emphasises the need for active labour market policies in these regions focused on youth unemployment and the need for adjustment in the education systems in these regions (countries).

Table 3.8: **Employment growth in the regions of CENTROPE 2000-2010 (in % of the previous year)**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Cumulative since 2004
Austria	0.5	0.6	−0.6	2.2	−1.3	2.1	3.3	1.9	1.5	−0.3	0.5	8.0
--Burgenland	−0.3	−2.5	0.6	4.0	−3.7	1.8	2.6	5.1	0.8	−1.0	0.7	6.3
--Lower Austria	0.1	0.1	2.4	0.8	−0.2	1.3	2.7	2.9	2.4	−2.1	0.7	7.8
--Wien	0.6	0.6	−6.5	3.3	−3.0	1.4	5.3	1.7	1.4	1.7	−0.2	8.5
Czech Republic	−0.7	0.1	1.0	−0.6	−0.2	1.6	1.4	1.9	1.6	−1.3	−1.0	3.9
--South Moravia*					0.2	1.2	0.3	3.3	0.9	−1.3	0.4	5.1
Hungary	1.0	1.0	0.1	1.3	−0.5	0.0	0.7	−0.1	−1.2	−2.5	0.0	−3.6
--Vas*	1.7	−0.4	1.0	0.5	−3.8	−2.3	1.4	−0.2	−2.7	−6.6	0.6	−13.1
--Gyor-Moson-Sopron*	−0.5	1.7	2.9	−2.5	−1.0	1.5	0.5	3.3	−0.9	−1.4	1.5	3.5
Slovakia	−1.4	0.9	0.0	1.8	0.3	2.2	4.0	2.4	3.2	−2.7	−2.1	7.2
--Bratislava reg.	0.4	−1.1	−1.9	2.2	−1.7	3.6	1.4	2.1	2.7	−0.4	−3.1	4.5
--Trnava reg.*	−2.1	3.2	1.6	2.4	3.3	3.5	2.2	2.5	2.7	−1.7	0.1	13.3
CENTROPE					−0.9	1.6	2.5	2.6	1.5	−0.9	0.0	6.5
EU 27	2.9	1.4	0.0	0.6	0.6	1.9	1.9	2.0	1.2	−1.7	−0.6	5.3

Source: EU Labor Force Survey. – Imputed from data on economically active, and unemployed, *2010 = estimates based on NUTS 2-level development and national statistic.

This confirms our assumption pointed out in the previous Regional Development Report, that for the EU 10-countries, this indicates a problem of the qualifications of the unemployed with the requirements of the labour market, as would be expected in economies with the speed of restructuring of the EU 10-parts of CENTROPE. If no appropriate actions are taken, this may therefore lead to a de-qualification of the work-force and increase persistence of the overall unemployment rates. Measures of active labour market policy focused on (long term) unemployment and de-qualification will be of a

very high importance in the CENTROPE in the next years. However, the regional competences in this area are mostly limited and most policies remain in the competence of the national authorities.

3.5.2. Employment growth

Similar as for unemployment also for employment growth, – despite large internal regional variation – CENTROPE as an aggregate has a history of outperforming the EU 27 average in the last decade. Employment grew more rapidly (declined by less) than the EU average in all years except for two (2004 and 2006) since 2004 (in which complete data was available for the first time) and over the period 2004 to 2010 the cumulative employment growth advantage of CENTROPE over the EU 27 amounted to 1.2 percentage points. Furthermore, also with respect to this indicator CENTROPE as an aggregate has proven to be more resilient to crisis than the EU 27. Employment declined by 0.9% in 2009 and stagnated in 2010 in the region as an aggregate, while the respective growth rates in the EU 27 average were –1.7% (in 2009) and –0.6% (in 2010).

The crisis has, however, also changed the regional patterns of employment growth. While in the period before 2009 and especially during the economic boom 2007 to mid 2008, it was in particular high employment growth in the Slovak and Czech parts of CENTROPE which were important for CENTROPE's good growth performance. The good performance of the Austrian CENTROPE in 2009 and 2010 in combination with lower productivity growth and a much stronger increase in the number of part time employed in this part of CENTROPE led to a reversal of long-term regional employment growth trends. Although the Austrian regions still lag substantially behind the region with the fastest employment growth over the period 2004 to 2011 (Trnava +13.3%), they now show slightly higher employment growth than South Moravia and Bratislava and definitely higher growth than the Hungarian parts of CENTROPE, where in Vas employment was by –13.1% lower in 2010 than in 2004 according to EUROSTAT data.

3.6. Conclusions

In the last decade, the economic development of the CENTROPE was characterized by above European average growth of GDP at market prices as well as GDP per capita at purchasing power standard, productivity and employment and declining unemployment rates. During this period the region also experienced significant internal convergence.

While the CENTROPE countries were harder hit by the crisis than the EU 27, the actual development confirmed that the CENTROPE region was not. The average economic growth in 2009-2011 was higher by 0.5 percentage points than the EU 27 average. However, the economic development in the individual CENTROPE regions differed substantially. While the Austrian regions and Gyor-Moson-Sopron experienced even higher average growth rates, the rest of the regions experienced substantial decrease in average growth rates (but in case of the Slovak CENTROPE still higher than in the Austrian regions). Despite the slowdown of economic growth, the Slovak regions maintained relatively high growth rates also during this period. The most significant growth in terms of GDP per capita in PPS has been recorded in the Bratislava region, which also made this region the richest region in CENTROPE.

The growth rate in CENTROPE is also expected to be slightly above the EU-average in future years. A noticeable exception is the Hungarian region of Vas which is also facing reduced growth in the long-term and is expected to grow by less than 1% annually until 2014. The Austrian CENTROPE regions of Burgenland and Vienna are expected to grow by slightly less than 2%, while all other regions will grow by more than 2% annually, with growth rates in the Slovak CENTROPE exceeding 4% annually.

The most significant impact of the economic and financial crisis was a decline in labour productivity growth as measured by GDP at market prices per person employed. In pre-crisis period 2004 to 2008 labour productivity in CENTROPE grew by 3.5% in average. In the period 2008 to 2011 productivity growth slowed down to 0.5% in average, and was even slightly below the EU-average. In this period therefore the convergence process to EU-productivity levels came to a halt, as labour productivity in CENTROPE decreased by 0.2 percentage points relative to the EU-average. Again, only the Slovak regions experienced convergence to the EU-average. Labour productivity in Bratislava region grew by 1.7 percentage points relative to the EU-average and in Trnava region an increase by a modest 0.5 percentage points was registered (table 3.1). On the opposite side the Austrian regions and Vas were mostly affected by the impact of economic crisis in terms of productivity growth. However, productivity levels are still higher than in EU-average in Lower Austria and Vienna.

In addition the development of the nominal compensation per employee implies that there are still substantial differences among the individual CENTROPE regions. In nominal terms the Austrian CENTROPE is still well ahead the rest of the CENTROPE region. The

difference is especially visible in the case of Bratislava region and Vienna. Although there is convergence in terms of GDP and productivity, the convergence process related to nominal compensation per employee is still lagging behind. However, in nominal terms the average growth is the strongest in the Slovak CENTROPE, especially in Bratislava region with average growth at 9.7% followed by Western Slovakia by 6.7% in 2008 – 2011. In general the economic crisis resulted in a decrease of average annual growth of compensation per employee especially in the new member states, although it remained higher than in the Austrian CENTROPE especially in the Slovak CENTROPE.

Finally crisis has also been associated with substantial structural change, which, however, has followed rather different patterns in the individual regions. The development of GVA by sectors shows the following development patterns:

- A significant impact of the crisis on agriculture in the Hungarian CENTROPE and Trnava region, construction in the Austrian CENTROPE and manufacturing in Vas, South Moravia and Trnava region.

- Tendencies towards recovery of sectoral GVA growth in 2011 – 2014, although with different rates in individual regions.

- A strong resilience of financial services and non-market services, which recorded positive GVA growth also during the crisis in all regions except the Hungarian regions and the highest growth rates in Bratislava and Trnava region.

- An adverse effect on personal services (Trade, Hotels & Restaurants, and Transport & Communication) of the economic crisis which should, however, be reversed according to forecasts for 2011 – 2014 especially in the Slovak and Czech parts of CENTROPE.

The impact of economic crisis also negatively influenced the development on labour markets. Most of the regions experienced rising unemployment rates. The average unemployment rate reported by Eurostat in 2010 in CENTROPE reached 6.5% which was 3.1 percentage points below the EU 27 average of 9.6% but also by 1.8 percentage points higher than the record low level of 2008. A more detailed look at the data shows that this privileged position of CENTROPE applies to almost all of its regions. Only 2 regions (Trnava and Vas) recorded an above EU 27 unemployment rate in 2010.

The increases in the crisis have, however also differed substantially among regions. Especially the Bratislava region, with traditionally low unemployment rate experienced increase of unemployment by 2.8 percentage points between 2008 and 2010. Moreover,

the most unfavourable development has been recorded in the Trnava region, where the unemployment rate went up from 5.9% (in 2008) to 9.9% (in 2010). The main reason for this increase in unemployment was the decline of external demand of in export oriented industries localised in this region. Similarly high increases of unemployment have been recorded in Vas (by 3.3 percentage points), South Moravia (by 3.2 percentage points) and Gyor-Moson-Sopron (by 2.8 percentage points). By contrast, the Austrian CENTROPE regions experienced only minor increases in Vienna (by 0.5 percentage points), Burgenland (0.3 percentage points) and in Lower Austria (by 0.2 percentage points). Thus on the labour market the Austrian CENTROPE regions have proven to be substantially more resilient to crisis than the other regions of CENTROPE.

4. Long term growth performance and structural change in CENTROPE (results of a shift-share analysis)

Authors: Peter Huber

4.1.Introduction

As pointed out in the chapter the years from the mid 1990s to just before the full effects of the recent financial and economic crisis in the year 2009 became visible in all CENTROPE countries, were marked by a rapid catching-up of both GDP per capita and labour productivity relative to the average levels of the EU 27, a dramatically improved growth performance in terms of gross value added and a noticeable structural change in terms of both the sector structure of employment as well as GVA in CENTROPE and since the crisis, while good employment and GVA growth have continued, productivity growth has reduced. This rapid development raises a number of questions such as:

1. Have these developments changed the relative competitive performance of the region as a whole or can they be attributed to the strong development of individual sectors (e.g. through the high level of manufacturing FDI's going to the EU 10-country parts of CENTROPE)?

2. Is the catching-up in labour productivity during the late1990s and the early 2000s as well as the subsequent reduction in productivity growth since 2009 primarily due to the decline of low productivity sectors and increased growth of high productivity sectors or rather due to a dynamic development of labour productivities within sectors or a combination of both?

3. What is the contribution of individual sectors and regions to the overall rapid growth of CENTROPE?

4. To what degree can one expect these developments of CENTROPE to continue in future?

In this chapter we address these questions by using data on employment, real GVA (at prices of the year 2000) and productivity for the years 1995 to 2011 in 6 broad sectors of

the economy[6] (agriculture, manufacturing and energy supply, construction, distributive services[7], financial intermediation[8] and non-market services[9]) taken from the Cambridge econometrics data base and applying standard methods of shift-share analysis to this data. Furthermore, since our data is available for all 1300 NUTS 3-regions in the EU 27 countries, we also use this data to compare CENTROPE to the EU-average as well as to the set of polycentric cross-border metropolitan regions previously defined by Chilla et al (2010) and adapted by Huber (2011) to the framework of the CENTROPE Regional Development Report project.[10]

4.2. Stylized facts

4.2.1. Growth performance

Figures 4.1 to 4.4 document some of the stylized facts mentioned above and thus set the scene for our subsequent analysis. At the same time they also highlight some of the differences and communalities of the set of cross-border metropolitan regions, which are used as a comparison group for the CENTROPE in this chapter. In particular as can be seen from Figure 4.1 the set of cross-border metropolitan regions analyzed here, due to their high urbanization and a high population density, in general, are also regions with very high real labour productivity levels. In 5 out of 7 of these regions labour productivity exceeded the average level of the EU 27 by more than 15% in all of the years considered (and amounted to a maximum of 43.5% in the Oresund metropolitan region in 1996).

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[6] It should be noted that the data for 2011 are preliminary estimates of GVA and employment and are subject to change

[7] This category includes: trade, hotels and restaurants and transportation

[8] This category includes: banking, insurance and real estate services

[9] This category includes: public administration, education, health, other public and personal services as well as private households and extraterritorial organizations.

[10] The definition of these regions is based on Chilla et al (2010). Next to the CENTROPE the regions considered are the Eurgio Mahl (which in order to allow each NUTS3 region to belong to only one cross-border metropolitan region has been collapsed with the Luxemburg metropolitan area and Saarbrücken), the Öresund metropolitan area, the Lille transborder metropolitan area, Strassburg-Offenburg, the Silesian-Moravian polycentric metropolitan area and the region Nice-Monaco-San Remo (see Huber, 2011 for a detailed description).

CENTROPE is in one of two exceptions to this rule. In 1996 (i.e. the first year for which data are available) the average real labour productivity level of CENTROPE was by 19.2% lower than the EU 27 average. Over the last one and a half decades, however, CENTROPE has also shown substantial convergence to the EU 27 average. In each of the years analyzed in Figure 4.1 the productivity gap to the EU 27 average reduced relative to the period considered before. In the period from 2004 to 2008, this reduction was particularly strong (from 17.4% in 2004 to 12.7% in 2008), but the productivity gap to the EU 27 average also reduced slightly during and after the crisis of 2009. In 2011 it amounted to 12.6%.

Figure 4.1: Relative real productivity level in CENTROPE and other cross-border metropolitan regions for the periods 1996 to 2008 (difference to EU 27 average in percent)
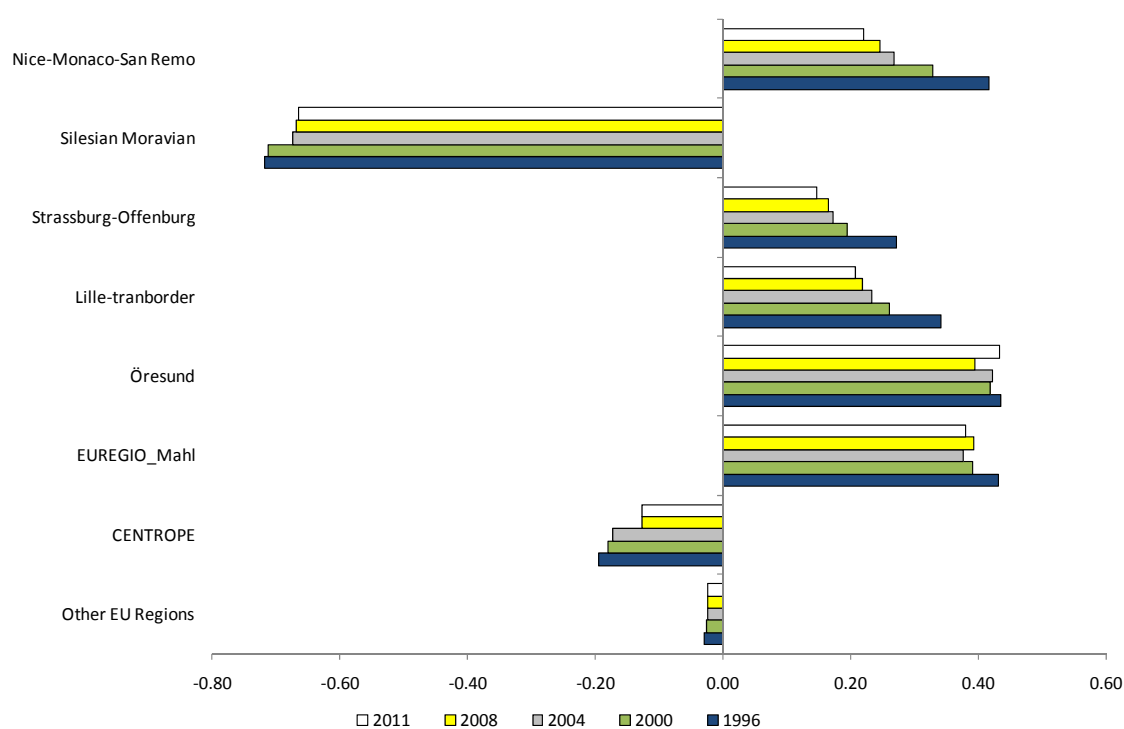
Source: Cambridge Econometrics; Note: table shows the difference between real labour productivity (=real gross value added at prices of the year 2000 per employee) in the respective region and the EU 27 average (in% of the EU average).

The only cross-border metropolitan region which shares similar characteristics as the CENTROPE is the Silesian-Moravian polycentric metropolitan area. In this region,

however, the productivity gap to the EU-average was substantially higher (at 71.2% at the beginning of our observation period) and the convergence tendencies were somewhat weaker (with the real labour productivity level differential to the EU 27 average still amounting to 66.4% in 2011).

Figure 4.2: Relative real productivity growth rates in CENTROPE and other cross-border metropolitan regions for the periods 1996 to 2008 (difference to EU 27 average in percentage points)
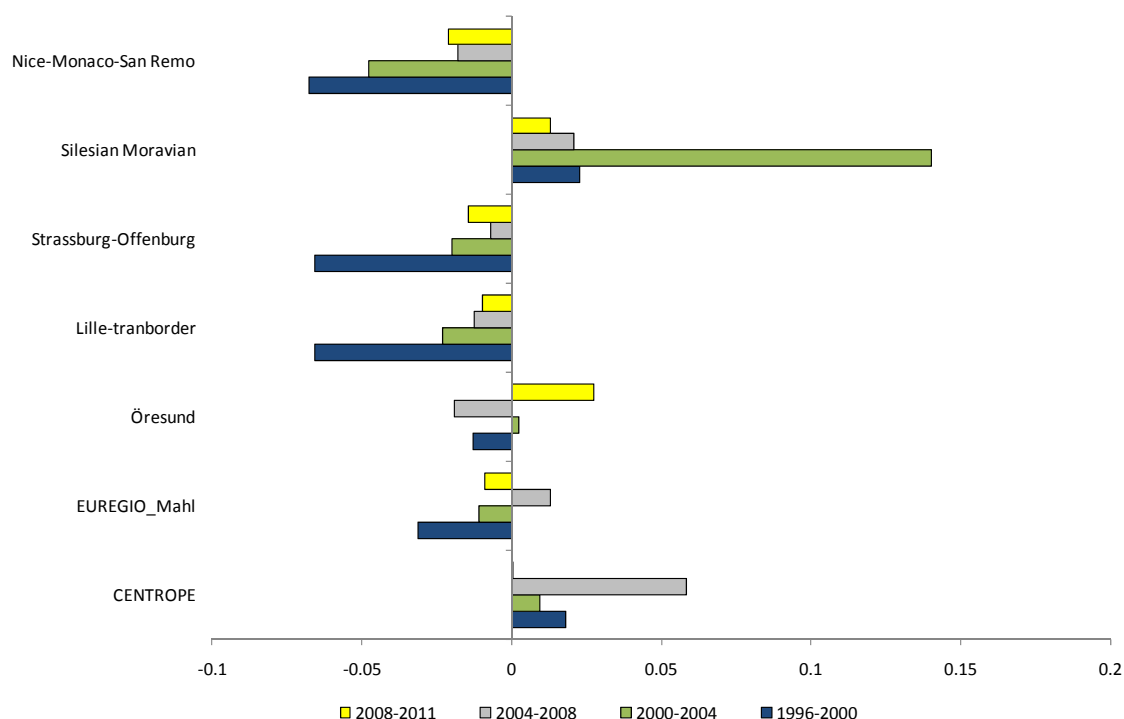
Source: Cambridge Econometrics; Note: table shows the (percentage point) difference between total growth rate of real productivity (=real gross value added at prices of the year 2000 per employee) in the respective region and the EU 27 average).

Given these tendencies of catching-up in productivity it should come as no surprise that the CENTROPE showed higher than (EU 27) average growth rates of real labour productivity throughout the whole observation period (Figure 4.2). While in general (and with only few exceptions) – as a consequence of their high starting levels – cross-border metropolitan regions in the EU exhibited below average real labour productivity growth rates in the last one and a half decades, CENTROPE's real labour productivity growth rate was by 1.8 percentage points higher than the EU-average in the 1996 to 2000 period, by

0.9 percentage points higher than the EU average in the 2000 to 2004 period and by 5.8 percentage points higher in the period from 2004 to 2008. Since the crisis in 2009, however, the productivity catch-up process has substantially lost in speed. In the period 2008 to 2011 productivity grew only by less than 0.1 percentage points more rapidly than in the EU 27 average.[11]

Figure 4.3: Relative GVA growth rates in CENTROPE and other cross-border metropolitan regions for the period 1996 to 2008 (difference to EU 27 average in percentage points)
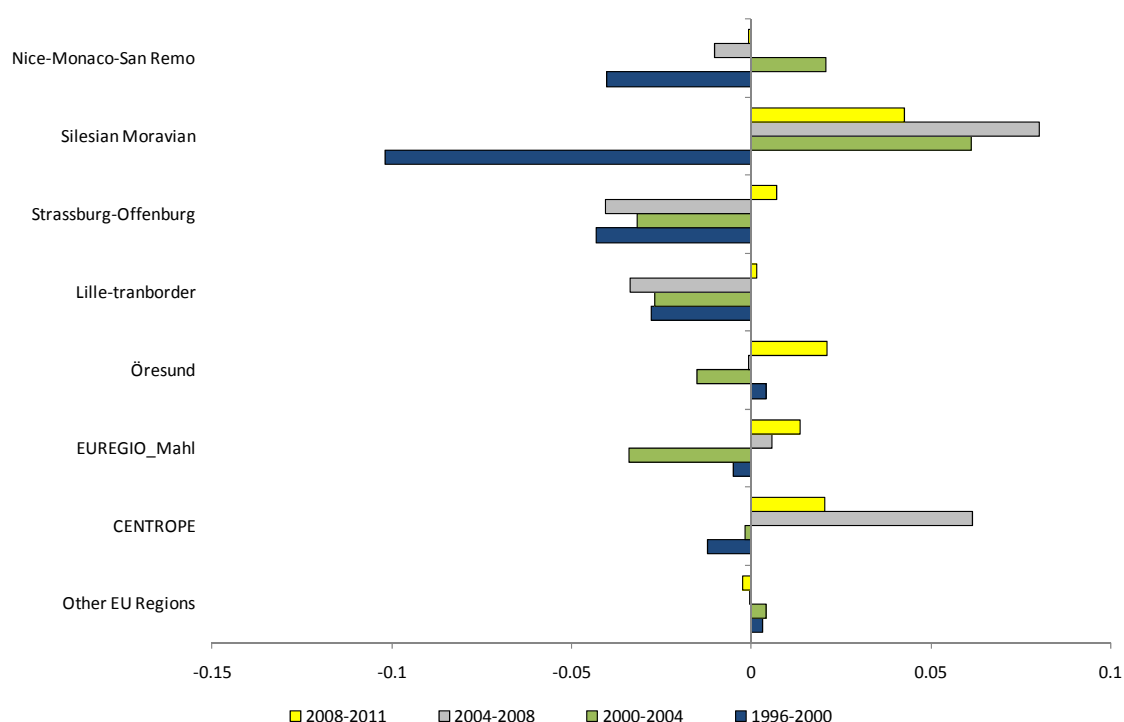
Source: Cambridge Econometrics; Note: table shows the (percentage point) difference between total growth rate of real gross value added at prices of the year 2000 in the respective region and the EU 27 average.

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[11] Note that productivity growth differences reported in this chapter differ slightly from those in the last chapter. The reason is that in order to provide as long a time period of observation as possible we focus on real labour productivity growth. Differences to nominal labour productivity growth differential, however, only account for a few thenths of a percentage point in most cases.

The only other cross-border metropolitan region that showed similarly high productivity growth rates as CENTROPE in the period 1996 to 2004 was the Silesian-Moravian cross-border metropolitan region. In this region real labour productivity growth was higher than in CENTROPE from 1996 to 2004, but lower than in CENTROPE in the years from 2004 to 2008. Since 2008, however, this region has once more achieved higher productivity growth rates than CENTROPE.

Thus the distinguishing feature of CENTROPE among the European cross-border metropolitan regions in the last one and a half decade was high real labour productivity growth. There is some indication that the process of productivity catch-up has been slowed down during the recession and its aftermath.

The high productivity growth of the region, however, did not always results in a higher than average real GVA growth (see figure 4.3). Real GVA growth is higher than the EU 27 average in CENTROPE only since enlargement in 2004. In particular in the period from 2004 to 2008 real GVA growth rates exceeded the EU 27-average by a startling 6.1 percentage points, and since the crisis (i.e. in the time period 2008 to 2011) the region grew by 2 percentage points faster than the EU 27 average. This was the second highest growth rate among all cross-border metropolitan regions.

This makes CENTROPE somewhat of a special case among the cross-border metropolitan regions in the EU 27. Most of these regions showed below average GVA growth in the time periods from 1996 to 2008. The only exceptions are the EUREGIO Mahl for the 2004 to 2008 period, the Oresund metropolitan area for 1996-2000, the Silesian-Moravian polycentric cross-border region after the year 2000 and Nice-Monaco-San Remo for the years 2000 to 2004. Since 2008, however, the above average growth performance of CENTROPE conforms to the experiences of other cross-border metropolitan regions. In this most recent time period these regions (with the exception of Nice-Monaco – San Remo) have all grown faster than the EU-average. Therefore the higher than average growth of CENTROPE in the post crisis period is in part also owed to the fact that urban regions in general have shown to be more resilient to the crisis than other regions.

Figure 4.4: Relative Employment growth rates in CENTROPE and other cross-border metropolitan regions for the period 1996 to 2008 (difference to EU 27 average in percentage points)
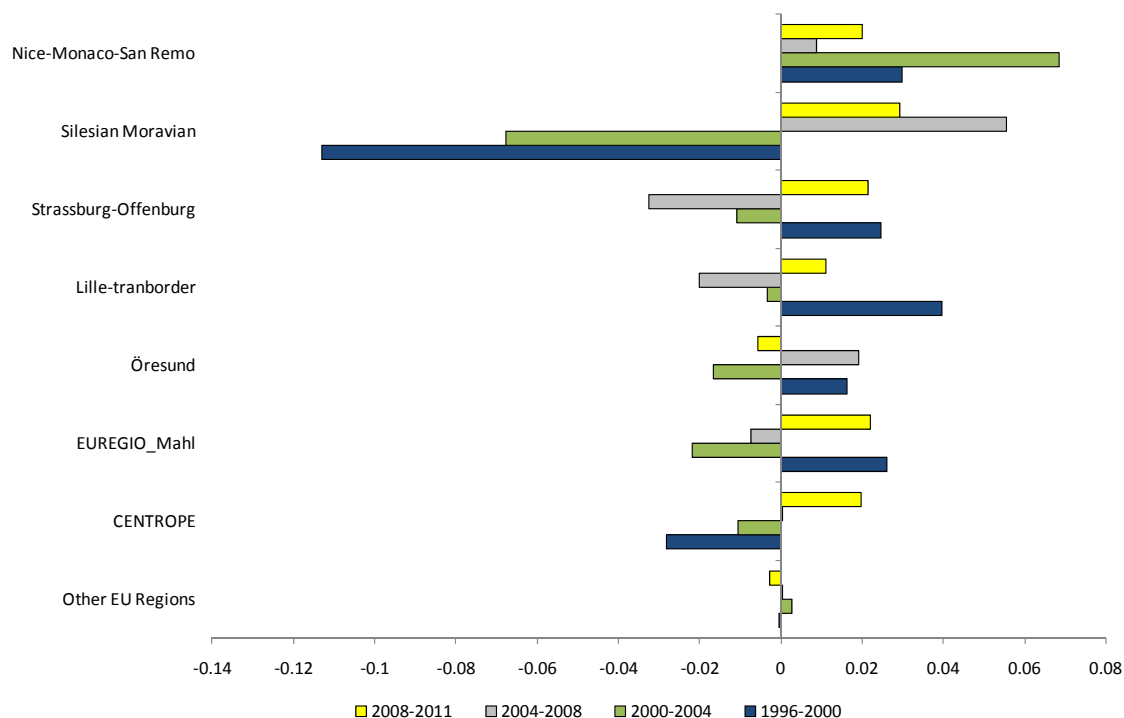
Source: Cambridge Econometrics; Note: table shows the (percentage point) difference between total employment growth in the respective region and the EU 27 average.

Also – despite substantial productivity growth – the higher than average real GVA growth rates since enlargement were sufficient to also allow for a higher employment growth than in the EU-average since 2004, although this was not the case in the period 1996 to 2004. In the period 2004 to 2008 CENTROPE employment growth advantage over the EU-average was rather small (less than 0.1%) on account of the high productivity growth.[12] Since 2008 – i.e. when productivity growth reduced somewhat – employment growth, however, was substantially (by 2 percentage points) higher than in the EU-average (figure 4.4). Again this higher than average employment growth rate since 2008 is, however,

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[12] By definition real labour productivity is the ration of real GVA and employment. Thus regions with above average growth rates of productivity have a lower employment growth for slowly given GVA growth.

shared by almost all (all except for the Oresund region) polycentric cross-border metropolitan regions in the period since the crisis

Thus a first appraisal of the growth performance of CENTROPE in the last one and a half decades show that until the crisis (i.e. 2008) CENTROPE differed from other cross-border metropolitan regions and also from the EU-average through a strong catching-up of productivity levels, which did not allow an equivalent expansion in employment throughout the period, and also did not result in above average GVA growth in the time period before 2004. In most other cross-border metropolitan regions (all but the Silesian-Moravian polycentric metropolitan region), low productivity growth was accompanied by an often below average GVA growth, while employment growth performance was mixed. Since the crisis, however, the previously high productivity growth rates seem to have reduced somewhat although in aggregate GVA and (due to low productivity growth) also employment in this time period still developed substantially more positively than in the EU 27 average. Since the crisis therefore growth in CENTROPE seems to have become more extensive as compared to the previously existing intensive growth model.

4.2.2. Structural Change

Aside from this difference, however, the employment GVA and productivity growth experiences of CENTROPE and the other cross-border metropolitan regions are based on a number of partly contradictory sector trends and thus structural change. For instance when considering the development of the real GVA in the six broad economic sectors for which we have data on GVA and employment (see tables 4.1 and 4.2), we find a rather heterogeneous picture of structural change across the different cross-border metropolitan regions.

In particular over period from 1996 to 2008 CENTROPE was marked by an above average decline of the share of construction as well as distributive and non-market services in total real GVA, while the share of manufacturing and financial intermediation in total GVA increased more rapidly than in many other cross-border metropolitan regions (Table 4.1). In terms of employment by contrast the share of distributive services and financial increased by more than in most other cross-border metropolitan regions, while the share of construction (which increased in many other cross-border metropolitan areas) as well as of agriculture and manufacturing shrunk by more than average. This in conjunction with GVA development therefore suggests a rather rapid productivity development in manufacturing

but a rather slow one in distributive services, so that also aggregate productivity trends may be due to rather disparate sector patterns.

Table 4.1: Change in sector shares in real GVA 1996 – 2008 in cross-border poly centric regions of the EU 27 (in percentage points)

	Agricul-ture	Con-struction	Distributive services	Manu-facturing	Financial intermediation	Non-Market Services
	1996–2008					
CENTROPE	−0.5	−1.7	−2.3	3.4	4.2	−3.1
EUREGIO Mahl	−0.2	−0.6	2.5	−2.5	2.3	−1.5
Oresund	−0.3	−0.3	0.8	0.8	3.3	−4.3
Lille-transborder region	−0.6	−0.8	1.4	−1.1	5.5	−4.3
Strassburg-Offenburg	−0.4	−1.1	0.8	1.7	1.7	−2.7
Silesian Moravian	−1.6	−1.9	−0.1	4.9	1.9	−3.2
Nice-Monaco-San Remo	−0.4	−0.1	1.5	−1.2	0.6	−0.5
Other EU-Regions	−0.5	−0.7	1.6	−1.5	3.2	−2.2
	2009–2011					
CENTROPE	−0.1	−0.7	−1.0	−0.5	1.0	1.3
EUREGIO Mahl	0.1	−0.3	−0.2	−0.5	0.1	0.9
Oresund	0.0	−0.2	−0.5	−0.7	0.7	0.7
Lille-transborder region	0.1	−0.2	−0.3	−0.4	0.1	0.8
Strassburg-Offenburg	0.1	−0.1	0.0	−0.9	0.1	0.8
Silesian Moravian	0.7	0.0	0.4	−0.6	−0.4	−0.1
Nice-Monaco-San Remo	0.1	−0.6	0.1	−1.4	0.5	1.4
Other EU-Regions	0.1	−0.3	−0.1	−0.7	0.4	0.7

Source: Cambridge Econometrics; Distributive services = trade, hotels and restaurants and transportation, Financial intermediation = banking, insurance and real estate services, non-market services = public administration, education, health, other public and personal services as well as private households and extraterritorial organizations.

Since 2008, however patterns of structural change in CENTROPE differ markedly from those before the crisis. This applies in particular to the changes in employment structure, where the share of manufacturing employment declined much more rapidly in CENTROPE than in the EU-average and also faster than in all other cross-border metropolitan regions. Similarly, the previously strong growth in manufacturing GVA reduced substantially and this sector actually lost slightly in importance in GVA at the expense of financial and non-market services. This may be indication that the many foreign owned firms in CENTROPE that often operate in manufacturing also have been more strongly affected by the crisis than others. So that the economic structure of the region at the outset of crisis may have

interacted with sector growth patterns to shape the growth experience of CENTROPE since 2008.

Table 4.2:   Change in sector shares of employment 1996 – 2008 in cross-border metropolitan regions of the EU 27 (in percentage points)

	Agriculture	Construction	Distributive services	Manufacturing	Financial intermediation	Non-Market Services
1996–2008						
CENTROPE	−2.6	−0.8	1.9	−2.9	4.2	0.3
EUREGIO Mahl	−0.6	−0.6	−0.3	−5.3	3.3	3.6
Oresund	−0.9	0.9	−0.3	−4.1	5.4	−0.9
Lille-transborder region	−0.8	0.1	0.6	−5.4	3.7	1.9
Strassburg-Offenburg	−0.4	−0.6	0.1	−4.2	3.1	2.0
Silesian Moravian	−5.0	0.7	2.7	−3.2	1.5	3.3
Nice-Monaco-San Remo	−1.0	0.9	0.0	−1.8	1.1	0.8
Other EU-Regions	−3.7	0.7	1.3	−3.6	3.3	2.1
2008–2011						
CENTROPE	−0.3	0.0	0.0	−1.8	0.9	1.2
EUREGIO Mahl	0.0	−0.1	0.0	−0.9	−0.4	1.4
Oresund	0.0	−0.4	−0.4	−1.3	0.0	2.0
Lille-transborder region	−0.1	−0.2	0.3	−1.3	−0.1	1.4
Strassburg-Offenburg	−0.1	−0.1	0.1	−1.1	0.0	1.2
Silesian Moravian	−0.2	−0.2	0.7	−1.7	0.6	0.8
Nice-Monaco-San Remo	−0.2	−0.2	0.3	−0.7	−0.1	0.9
Other EU-Regions	−0.2	−0.6	0.0	−1.0	0.3	1.5

Source: Cambridge Econometrics; Distributive Services= trade, hotels and restaurants and transportation, Financial intermediation = banking, insurance and real estate services, non-market services= public administration, education, health, other public and personal services as well as private household and extraterritorial organizations.

In addition the large decline in agricultural employment over the whole period suggests that the CENTROPE as well as the Silesian-Moravian polycentric metropolitan region also differed from many of the other regions in terms of economic structure already at the outset of our observation period (i.e. 1996). This is confirmed by much of the literature that compares the economic structure of the EU 10 and EU 15 countries.[13] Thus in addition to

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[13] In general this literature (e.g. Huber, 2011a) finds a lower tertiary and in particular for the Czech and Slovak Republics a higher industrial share in employment and GVA in the EU 10 than in the EU 15-countries.

different sector trends also different specialization patters at the outset of our observation period may have contributed to the particular growth performance of CENTROPE.

Figure 4.5: Index of structural change (turbulence index) in CENTROPE and other cross-border metropolitan regions for the period 1996 to 2008
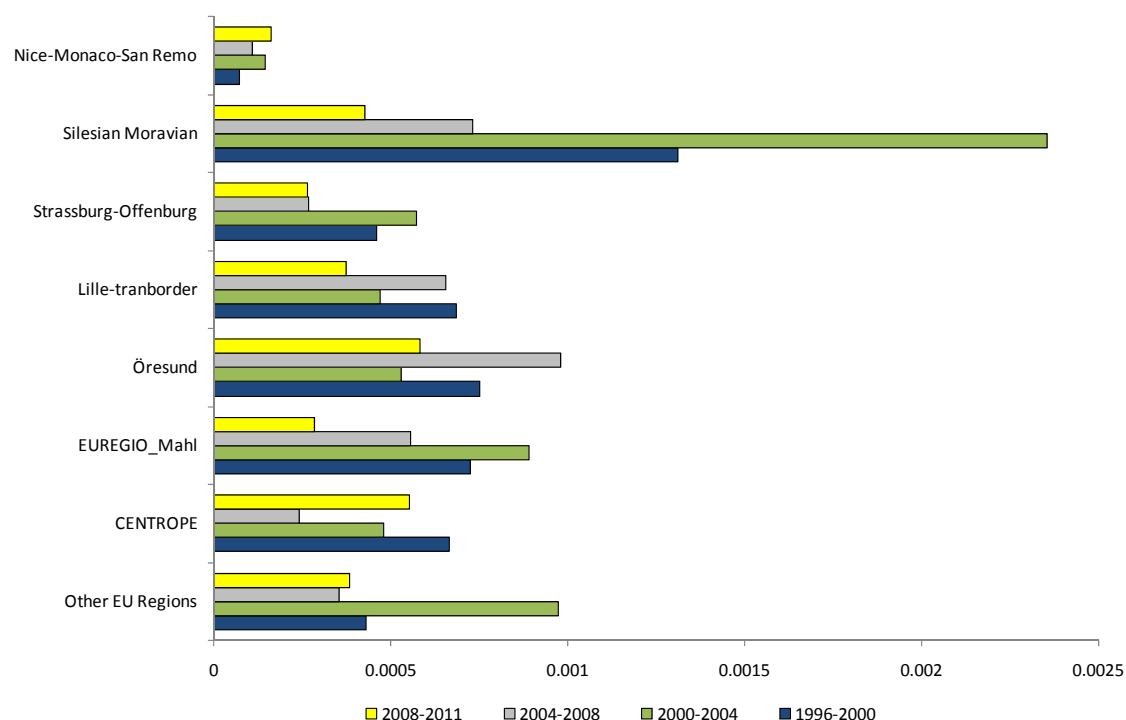
Source: Cambridge Econometrics; Note: Turbulence index =half the sum of squares of changes in sector shares over a time period. It ranges between 1 and 0, with zero indicating no structural change and 1 indicating complete structural change.

This interaction between economic structure and growth of a region is further complicated by the fact that the sector structure of a region (irrespective of whether this is measured in terms of employment or GVA), is also continuously changing through the process of structural change. As evidenced by Figure 4.5 (which shows the turbulence index[14] as an overall measure of structural change for the cross-border metropolitan regions) this structural change was particularly pronounced in CENTROPE in the periods from 1996 to

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[14] This index is defined as half the sum of squares of changes in sector shares over a time period. It ranges between 1 and 0, with zero indicating no structural change and 1 indicating complete structural change.

2000 and from 2004 to 2008 in which only the Silesian-Moravian polycentric metropolitan area experienced more structural change than CENTROPE and even more so since the crisis, when CENTROPE had the highest turbulence index among all cross-border metropolitan regions.[15]

4.3. The shift-share methodology

4.3.1. A decomposition of employment and GVA growth

Thus aggregate growth developments and sector structure on a regional level are intimately linked to each other. A standard economic method by which these links can be quantified, analyzed and interpreted is shift-share analysis. This work-horse method of regional economics[16] was introduced in the economic literature by von Fuchs (1959) and Dunn (1960). The central idea is that the growth of any region, by definition, is the sum of sector growth rates weighted by the share of each sector at the beginning of the observation period. More formally the growth rate of a region can therefore be written as:

$$g_{i,t} = \sum_s g_{j,i,t} s_{j,i,t-1}$$

with $g_{i,t}$ the growth rate of region i in the time period from t-1 to t, $g_{j,i,t}$ the growth rate of sector j in the same region over the same time period and $s_{j,i,t-1}$ the share of the same sector in the same region in period t-1 (i.e. the beginning of the period considered). The growth rate differential of region i relative to another (such as for instance the total EU) is therefore given by:

$$g_{i,t} - g_{EU,t} = \sum_s g_{j,i,t} s_{j,i,t-1} - \sum_s g_{j,EU,t} s_{j,EU,t-1}$$

where the subscript EU is used to make clear that the given quantity is now measured with respect to the EU rather than with respect to region i. By adding and at the same time

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[15] By contrast, the period from 2000 to 2004 was marked by a slightly slower pace of structural change, but even here only the Lille transborder metropolitan area and the Silesian-Moravian polycentric metropolitan region had higher turbulence indices than CENTROPE.

[16] While the method is fairly standard a number of authors have pointed to some methodological limitations and have voiced criticisms (see for instance Herzog and Olsen, 1977, Berzeg, 1978, or Tengler, 1989).

subtracting the term $\sum_s g_{j,EU,t} s_{j,i,t-1}$ to the right hand side of this equation[17], this can be reformulated as:

$$g_{i,t} - g_{EU,t} = \sum_s (g_{j,i,t} - g_{j,EU,t}) s_{j,i,t-1} + \sum_s g_{j,EU,t} (s_{j,i,t-1} - s_{j,EU,t-1}) \qquad (1)$$

While the derivation of this formula is trivial the two terms on the right hand side of equation (1) have rather interesting economic interpretations. In particular:

The term under the second summation on the right hand side of equation (1) $(\sum_s g_{j,EU,t}(s_{j,i,t-1} - s_{j,EU,t-1}))$ gives a hypothetical growth rate difference between the region under consideration and the EU average if all of the sectors in region i grew with the EU wide growth rate. Thus this hypothetical growth rate measures the sector effect on aggregate growth rate of a region. In particular if a region is specialized in sectors that grow slowly (i.e. if $s_{j,i,t-1} - s_{j,EU,t-1}$ is positive for all sectors growing slowly in the EU but negative for all rapidly growing sectors) this term will be negative and the region can be said to have a structural disadvantage on account of being specialized in slow growing sectors. By contrast, if a region is specialized in rapidly growing sectors (i.e. if $s_{j,i,t-1} - s_{j,EU,t-1}$ is positive for all sectors growing rapidly in the EU but negative for all slowly growing sectors) this term will be positive and the region can be said to have a structural advantage. This factor can thus be called the sector effect on regional growth.

The term under the first summation on the right hand side of equation (1) $(\sum_s (g_{j,i,t} - g_{j,EU,t}) s_{j,i,t-1})$ gives the hypothetical growth rate difference between the region under consideration and the EU-average if the region had the same sector structure as the EU. This hypothetical growth rate therefore measures the regional effect on the aggregate growth rate of a region. In particular if all sectors grow more rapidly in region i than in the EU (i.e. if $\sum_s (g_{j,i,t} - g_{j,EU,t}) s_{j,i,t-1}$ is positive) the region can be said to have a regional advantage irrespective of sector specialisation. By contrast, if all sectors grow more slowly than in the EU (i.e. if $\sum_s (g_{j,i,t} - g_{j,EU,t}) s_{j,i,t-1}$) is negative) the region can be said to have a regional disadvantage. This factor is therefore called the regional effect.

Esteban (1972, 2000) argues that although compelling, this composition does not take into account the fact that certain sectors may locate in a particular region because the regions in which this sector locates offer particularly good growth perspective for this sector. He

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[17] Note that by both adding and subtracting this term to the right hand side of this equation we essentially leave the numerical value of this equation unchanged.

therefore suggests taking this analysis one step further by redefining the regional effect as $\sum_s(g_{j,i,t}-g_{j,EU,t})s_{j,EU,t-1}$, which is equivalent to analyzing the growth performance of the region relative to the "norm structure" of the EU. Furthermore, inserting this expression in equation (1) and rearranging it is easy to show that:

$$g_{i,t} - g_{EU,t} = \sum_s(g_{j,i,t}-g_{j,EU,t})s_{j,EU,t-1} + \sum_s g_{j,EU,t}(s_{j,i,t-1} - s_{j,EU,t-1})$$

$$+ \sum_s(s_{j,i,t-1} - s_{j,EU,t-1})(g_{j,i,t} - g_{j,EU,t}) \qquad (2)$$

where the first and second term on the right hand side of equation (2) have the same interpretation as in equation (1) but where an additional term $(\sum_s(s_{j,i,t-1} - s_{j,EU,t-1})(g_{j,i,t}-g_{j,EU,t})s_{j,EU,t-1})$, often referred to as the allocation effect, controls for the fact that sectors may be located in regions offering an above average growth potential for this sector.

4.3.2. Decomposing productivity differentials and productivity growth

Although shift-share analysis is mostly applied to regional employment and GVA growth, in principle it offers a generic method to decompose any economic indicator, which can be expressed in terms of a weighted sum of a number of sub-aggregates. For instance the productivity ($p_{i,t}$) of a region i at a particular point in time t can be considered to be the employment weighted sum of sector productivities (i.e. $p_{i,t} = \sum_s p_{j,i,t}s_{j,i,t}$ where the only difference to the previous equation that $s_{i,j,t}$ is now the employment share of sector j in region i at time t). Following the argument of the previous section therefore the productivity differential between a region and the EU-average at any point in time can be decomposed into two components by applying the formula:

$$p_{i,t} - p_{EU,t} = \sum_s(p_{j,i,t}-p_{j,EU,t})s_{j,i,t} + \sum_s p_{j,EU,t}(s_{j,i,t-1} - s_{j,EU,t}) \qquad (3)$$

where the term under the second summation on the right hand side of equation 3 $(\sum_s p_{j,EU,t}(s_{j,i,t-1} - s_{j,EU,t}))$ is the sector effect, which arises due to the specialization of the region on high or low productivity sectors, and the first term $(\sum_s(p_{j,i,t}-p_{j,EU,t})s_{j,i,t})$ is the regional effect arising from a higher or lower productivity of the "average" sector in a particular region.

Finally, as pointed out by Fagerberg (2000), Timmer and Szimai (2000) as well as Peneder (2001) also productivity growth within a region can be decomposed in a similar fashion by applying the formula:

$$p_{i,t} - p_{i,t-1} = \sum_s (p_{j,i,t} - p_{j,i,t-1}) s_{j,i,t-1} + \sum_s p_{j,i,t-1} (s_{j,i,t} - s_{j,i,t-1})$$

$$+ \sum_s (s_{j,i,t} - s_{j,i,t-1})(g_{j,i,t} - g_{j,i,t-1}) \tag{4}$$

In this decomposition also the individual components have rather interesting economic interpretations.[18] In particular here the term $\sum_s p_{j,i,t-1}(s_{j,i,t} - s_{j,i,t-1})$ measures the so called static structural effect, which is positive or negative, if a particular region is increasingly specializing in high or low productivity sectors, and thus reflects the structural bonus hypothesis of the productivity growth literature (see Peneder, 2001) according to which regions in their development specialize in sectors with high productivity. The term $\sum_s (s_{j,i,t} - s_{j,i,t-1})(g_{j,i,t} - g_{j,i,t-1})$, referred as the dynamic structural effect by contrast is positive if sectors with high productivity growth also increase their share in employment, while it is negative if high productivity growth sectors reduce employment shares as has for instance been proposed in the "structural burden" hypothesis (Baumol, 1967). Finally the term $\sum_s (p_{j,i,t} - p_{j,i,t-1}) s_{j,i,t-1}$ which is called the structural growth effect, measures the hypothetical productivity growth of the region in the absence of structural change.

4.4. Decomposition Results: for CENTROPE

4.4.1. Real labour productivity Difference

Table 4.3 shows the results of the decomposition of productivity differentials between cross-border metropolitan regions and the EU 27-average as suggested in equation (3). The results imply that the majority of the productivity gap of CENTROPE relative to the EU-average over the complete observation horizon (both before as well as after 2008) was due to the regional effect, rather than to the sector effect. In 1996 the regional effect with respect to real labour productivity contributed 21.3 percentage points (or more than the actual productivity differential) to the total productivity gap of CENTROPE (of 19.2%) relative to the EU-average. By contrast, as evidenced by the sector effect, CENTROPE had a rather favourable sector mix already in 1996. Its aggregate productivity level would

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[18] Note that in this decomposition we decompose productivity growth within a region and not productivity differentials between two different regions.

have been 1.9% above the EU-average if each of the sectors had had a real labour productivity equal to the EU-average.

Table 4.3: **Decomposition for real labour productivity differentials between cross-border metropolitan region and the EU-average (effects in percent of the EU 27-average)**

	1996	2000	2004	2008	2011
	Total productivity difference (%)				
Other EU-Regions	−2.7	−2.4	−2.2	−2.3	−2.2
CENTROPE	−19.2	−17.9	−17.2	−12.5	−12.0
EUREGIO Mahl	41.6	37.4	36.0	37.7	35.9
Oresund	43.8	42.1	42.4	39.8	41.5
Lille-transborder region	34.5	26.3	23.6	22.1	22.8
Strassburg-Offenburg	27.4	19.7	17.4	16.7	15.1
Silesian Moravian	−71.8	−71.2	−67.4	−66.8	−66.5
Nice-Monaco-San Remo	41.9	33.0	27.0	24.8	24.9
	Regional effect **(contribution to total difference in percentage points)**				
Other EU-Regions	−2.1	−1.8	−1.9	−2.0	−2.0
CENTROPE	−21.3	−20.9	−19.8	−15.5	−15.8
EUREGIO Mahl	31.6	28.6	30.3	31.9	31.7
Oresund	39.5	38.0	40.2	37.1	41.8
Lille-transborder region	31.4	22.8	22.2	21.5	21.0
Strassburg-Offenburg	24.4	16.1	15.9	15.8	14.5
Silesian Moravian	−67.5	−67.5	−65.7	−66.0	−66.4
Nice-Monaco-San Remo	39.6	33.1		27.8	25.7
	Sector effect **(contribution to total difference in percentage points)**				
Other EU-Regions	−0.8	−0.8	−0.5	−0.5	−0.4
CENTROPE	1.9	2.9	2.5	2.8	3.1
EUREGIO Mahl	11.5	10.4	7.2	7.3	6.3
Oresund	4.0	3.8	1.9	2.3	1.4
Lille-transborder region	2.7	3.3	1.1	0.3	−0.3
Strassburg-Offenburg	2.8	3.3	1.3	0.6	0.3
Silesian Moravian	−4.4	−3.8	−1.8	−0.8	0.0
Nice-Monaco-San Remo	2.0	−0.4	−2.4	−3.3	−3.8

Source: Cambridge Econometrics, own calculations, Note: table reports a decomposition of real labour productivity relative to the EU-average according to equation (4).

Over time, however, the negative regional effect improved more strongly than the sector effect. In 2008 the negative contribution of the region effect to the total productivity differential was only 15.5 percentage points, while the sector effect (with 2.8 percentage points) was even more strongly positive than in 1996. Thus although structural change in the direction of high productivity sectors also contributed to the spectacular productivity catch-up of the CENTROPE relative to the EU-average the more important contribution came from a catching-up of productivity in all sectors in the economy (i.e. the regional

effect). This tendency, however, came to a halt in the time period from 2008 to 2011 since in 2011 the region effect to total productivity declined (to -15.8%) relative to 2008 while the sector effect increased to 3.1%. The slight improvement in aggregate productivity in CENTROPE in the time period 2008 to 2011 is therefore solely due to the fact that CENTROPE possessed a favourable sector structure for productivity growth at the outset of the crisis.

CENTROPE is also somewhat particular among all cross-border metropolitan regions in this respect. Although in most other regions the regional effect on productivity levels is also a more important determinant of differences in real labour productivity across regions than the sector effect - which implies differences in productivities within sectors across regions rather than differences in specialization in sectors with different productivity levels are the most important determinant of regional productivity differentials among cross-border metropolitan regions in the EU-CENTROPE differs from the other cross-border metropolitan areas through the direction of this change. In all other cross-border metropolitan regions (but the EUREGIO Mahl and the Silesian-Moravian polycentric metropolitan region) the initially positive productivity differentials on account of the regional effect reduced rather than increased, and even in the two exceptional cases of the EUREGIO Mahl and the Silesian-Moravian polycentric metropolitan region the improvement of the sector effect was much smaller in CENTROPE (by 0.1 and 1.5 percentage points only).

Also in contrast to the developments in CENTROPE the sector effect of productivity declined over our observation period in most other cross-border metropolitan regions (all except for the Silesian-Moravian polycentric metropolitan region where this effect was, however, negative throughout) and even became negative in the Nice-Monaco-San Remo region. Furthermore, also in contrast to CENTROPE the sector effect reduced rather than increased in all cross-border metropolitan regions, while no clear tendencies can be seen for the regional effect.

In sum therefore this suggests that first of all the rapid productivity catch-up of CENTROPE in the last one and a half decades was primarily caused by productivity growth within individual sectors catching-up to EU-average levels rather than the increased specialization on high productivity sectors. This therefore documents the massive "learning and imitation effects" triggered inter alia by the inflow of foreign direct investments. Second of all, however, our results also suggest that CENTROPE is rather

unique among the cross-border metropolitan regions, since in most other regions relative productivity levels within sectors (which, however, mostly started above average in these regions) declined and most cross-border metropolitan regions also increasingly specialized in sectors with lower productivity levels. Third of all our results also indicate that the markedly slower improvement of productivity levels of CENTROPE since 2008 is primarily due to slower catching-up of all sectors rather than due to an unfavourable specialisation on certain sectors.

4.4.2. Labour productivity growth

This impression of a rather unique speed of productivity growth in CENTROPE that was more strongly linked to within sector developments than to changing sector contributions before the crisis and a substantially slower development since the crisis, which is also primarily due to within sector developments rather than to changing sector contributions is also confirmed when performing a productivity growth decomposition as suggested in equation (4) (see table 4.4). As evidenced by the large contribution of the sector growth effect, the major reason for the rapid productivity growth in CENTROPE (but also in most other cross-border metropolitan regions) throughout the time period from 1996 to 2008 was the fact that most sectors had high productivity growth in this time period. Furthermore, the second most important contribution to growth here comes from a specialization of the region in high productivity sector (e.g. in manufacturing), while the dynamic structural effect remained small but negative throughout.

As a consequence of the crisis there was a substantial reduction of the sector growth effect from 2,800 € per employee in the period 2004 to 2008 to only € 700 per employee. This therefore suggests that the slower relative productivity growth of CENTROPE since the crisis is primarily due to slow productivity growth in almost all sectors rather than slow growth in only some sectors, which is further corroborated by the fact that the decline in the static structural effect between these two time period was only € 400 per employee, while the dynamic structural effect remained unimportant throughout.

Table 4.4: **Decomposition results for real labour productivity growth in the cross-border metropolitan regions (effects in percent of total change and in € 1,000)**

	Static structural effect	Dynamic structural effect	Sector growth effect	Total Productivity growth	Static structural effect	Dynamic structural effect	Sector growth effect
	Absolute (in 1000 € per employee)				In% of total change		
	1996-2000						
Other EU-Regions	0.6	−0.1	2.6	3.1	17.9	−1.7	83.8
CENTROPE	0.6	0.0	2.4	3.0	20.2	0.3	79.6
EUREGIO Mahl	0.2	−0.2	2.9	2.9	4.5	−5.7	99.6
Oresund	1.0	−0.4	3.2	3.8	25.7	−10.9	85.1
Lille-transborder region	1.2	−0.4	0.2	1.0	119.2	−33.9	14.7
Strassburg-Offenburg	1.2	−0.3	0.1	1.0	119.2	−30.0	10.8
Silesian Moravian	0.0	0.0	1.1	1.1	3.3	−1.9	98.6
Nice-Monaco-San Remo	0.0	0.0	1.0	1.0	3.0	−4.3	101.3
	2000–2004						
Other EU-Regions	0.8	−0.1	1.5	2.2	35.9	−4.8	68.9
CENTROPE	0.5	−0.1	1.7	2.1	21.9	−3.2	81.2
EUREGIO Mahl	−0.4	−0.2	3.1	2.5	−14.6	−8.6	121.5
Oresund	0.0	−0.2	3.4	3.3	1.0	−6.6	105.6
Lille-transborder region	0.0	−0.1	1.7	1.7	0.4	−4.9	104.4
Strassburg-Offenburg	0.0	−0.1	1.8	1.7	2.3	−8.3	106.0
Silesian Moravian	0.3	−0.1	2.0	2.2	11.6	−2.8	91.2
Nice-Monaco-San Remo	0.2	0.0	0.3	0.5	42.0	−10.1	68.1
	2004–2008						
Other EU Regions	0.5	0.0	0.9	1.4	38.1	−1.9	63.8
CENTROPE	0.4	0.0	2.8	3.2	12.8	−1.4	88.6
EUREGIO Mahl	0.4	−0.1	2.4	2.7	13.5	−3.1	89.6
Oresund	0.7	−0.2	0.4	0.9	78.9	−21.2	42.3
Lille-transborder region	0.2	−0.1	1.0	1.1	20.2	−7.9	87.7
Strassburg-Offenburg	0.3	−0.1	1.1	1.3	23.0	−4.4	81.4
Silesian Moravian	0.2	0.0	0.6	0.7	27.4	−2.0	74.6
Nice-Monaco-San Remo	0.4	0.0	0.5	0.9	43.6	−0.2	56.6
	2008–2011						
Other EU-Regions	0.0	0.0	0.8	0.7	−1.8	−4.0	105.7
CENTROPE	0.0	−0.1	0.7	0.7	0.7	−10.3	109.7
EUREGIO Mahl	−0.5	0.0	1.1	0.5	−109.6	−8.3	217.9
Oresund	−0.8	−0.2	3.6	2.6	−30.0	−5.7	135.7
Lille-transborder region	−0.5	−0.1	1.0	0.4	−129.0	−17.0	246.1
Strassburg-Offenburg	−0.3	0.0	0.4	0.1	−211.0	−15.0	326.0
Silesian Moravian	0.0	0.0	0.5	0.4	−3.7	−7.9	111.6
Nice-Monaco-San Remo	−0.2	0.0	−0.1	−0.2	75.1	−14.9	39.8

Source: Cambridge Econometrics, own calculations, Note: table reports a decomposition of real labour productivity growth according to equation (3).

4.4.3. GVA and Employment Growth

Finally, also results with respect to the decomposition of GVA and employment growth rates relative to EU-average (as in equation 1) point to a rapidly improving regional

competitiveness of CENTROPE in the period 1996 to 2008 (see Figure 4.6 and Table 4.5). The most compelling evidence for this is presented in Figure 4.6, which plots the evolution of the structural component (on the horizontal axis) and the regional component (on the vertical axis) for the GVA growth rate differential to the EU as defined in equation (1) for all cross-border metropolitan regions in the time period 1996 to 2011. While for most cross-border metropolitan regions both the regional as well as the structural component change very little over time and also fluctuate substantially, the CENTROPE shows a clear improvement of the regional effect in the time period 2008. This increased from –1.1 percentage points (i.e. indicating a 1.1 percentage point slower growth for the average sector of that region) to 6.2 percentage points between 1996 and 2008. The sector component by contrast hardly changed and was slightly negative in 1996-2000, positive 2000-2004 and just about zero in the 2004 to 2008 period. Thus in the time period from 2004 to 2008 the CENTROPE was the region with (after the Silesian-Moravian polycentric metropolitan region) the second highest regional growth contribution among all polycentric cross-border regions.

This picture, however, slightly changed since the crisis. Although in the period 2008 to 2011 CENTROPE remained to be the region with the second highest regional growth contribution among all polycentric cross-border regions, this advantage over other regions also reduced substantially by 3.9 percentage points, so that the regional advantage reduced to 2.3% in this time period. The sector component by contrast was hardly affected by the crisis.

Similar evidence is also provided by the decomposition of employment growth rates. Here too CENTROPE is one of the few cross-border metropolitan regions (the only one aside from the Oresund metropolitan region and the Silesian-Moravian polycentric metropolitan region), where the regional component to the employment growth differential has improved in the last one and a half decades (see table 4.5). While in the period from 1996 to 2000 this regional effect still indicated an employment growth disadvantage of the average sector relative to the EU-average of 3.0 percentage points, in the period 2004-2008 this disadvantage had reduced to 0.3 percentage points (or on tenth of the original amount). Furthermore as with the decomposition of the GVA growth differential also for the employment growth rate differential, the sector component (i.e. the part of the decomposition controlling for different sector structures of the regions) remained relatively stable (oscillating between 0.2 and 0.8 percentage points) in the time period considered.

Figure 4.6: Decomposition results for real GVA growth in the cross-border metropolitan regions (effects in percentage points)
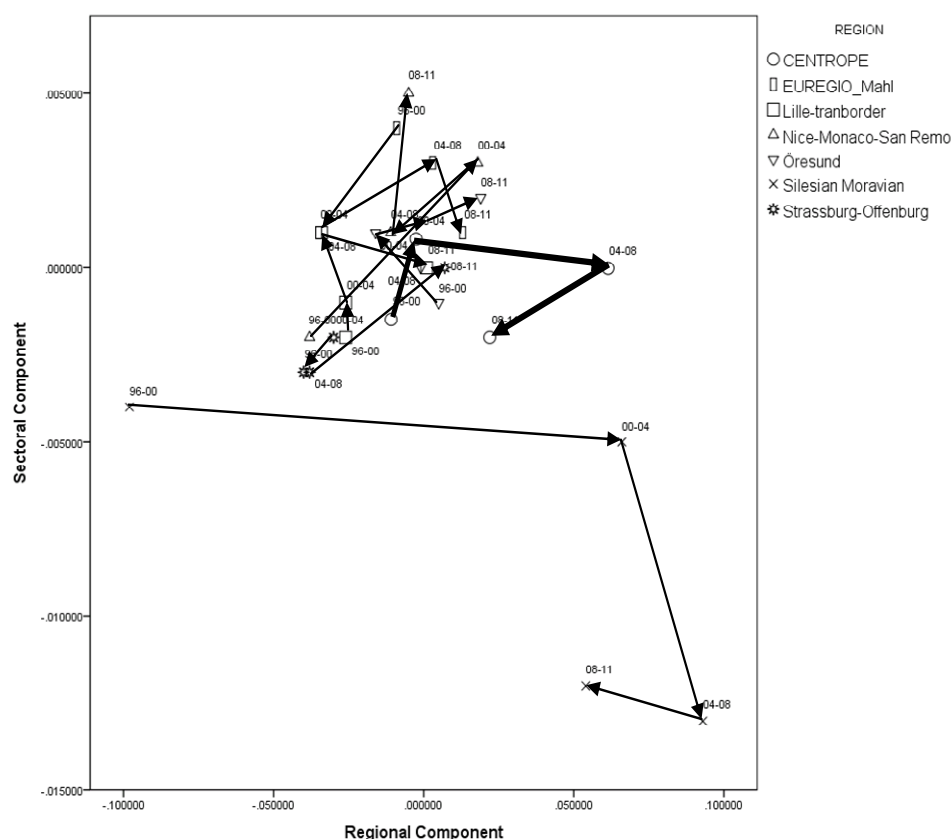
Source: Cambridge Econometrics, own calculations, Note: table reports a decomposition of GVA growth differential relative to the EU-average according to equation (1), bold arrow= CENTROPE.

Here, however, the crisis has been associated with a substantial improvement of the regional component. While the sector structure of CENTROPE with its high specialisation on manufacturing, would have suggested that employment in CENTROPE should have grown by 0.1 percentage points slower than the EU-average the actual employment growth rate was 2.0 percentage points higher than in the EU-average so that the regional component accounts for a 2.1 point increase in the employment growth rate.

Thus this evidence suggests that the much improved growth performance of the CENTROPE region in the years to 2008 was primarily owed to a substantial increase in regional competitiveness of that region. The only other cross-border metropolitan region in

which similar changes were observed in that period was the Silesian-Moravian polycentric metropolitan region. In this region the regional component of the GVA growth rate differential increased from –9.4 percentage points in the 1996 to 2000 period to +9.3 percentage points in the 2004 to 2008 period. Similarly the regional component of the employment growth rate differential increased from 9.3% to 7.0%. However in this region the period 2004 to 2008 was also marked by a noticeable worsening of the regional component of this decomposition with respect to GVA growth. This reduced from –0.1 percentage points to a –1.3 percentage point structural disadvantage of this region.

Table 4.5: **Decomposition results for employment growth in the cross-border metropolitan regions (effects in percentage points)**

	1996-2000	2000-2004	2004-2008	2008-2011
	Total Growth Difference to the EU			
Other EU-Regions	−0.1	0.3	0.0	−0.3
CENTROPE	−2.8	−1.0	0.0	2.0
EUREGIO Mahl	2.7	−2.3	−0.6	2.2
Oresund	1.6	−1.7	1.9	−0.6
Lille-transborder region	4.0	−0.3	−2.0	1.1
Strassburg-Offenburg	2.5	−1.1	−3.3	2.1
Silesian Moravian	−11.3	−6.8	5.5	2.9
Nice-Monaco-San Remo	3.0	6.9	0.9	2.0
	Of this: sector effect			
Other EU-Regions	−0.1	−0.2	−0.1	0.0
CENTROPE	0.2	0.8	0.3	−0.1
EUREGIO Mahl	1.2	2.1	1.1	0.6
Oresund	1.1	2.4	1.0	1.0
Lille-transborder region	0.4	1.7	0.4	0.6
Strassburg-Offenburg	0.2	1.5	0.3	0.3
Silesian Moravian	−2.0	−2.0	−1.5	−1.5
Nice-Monaco-San Remo	1.1	1.5	0.6	0.6
	Of this: regional effect			
Other EU-Regions	0.0	0.5	0.1	−0.2
CENTROPE	−3.0	−1.8	−0.3	2.1
EUREGIO Mahl	1.5	−4.4	−1.8	1.6
Oresund	0.5	−4.0	0.9	−1.5
Lille-transborder region	3.6	−2.0	−2.5	0.5
Strassburg-Offenburg	2.3	−2.6	−3.5	1.8
Silesian Moravian	−9.3	−4.8	7.0	4.4
Nice-Monaco-San Remo	1.9	5.3	0.3	1.4

Source: Cambridge Econometrics, own calculations, Note: table reports a decomposition of employment growth differentials relative to the EU-average according to equation (1).

Since 2008, however, despite a still highly favourable regional component, advantages with respect to GVA growth have declined somewhat, while – thanks to a slower productivity growth –the regional component with respect to employment growth has improved substantially. This once more is evidence that the major difference in the growth process of CENTROPE since 2008 to the times before are slower rates of productivity growth and a higher labour intensity of growth.

4.5.Sector Contributions

4.5.1. Productivity differentials and productivity growth

Summarizing our results so far we can therefore conclude that the rapid productivity growth of CENTROPE prior to the crisis was primarily rooted in a catching-up of many sectors to European productivity levels and that much of its improved growth performance in this period was due to a rapid increase of regional competitiveness (rather than a more favourable sector structure). Furthermore, we can also conclude that since 2008 productivity growth has been substantially more modest despite continued GVA growth. This has implied that growth has become more labour intensive and that regional competitiveness in terms of GVA has slightly decreased, while regional conditions have become more favourable of employment growth.

Further insights into the contributions of individual sectors to both the productivity catch-up as well as the improved regional competitiveness of the region can, however, be gained by analyzing the contribution of individual sectors to the decomposition results above. For instance table 4.6 displays the percentage point contribution of individual sectors to the overall regional and sector effects in our decomposition of productivity differential between CENTROPE and the other EU-regions. Focusing first on the contribution to the regional effects, we can see that in the 1996 to 2000 period the largest contribution to the overall lower productivity of CENTROPE arose from the lower real labour productivity in only three sectors in the economy: manufacturing & energy, financial intermediation and non-market services. Together the below EU 27-average productivity in these sectors contributed 20 percentage points to the 21.2 percentage point regional disadvantage of CENTROPE in productivity relative to the EU.

7Table 4.6: Detailed sector decomposition results for the real labour productivity differential between CENTROPE and the EU 27-average (contribution to total differential in percent of the EU 27-average)

	1996	2000	2004	2008	2011
	Regional Effects				
Agriculture	0.2	0.3	0.2	0.3	0.3
Construction	−0.7	−0.4	−0.4	0.1	−0.7
Distributive Services	−0.6	−2.0	−2.8	−3.1	−3.7
Manufacturing & Energy	−7.5	−7.5	−6.2	−2.9	−1.7
Financial intermediation	−8.3	−7.9	−8.2	−8.1	−8.7
Non-market Services	−4.4	−3.4	−2.3	−1.9	−1.3
	Sector Effects				
Agriculture	−0.7	−0.9	−0.6	−0.6	−0.7
Construction	0.9	0.4	0.2	−0.2	0.2
Distributive Services	0.4	0.8	0.9	1.1	1.0
Manufacturing & Energy	0.6	1.2	0.9	1.7	0.8
Financial intermediation	0.6	1.3	2.3	2.2	3.4
Non-market Services	0.0	0.0	−1.3	−1.4	−1.6
	Total				
Agriculture	−0.5	−0.6	−0.4	−0.3	−0.4
Construction	0.2	0.0	−0.2	−0.1	−0.5
Distributive Services	−0.2	−1.2	−1.9	−2.0	−2.7
Manufacturing & Energy	−6.9	−6.3	−5.3	−1.2	−0.9
Financial intermediation	−7.7	−6.6	−5.9	−5.9	−5.3
Non-market Services	−4.4	−3.4	−3.6	−3.3	−2.9

Source: Cambridge Econometrics, own calculations, Note: table reports contributions of individual sectors to a decomposition of real labour productivity according to equation (4) for the CENTROPE region.

One can also see that the major reason for the rapid catching-up of CENTROPE in 2008 is primarily a substantial improvement in the relative productivity of manufacturing (and to a lesser degree in non market services) in the time period under consideration. By 2008 the contribution of the manufacturing sector to the total productivity differential of CENTROPE relative to the EU had reduced from −6.9 percentage points in 1996 to only −1.2 percentage points in 2008. By contrast the development in distributive services was less favourable, here the productivity differential to the EU 27 increased in the period considered, so that in 1996 this sector only contributed −0.2 percentage points to the productivity gap of the CENTROPE, while by 2008 this contribution had increased to −2.0 percentage points.

The slower development of productivity since 2008 in CENTROPE by contrast is due to the development of the regional effect in distributive services and in construction. The contribution of these sectors to the total productivity differential of CENTROPE to the EU 27 increased after the crisis (form –2.0 percentage points to –2.7 percentage in distributive services and from –0.1 to –0.5 percentage points in construction). By contrast, manufacturing and financial services continued to improve their relative position in terms of productivity. The contribution of manufacturing to productivity differences fell to –0.9 percentage points in 2011 that of financial services to –5.3 percentage points.

In addition, when considering the contribution to the sector effects (in the bottom panel of table 4.6) we find that the higher than average share of employment in manufacturing and the below average share in distributive services and financial intermediation were the primary contributors to the positive sector effect.

Table 4.7: **Detailed sector decomposition results for real labour productivity growth in CENTROPE (in € 1,000 per employee in prices of 2000)**

	1996-2000	2000-2004	2004-2008	2008-2011
	Static structural effect			
Agriculture	−0.14	−0.07	−0.14	−0.05
Construction	−0.16	−0.03	−0.03	0.01
Distributive Services	0.21	0.24	0.12	−0.01
Manufacturing & Energy	−0.28	−0.40	−0.16	−0.79
Financial intermediation	0.83	0.79	0.63	0.51
Non-market Services	0.16	−0.07	−0.03	0.34
	Dynamic structural effect			
Agriculture	−0.03	−0.01	−0.02	0.00
Construction	−0.01	0.00	0.00	0.00
Distributive Services	0.01	0.00	0.00	0.00
Manufacturing & Energy	−0.05	−0.07	−0.04	−0.08
Financial intermediation	0.08	0.01	0.02	0.00
Non-market Services	0.01	0.00	0.00	0.01
	Sector growth effect			
Agriculture	0.14	0.16	0.14	0.02
Construction	0.09	0.01	0.14	−0.25
Distributive Services	0.34	0.14	0.22	−0.20
Manufacturing & Energy	1.01	1.01	1.84	0.84
Financial intermediation	0.55	0.11	0.29	0.03
Non-market Services	0.28	0.28	0.18	0.27

Source: Cambridge Econometrics, own calculations, Note: table reports the detailed results of a decomposition of real labour productivity growth according to equation (3).

Table 4.8: **Decomposition results for real GVA growth differential between CENTROPE and the EU 27-average (effects in percentage points)**

	1996-2000	2000-2004	2004-2008	20082011
	Sector effect			
Agriculture	0.0	−0.1	0.0	0.0
Construction	1.7	1.2	0.9	0.6
Distributive Services	5.7	3.6	2.6	1.0
Manufacturing & Energy	−3.5	−2.9	−1.9	1.6
Financial intermediation	−4.3	−2.5	−1.8	−2.7
Non-market Services	0.2	0.8	0.2	−0.7
	Regional effect			
Agriculture	−0.2	0.1	0.1	−0.1
Construction	−0.4	−0.3	0.1	−0.2
Distributive Services	−1.8	−1.0	−0.1	−0.4
Manufacturing & Energy	0.1	1.1	5.6	0.7
Financial intermediation	1.7	0.9	0.5	1.3
Non-market Services	0.3	−0.6	0.4	1.1
	Allocation effect			
Agriculture	0.0	0.0	0.0	0.0
Construction	−0.1	−0.1	0.0	0.0
Distributive Services	−0.4	−0.2	0.0	0.0
Manufacturing & Energy	0.0	−0.1	−0.5	0.1
Financial intermediation	−0.2	−0.1	0.0	−0.1
Non-market Services	0.0	0.0	0.0	0.0

Source: Cambridge Econometrics, own calculations, Note: table reports detailed sector decomposition results of GVA growth differential in CENTROPE according to equation (2).

The rapid productivity catch-up of CENTROPE region until 2008 relative to the EU 27 average is thus closely linked to the rapid productivity development in the manufacturing sector of CENTROPE. This is also confirmed when considering the detailed sector results of our decomposition of productivity growth (i.e. detailed results with respect to the decomposition presented in equation (4) above). According to these results depending on the period considered in total between € 1,000 to €1,800 per employee of the total productivity growth (of between € 1,700 to € 2,800 per employee) in CENTROPE is accounted for by the sector growth effect in manufacturing. Only in the period from 2008 to 2011 this contribution was slightly lower in absolute terms (€ 840 per employee). Nonetheless productivity growth in manufacturing alone contributed almost 50 percent to total productivity growth of CENTROPE in the years from 1996 to 2011 (table 4.7). Furthermore, the results for the static structural effect also suggest that the increase in employment share in financial services was another important contributor to total productivity growth. This contributed about another quarter to total productivity growth in

the time period considered. By contrast the contribution of most other sectors to the individual effects remains negative or small in absolute terms, both before and after 2008.

4.5.2. GVA and employment growth

Similarly also the detailed sector decomposition results for the GVA growth differential between CENTROPE and the EU 27-average real GVA growth rate point to the important role of the manufacturing sector in driving the substantial increase in the competitiveness of the region from 1996 to 2011. Of the total increase in the regional effect of GVA growth of 6.7 percentage points in the time period 2004 to 2008 considered, 5.6 percentage points can be accounted for by the increased contribution of the manufacturing sector to this component. Thus even at constant GVA shares the manufacturing sector growth contributed about 5.6 percentage points to total GVA growth in the time period from 2004 to 2008, while the next most important sector financial intermediation contributed only a further 0.5 percentage points. By contrast since 2008 the positive contributions financial intermediation and non-market services to the regional effect were more important than those of manufacturing.

The contribution of the individual sectors to the above average growth performance and the improved competitiveness of CENTROPE with respect to employment growth differential was slightly more balanced (see table 4.9). In the 2004 to 2008 period the manufacturing sector only contributed 0.7 percentage points to the total regional growth effect in CENTROPE and of the total 2.7 percentage point improvement of this effect relative to the 1996 to 2000 period only 0.8 percentage points can be explained the manufacturing sector, while 1.1 percentage points are accounted for by distributive services and a further 1.4 percentage points by financial services and 0.4 percentage points by distributive services. Since 2008 here financial and distributive services as well as manufacturing have increased their positive contribution, while the contribution of all other sectors has been negative.

Table 4.9: Decomposition results for employment growth differential between CENTROPE and the EU-average (effects in percentage points)

	1996-2000	2000-2004	2004-2008	2008-2011
	Sector effect			
Agriculture	−1.4	1.2	−0.3	−0.1
Construction	−0.7	−0.3	−0.5	0.7
Distributive Services	−0.3	−0.1	0.1	0.4
Manufacturing & Energy	−0.1	−0.4	0.7	−0.3
Financial intermediation	0.0	0.3	−0.1	0.9
Non-market Services	−0.7	−2.1	−0.2	0.4
	Regional effect			
Agriculture	−2.4	−2.4	−1.5	−1.5
Construction	1.1	0.5	0.2	−0.3
Distributive Services	0.5	0.9	1.1	1.2
Manufacturing & Energy	0.6	1.0	0.8	1.3
Financial intermediation	0.3	0.7	1.4	1.2
Non-market Services	0.0	0.0	−1.8	−1.9
	Allocation effect			
Agriculture	0.4	−0.4	0.1	0.0
Construction	−0.1	0.0	0.0	0.0
Distributive Services	0.0	0.0	0.0	0.0
Manufacturing & Energy	0.0	0.0	0.0	0.0
Financial intermediation	0.0	0.0	0.0	0.1
Non-market Services	0.0	0.0	0.0	0.0

Source: Cambridge Econometrics, own calculations, Note: table reports detailed sector decomposition results of employment growth differentials in CENTROPE according to equation (2).

4.6. Regional Differentiation

In sum therefore both the substantial catching-up of CENTROPE in terms of real labour productivity as well as its' improved regional competitiveness and growth performance in the period from 2004 to 2008, are closely linked to the performance of the manufacturing sector in this region, while the somewhat slower productivity growth since 2008 is mainly due to a less rapid development in financial and distributive services. As has, however, often been pointed out in the literature on this region, CENTROPE is a very heterogeneous region both in terms of structure and growth performance. Thus aside from focusing on differences among sectors – as in the last section – it may also be of importance to consider differences among regions in terms of productivity, GDP and employment growth behaviour.

4.6.1. Productivity and productivity growth decomposition

Here, performing decompositions for individual regions we find vast differences in productivity and competitiveness between the individual NUTS 3-regions of CENTROPE. In particular, real labour productivity ranged from 148.3% of the EU-average in Vienna to only 27.5% of the EU-average in Vas in 2011 and in particular Vienna and its environs reached real labour productivity levels well in excess of the EU-average, while the EU 10-country regions of CENTROPE in general had productivity levels well below the EU-average in 2011 (see table 4.10). These differences also apply to the individual components contributing to these productivity differentials among the CENTROPE regions. Here in particular – as evidenced by the negative sector effect – most of the Austrian regions (all except for Vienna and the southern Vienna environs) are specialized in sectors with low productivity, but a positive region effect in all Austrian regions compensates for this and leads to productivity being higher than in the EU-average in all Austrian CENTROPE regions but central and southern Burgenland as well as the Waldviertel. By contrast the EU 10-regions of CENTROPE, which as pointed out for instance in Rozmahel et al (2010) are much more strongly industrialized than the Austrian CENTROPE regions are all specialized in sectors with high productivity levels, as is shown by the positive sector effect on regional productivity (for all regions but Györ-Moson-Sopron and Trnava). The substantially lower than average total real labour productivity of the EU 10-country regions of CENTROPE is therefore almost exclusively due to the highly negative regional component on productivity levels.

As also shown in table 4.11 the rapid catching-up in productivity levels relative to the EU 27 in the CENTROPE until 2008 is a feature shared by almost all CENTROPE regions. All of the individual CENTROPE regions had higher relative real labour productivity levels in 2008 than in 1996. The decline in productivity growth in CENTROPE since 2008, however, has also affected all regions and in some Austrian as well as all Hungarian regions of CENTROPE productivity actually declined from 2008 to 2011. Furthermore, in most regions the reasons for this improved relative real labour productivity was an improved regional component. Among the regions in which relative real labour productivity improved in the time period between 1996 and 2008 the change in sector structure (i.e. the change in the sector effect) contributed more to this improvement than the regional effect

Table 4.10: Decomposition results for the real labour productivity differential between individual CENTROPE regions and the EU-average (in% of EU-average)

Region	1996			2000			2004			2008			2011		
	Total	Region effect	Sector effect	Total	Region effect	Sector effect	Total	Region effect	Sector effect	Total	Region effect	Sector effect	Total	Region effect	Sector effect
Mittelburgenland	−14.7	3.5	−18.2	−7.6	7.7	−15.4	−2.8	10.6	−13.4	−4.5	8.8	−13.3	−8.7	5.0	−13.7
Nordburgenland	7.9	21.3	−13.4	5.7	17.2	−11.5	10.4	19.2	−8.8	5.7	14.3	−8.6	4.6	13.6	−8.9
Südburgenland	−19.8	0.6	−20.4	−14.4	0.7	−15.1	−13.6	−1.1	−12.4	−9.0	2.2	−11.2	−12.8	−2.1	−10.7
Mostviertel-Eisenwurzen	−1.0	12.3	−13.3	0.4	12.1	−11.6	4.0	13.8	−9.9	16.9	24.7	−7.7	16.9	23.6	−6.6
Niederösterreich Süd	9.9	15.0	−5.1	9.1	13.0	−4.0	12.8	17.5	−4.8	12.2	16.5	−4.3	11.5	15.7	−4.3
St. Pölten	12.7	16.5	−3.8	14.7	17.5	−2.8	15.2	18.7	−3.5	16.3	20.0	−3.6	14.8	17.9	−3.0
Waldviertel	−3.6	11.5	−15.1	−3.9	10.7	−14.6	−7.5	6.1	−13.6	−7.1	6.1	−13.2	−9.9	3.4	−13.4
Weinviertel	0.4	18.4	−18.0	1.5	18.2	−16.7	−0.2	16.1	−16.3	0.6	17.1	−16.4	−3.0	13.5	−16.5
Wr. Umland Nord	20.1	26.0	−5.9	23.9	27.1	−3.2	21.5	25.1	−3.6	25.6	28.9	−3.3	24.6	27.6	−3.0
Wr. Umland Süd	29.7	27.6	2.2	41.6	39.1	2.5	35.7	33.9	1.8	49.5	47.7	1.8	47.8	45.9	1.9
Vienna	50.1	37.8	12.2	46.2	34.4	11.8	46.3	36.4	9.9	48.3	39.1	9.2	48.3	38.8	9.6
South Moravia	−71.3	−74.7	3.4	−73.0	−76.1	3.1	−71.0	−74.5	3.5	−67.3	−70.8	3.4	−70.8	−74.5	3.6
Gyor-Moson-Sopron	−73.3	−65.0	−8.3	−64.6	−62.2	−2.5	−65.4	−62.0	−3.3	−62.4	−61.5	−0.9	−66.2	−65.9	−0.4
Vas	−74.4	−66.8	−7.6	−70.7	−67.5	−3.2	−71.0	−67.6	−3.4	−68.4	−68.5	0.0	−73.5	−73.9	0.4
Bratislava region	−66.9	−76.7	9.7	−65.7	−75.3	9.6	−62.5	−71.4	8.9	−51.6	−59.9	8.3	−51.7	−61.1	9.4
Trnava Region	−74.5	−66.7	−7.8	−72.7	−68.0	−4.7	−71.0	−68.7	−2.3	−57.7	−56.0	−1.7	−59.2	−58.4	−0.9

Source: Cambridge Econometrics, own calculations. – Note: table reports a decomposition of real labour productivity according to equation (4).

Table 4.11: **Decomposition results for real labour productivity growth in the CENTROPE regions (effects in € 1,000)**

Region	1996-2000				2000-2004				2004-2008				2008-2011			
	Total	sse	dse	sge	Total	sse	dse	sge	Total	sse	dse	sge	Total	sse	dse	sge
Mittelburgenland	5.4	1.5	−0.1	4.0	4.0	0.7	−0.3	3.7	0.7	0.5	−0.2	0.3	−1.0	−0.2	−0.1	−0.7
Nordburgenland	2.5	1.7	−0.3	1.0	4.3	1.6	−0.3	2.9	−0.4	0.5	0.0	−0.8	0.3	−0.1	−0.1	0.4
Südburgenland	4.6	2.9	−0.1	1.8	2.2	1.2	−0.1	1.1	3.2	1.0	0.0	2.2	−0.7	0.4	0.0	−1.1
Mostviertel-Eisenwurzen	3.6	0.8	0.0	2.8	3.7	0.6	−0.1	3.2	7.0	1.3	0.0	5.7	0.5	0.2	−0.1	0.5
Niederösterreich Süd	3.1	0.5	−0.2	2.8	3.9	0.0	−0.1	4.0	1.4	0.5	0.0	0.9	0.3	−0.2	−0.1	0.5
St. Pölten	4.3	0.8	−0.2	3.7	2.7	0.1	−0.3	2.9	2.1	0.6	0.0	1.5	−0.1	0.1	0.0	−0.2
Waldviertel	2.9	0.7	0.0	2.2	0.7	0.4	−0.1	0.4	1.5	0.5	−0.1	1.1	−0.4	0.0	0.0	−0.3
Weinviertel	3.6	1.3	−0.1	2.3	1.6	0.3	−0.1	1.4	1.8	0.2	0.0	1.5	−0.8	0.1	0.0	−0.9
Wr. Umland/Nord	5.2	1.2	−0.3	4.3	1.8	−0.2	−0.4	2.3	3.5	0.5	−0.1	3.1	0.1	−0.3	0.0	0.4
Wr. Umland/Süd	8.6	−0.3	−0.7	9.7	0.7	−0.8	0.2	1.4	7.8	0.0	−0.2	8.0	−0.5	−0.8	−0.1	0.4
Vienna	3.2	0.5	−0.1	2.8	3.3	0.2	−0.2	3.3	3.0	0.2	−0.1	2.8	0.2	−0.3	0.0	0.5
South Moravia	0.2	0.0	0.0	0.2	1.4	0.1	0.0	1.4	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.1
Gyor-Moson-Sopron	4.2	1.0	−0.5	3.7	0.5	−0.2	0.0	0.7	1.8	0.4	0.0	1.4	−0.2	−0.2	−0.1	0.0
Vas	2.2	0.7	−0.2	1.8	0.5	−0.1	−0.1	0.8	1.5	0.9	−0.6	1.3	−0.6	0.0	−0.1	−0.5
Bratislava region	1.5	0.2	0.0	1.4	2.1	0.1	−0.2	2.1	5.2	−0.1	0.0	5.3	1.2	−0.3	−0.1	1.7
Trnava Region	1.5	0.2	−0.2	1.5	1.3	0.4	−0.1	1.0	6.1	−0.1	−0.3	6.5	0.7	−1.3	−0.4	2.4

Source: Cambridge Econometrics, own calculations. – Note: table reports a decomposition of real labour productivity growth according to equation (3). Total= total productivity growth in percent   sse= Static structural effect, dse= Dynamic structural effect, sge= Sector growth effect.

only in Trnava and Südburgenland, and also among the few regions where relative real labour productivity declined, this was solely due to the negative development of the regional component.

In sum therefore the catching-up of CENTROPE in terms of relative real labour productivity until 2008 was relatively uniformly based on a strongly improved productivity performance of the individual sectors in CENTROPE and mostly unrelated to structural change. The decline in productivity growth, since 2008 is, however, also due to a broad based decline in almost all regions.

Once more this is confirmed by the decomposition of productivity growth as proposed (in equation 4). According to this decomposition (see table 4.11) in all of the sub-periods and the overwhelming part of the regions considered the sector growth effect (i.e. productivity improvements within individual sectors) were the most important driving force contributing to productivity growth until 2008, while the static structural effect was the second most important. The only exceptions to this were southern and northern Burgenland in the period from 1996 to 2000, Southern Burgenland in the period from 2000 to 2004 and northern and central Burgenland in the period 2004 to 2008. In these regions the static structural effect (i.e. structural change to more productive sectors) was more important than the sector growth effect, while the dynamic structural effect remained rather small (and mostly negative) in all regions and all periods. Again this stylized fact has changed slightly since 2008, since in the period 2008 to 2011 the sector growth effect has reduced substantially in all regions and even become negative in some Austrian and Hungarian regions of CENTROPE.

4.6.2. GVA and employment growth

Thus while productivity levels and their determinants vary widely among CENTROPE regions, the higher than average productivity growth of CENTROPE in the time 1996 to 2008 as well as the more modest growth since 2008 applies to almost all individual sub-regions of CENTROPE and is mostly based on the productivity growth experiences across individual sectors rather than rapid structural change. This rather uniform development found for productivity growth, however, does not apply of regional competitiveness. Performing a decomposition of GVA and employment growth rates (as proposed in equation (1)) for the individual NUTS 3-regions of CENTROPE (see tables 4.12 and 4.13) shows that first of all there is substantial heterogeneity in the development of the regional component of this decomposition among individual CENTROPE regions and second of all, that the in aggregate improved regional

Table 4.12: Decomposition results for real GVA growth differentials to the EU in the CENTROPE regions (effects in percentage points)

	1996-2000			2000-2004			2004-2008			2008-2011		
	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect
Mittelburgenland	1.3	−2.3	3.7	3.9	−0.8	4.7	−1.1	−1.4	0.3	−0.4	−0.8	0.4
Nordburgenland	2.6	−1.6	4.1	6.9	−0.2	7.1	−2.4	−0.9	−1.5	1.0	−0.1	1.1
Südburgenland	1.0	−2.0	2.9	0.2	−0.6	0.8	4.2	−1.1	5.3	0.0	−0.3	0.3
Mostviertel-Eisenwurzen	2.2	−1.3	3.6	2.4	−0.8	3.2	12.0	−1.6	13.5	2.6	−1.1	3.7
Niederösterreich Süd	−2.3	−1.2	−1.1	2.4	−0.7	3.1	−0.2	−1.3	1.1	1.7	−0.7	2.4
St. Pölten	0.3	−1.4	1.7	−2.1	−0.3	−1.9	3.6	−0.6	4.2	0.8	−0.3	1.1
Waldviertel	−2.7	−1.6	−1.1	−6.1	−0.5	−5.6	−2.9	−1.4	−1.6	−0.3	−0.3	−0.1
Weinviertel	−3.9	−2.1	−1.8	−5.9	−0.3	−5.6	−4.6	−1.6	−3.0	−2.1	0.2	−2.3
Wr. Umland/Nord	3.9	−0.8	4.8	0.2	−0.4	0.6	5.1	−0.8	5.9	2.8	−0.7	3.5
Wr. Umland/Süd	13.2	0.7	12.6	−2.0	0.0	−2.0	14.2	0.0	14.2	1.2	−0.8	2.0
Vienna	−2.0	0.4	−2.4	−2.1	0.5	−2.7	1.7	1.0	0.7	2.8	0.3	2.5
South Moravia	−14.7	−0.4	−14.3	3.6	−0.3	4.0	13.8	−1.0	14.8	−0.8	−0.8	0.0
Gyor-Moson-Sopron	43.1	0.0	43.1	−5.2	−1.1	−4.1	3.8	−2.0	5.9	−2.8	−1.1	−1.7
Vas	18.3	−0.1	18.4	−5.7	−1.0	−4.7	−5.6	−2.1	−3.5	−10.1	−0.6	−9.5
Bratislava region	−0.7	0.6	−1.3	13.5	0.2	13.2	40.2	0.0	40.3	7.3	−0.4	7.7
Trnava Region	−8.3	−0.8	−7.5	13.5	−0.8	14.3	51.1	−2.4	53.5	−1.4	−1.8	0.4

Source: Cambridge Econometrics, own calculations. – Note: table reports a decomposition of GVA growth differential to the EU-average according to equation (1).

Table 4.13: Decomposition results for employment growth differentials to the EU in the CENTROPE regions (effects in percentage points)

	96-00			00-04			04-08			04-08		
	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect	Total growth	Sector effect	Regional effect
Mittelburgenland	−6.8	−1.8	−5.0	−1.5	−2.7	1.2	0.7	−1.5	2.2	3.7	−1.1	4.8
Nordburgenland	4.5	−0.8	5.3	1.9	−1.5	3.4	2.3	−0.9	3.1	2.1	0.1	2.1
Südburgenland	−5.8	−1.7	−4.1	−0.7	−3.0	2.2	−1.4	−1.7	0.3	3.5	−0.3	3.9
Mostviertel-Eisenwurzen	0.6	−1.6	2.2	−1.3	−3.1	1.8	−1.4	−2.0	0.6	3.2	−1.1	4.3
Niederösterreich Süd	−1.4	−0.8	−0.6	−1.1	−0.4	−0.6	0.3	−0.8	1.1	2.8	−0.5	3.3
St. Pölten	−1.6	0.0	−1.6	−2.4	0.7	−3.1	2.4	0.1	2.3	2.6	0.3	2.3
Waldviertel	−2.2	−1.2	−0.9	−2.1	−3.2	1.2	−3.3	−2.1	−1.2	2.3	−0.4	2.6
Weinviertel	−4.7	−1.0	−3.7	−4.0	−2.9	−1.1	−5.3	−2.0	−3.3	1.4	0.0	1.4
Wr. Umland/Nord	0.4	−0.6	0.9	2.1	−0.2	2.4	1.4	−0.4	1.8	4.4	−0.2	4.6
Wr. Umland/Süd	2.4	0.4	2.1	2.4	1.4	1.0	2.8	0.8	2.0	3.7	0.0	3.7
Vienna	0.8	2.1	−1.2	−2.1	3.4	−5.4	0.1	2.2	−2.0	4.2	1.3	2.9
South Moravia	−7.9	−0.5	−7.4	−3.7	−0.1	−3.6	0.1	−0.2	0.3	0.6	−1.0	1.6
Gyor-Moson-Sopron	4.7	−1.9	6.5	−2.8	−0.8	−2.0	−4.9	−1.4	−3.6	−0.2	−1.5	1.3
Vas	1.6	−2.1	3.7	−4.3	−1.4	−2.9	−13.6	−1.9	−11.6	−4.2	−1.4	−2.8
Bratislava region	−4.3	1.3	−5.6	3.1	2.3	0.9	6.3	1.4	4.8	2.9	0.2	2.6
Trnava Region	−14.1	−2.0	−12.1	6.2	−1.1	7.3	0.9	−1.3	2.1	−3.5	−1.4	−2.1

Source: Cambridge Econometrics, own calculations. – Note: table reports a decomposition of employment growth differential to the EU-average according to equation (1).

competitiveness of CENTROPE in the time period from 2004 to 2008hinges crucially on the good development of the Slovak CENTROPE regions in this time period. The somewhat weaker development since 2008, however, is also primarily due to reduction of the regional effect in the Slovak CENTROPE.

Thus for instance when conducting the decomposition for regional GVA growth differentials (relative to the EU-average) as in table 4.12 we find that the regional effect increased only in 7 out of 11 Austrian CENTROPE regions as well as in southern Moravia and most substantially in the Slovak CENTROPE region, between the time periods 1996 to 2000 and 2004 to 2008, while its decreased (or stagnated) in another 4 out of 11 NUTS 3-regions of the Austrian CENTROPE as well as in both Hungarian CENTROPE regions. Similarly, also the regional effect for employment growth increased only in 6 out of 11 Austrian CENTROPE regions and southern Moravia and in the Slovak CENTROPE but decreased in 5 out of 15 Austrian CENTROPE regions as well as the Hungarian CENTROPE regions.

The substantial aggregate increase in the regional competitiveness of the CENTROPE therefore is based on a rather heterogeneous development of individual regions and a rather spectacular improvement in the Slovak CENTROPE in 2004 to 2007. In this region the regional effect still contributed negatively to both GVA and employment growth in the 1996 to 2000 period. In Trnava region the contribution to aggregate GVA growth of this effect was –8.3 percentage points, in Bratislava region –0.7 percentage points in the 1996 to 2000 period and the respective figures for employment growth were –14.1 percentage points (Trnava region) and –4.3 percentage points (in Bratislava). By the 2004 to 2008 period, by contrast the regional effect contributed 53.5 percentage points to total GVA growth in that time period in Trnava region and 40.3 percentage points in Bratislava. Similarly the equivalent figures for employment growth had improved dramatically to 4.8 percentage points in Bratislava region and 2.1 percentage points in Trnava region.

The partial decline in regional competitiveness of CENTROPE since 2008 is, however, also strongly focused on the Slovak regions of CENTROPE since regional effect contributed only 0.4 percentage points to total GVA growth in that time period in Trnava region and 7.7 percentage points in Bratislava. Similarly the equivalent figures for employment growth reduced substantially to 2.6 percentage points in Bratislava region and –2.1 percentage points in Trnava region.

4.7.Conclusions

This chapter of the regional development report for CENTROPE was concerned with a detailed analysis of the rapid catch-up process in terms of productivity levels and the strongly improved growth performance both in terms of employment and real GVA growth in CENTROPE in the last one and half decades. We find a number of stylized facts that are particular to CENTROPE in a comparison to the EU-average as well as to other cross-border metropolitan regions in the EU.

In particular we find that – in contrast to most other cross-border metropolitan regions in the EU which in 1996 had real productivities well in excess of the EU 27 average – GVA growth in the CENTROPE – where real productivity growth was lower than in the EU 27-average – was driven mainly by increasing productivity rather than employment growth (i.e. was intensive rather than extensive) until 2008. This therefore reflects positively on the development of the competitiveness in the region, but also warns that – since productivity is still below the EU-average in aggregate – CENTROPE needs higher growth rates of GVA than most other cross-border metropolitan regions to increase employment and thus improve its labour market performance.

We, however, also find that while according to preliminary estimates both GVA and employment growth also exceeded the EU 27 average in the post crisis period 2008 to 2011 productivity catch-up was much slower than in the previous period and that growth patterns moved substantially from a more intensive to a more extensive growth pattern in this period.

Furthermore, we also find that much of the productivity catch-up in CENTROPE occurred due to productivity growth within sectors rather due to a specialization on high productivity growth sectors and that this improvement of the "regional" factor of the productivity is strongly associated with the productivity growth in the manufacturing. While this stylized fact also applies to most other cross-border regions, the much higher rates of productivity growth in particular in the years from accession of the EU 10-countries to the EU to 2008, suggests that the substantial foreign direct investments that have gone into this regions (see Römisch et al 2010) have led to substantial spill-over effects in terms of productivity growth in the region.

Interestingly we also find that (according to the preliminary data for the period 2008 to 2011) while the manufacturing sector – although growing more slowly – has continued to improve its relative productivity, slow productivity growth since 2008 is closely associated with reduced productivity growth in some market services sectors. From a policy perspective this therefore suggests that aside from the industrial policy strategies

focusing strongly on the attraction of FDI's also the service industries may require some policy support to increase productivity and competitiveness.

Finally, we find that the improved growth performance both in terms of GVA and employment has been associated with a rapid improvement in the regional growth effect of CENTROPE, suggesting that much of the good growth performance has been due to an improved general competitiveness of the region, which obviously offers rather favourable conditions for growth to the enterprises located in the region. Although according to preliminary data for 2008 to 2011 some of this improvement in regional competitiveness has been lost during the crises, CENTROPE still had the second highest regional growth effect among all polycentric cross-border metropolitan regions in EU 27 and may thus be considered as a highly competitive location of production in the EU 27.

While these factors reflect positively on the development on the competitiveness of CENTROPE in the EU and in particular among the cross-border metropolitan regions, we also find large regional disparities in the causes of regional growth among the individual CENTROPE NUTS 3-regions. Here while above EU-average productivity growth rates are a feature of almost all CENTROPE NUTS 3-regions there are still sizeable productivity differences between the EU 15-country and EU 10-country parts of this region and the in aggregate much improved regional effect on employment and GVA growth in the period 2004 to 2008 as well as the slight reduction in the 2008 to 2011 period seems to be strongly linked to the developments in the Slovak NUTS 3-regions of CENTROPE.

5. Changes in Population Structure and Demographic Challenges in CENTROPE

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5.1.Introduction

The demographic trends in the last decades show significant differences in different parts of the world. The development is characterised by high birth rates and population growth in the developing countries and declining birth rates, increasing life expectancy and a general trend towards population ageing in the developed countries. These later demographic challenges are especially relevant for European countries, most of which are experiencing all of the above mentioned demographic developments.

These trends also raise important issues on how to eliminate or at least reduce the impact of these shifts in population structure. In particular it is often argued that demographic ageing and population decline are putting pressures on the pension and health care system as well as the sustainability of public finances. Furthermore, it is also often argued that demographic decline and ageing may lead to labour shortage in future and thus threaten the competitiveness of regions such as the CENTROPE, whose primary source of competitiveness is a highly skilled labour force. The failure to address the demographic changes of the future could therefore have important implication on the sustainability of economic development in most developed countries and regions.

However, it should be emphasised, that although population ageing and demographic changes in general are perceived as negative phenomena, they are the result of the successful development of western civilization in the post second world war period. The progress in science, research and development, healthcare and the general increase in quality of life (measured by various types of indicators) is contributing to increasing longevity of the population. Ageing of the population also creates opportunities for new types of products and services focused on elderly people (the so called emergence of the silver economy). It can be assumed that this market, for the most part, is relatively untapped and represents substantial long-term growth potential. This would, however, entail a more long-term investment and commitment. Still, it can be assumed that the market will be huge[19]. Therefore it is crucial to address the

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[19] http://www.innoconnections.com/opportunities/silver-economy-ageing-population.html.

demographic changes and use them as an opportunity to maintain the existing economic and social cohesion in our societies.

Taking this into account, it is important to identify the development of demographic changes in CENTROPE during the last decade and to address the challenges posed by the expected (projected) demographic development of the future. In this chapter we therefore first of all (in the next section) shortly summarize the demographic development of CENTROPE in the last decade. We show that while the population was still growing in the last decade in almost all regions in CENTROPE, demographic ageing has been a phenomenon observed in each and every region (except for stagnation in Vienna). Second of all (in the third section) we also summarize the results of different population forecasts. We find that although individual forecasts differ in their concrete predictions a common stylized fact found in all available forecasts is that – on account of substantial in-migration (in particular in the Austrian CENTROPE) – population will not decline. Different forecasts, however, also agree that the active aged population will decline in some regions of the CENTROPE and in the CENTROPE average in the next two decades.

This clearly opens the question as to whether labour supply will reduce in CENTROPE in the next two decades. Here we show that a lot depends on the development of activity rates in the labour market. In most regions of CENTROPE an increase in economic activity rates by less than 6 percentage points will suffice to sustain current labour supply, with only the Slovak CENTROPE regions performing somewhat less positively. If activity rates could be increased to the current best practice level in the EU (i.e. the 83.8% currently found in Denmark) there would even be a substantial increase in labour supply (by around 350 thousand persons). In the policy conclusions in section four we therefore conclude that policies at increasing activity rates are therefore the most important component to securing continued high labour supply in CENTROPE.

5.2. Population Structure in the CENTROPE

5.2.1. Changes in total population

Gradual changes in population structure are visible in the all CENTROPE regions in the last decade. In 2010 the total population of CENTROPE regions reached 6.6 million. Since 2001 the population therefore increased by 288,219 persons (figure 5.1). Compared to 2001, the highest increase of population (by 143,087) was recorded in the Austrian region of Vienna (figure 5.2). In relative terms the population of Vienna grew by 9.2%. The Bratislava region was the second best performing region in terms of

population growth with 4.9% followed by Lower Austria with 4.4% and Györ-Moson-Sopron with 3.3%. Thus as a rule more highly urbanised spaces have seen more rapid demographic growth in the last decade than more rural and peripheral regions, such as Burgenland or Vas – where the population actually declined.

Figure 5.1: Changes in the number of population in 2010 relative to 2001 (absolute values)
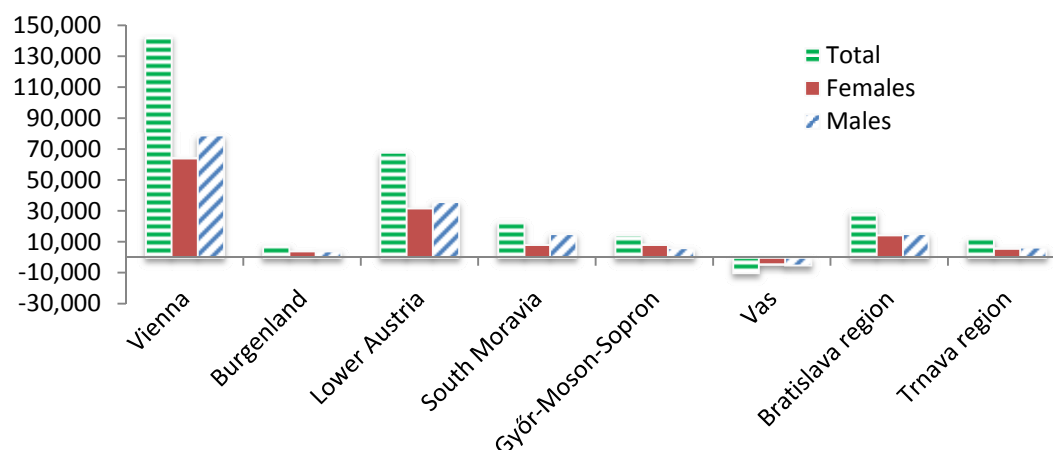
Source: own calculations, national statistics offices.

These demographic trends were closely linked to migratory movements in the last decade. In this respect most CENTROPE regions are net immigration regions and have experienced increasing immigration in the last decade. In the Slovak and Czech CENTROPE regions net migration contributed slightly to the overall population growth. In South Moravia net migration reached 1,472 people in 2010. In 2001 net migration in South Moravia by contrast was negative. The number of emigrants was higher by 1,463 than the number of immigrants. In Bratislava region net migration contributed to 4,370 people to total population growth in 2010, compared to 1200 in 2001. Similar developments can be observed in Trnava region, where the net migration went up to 1,590 in 2010 compared with 765 in 2001. Similarly also the Austrian CENTROPE region experienced immigration throughout the last decade. Here, however, in contrast to the other parts of CENTROPE migration aside from suburbanisation processes between Vienna and Lower Austria also migration from abroad plays an important role. In particular in Vienna this led to an increase the share of foreign born in total population to almost 40%, while international migration flows to the EU 10 parts of CENTROPE have remained rather low. This therefore suggests that while the ethnic diversity of the population is rising in almost all CENTROPE regions, the region which

has the largest challenges to face from integrating a large foreign born labour force is Vienna.

Figure 5.2: Growth of population in CENTROPE regions in 2010 relative to 2001 (in%)
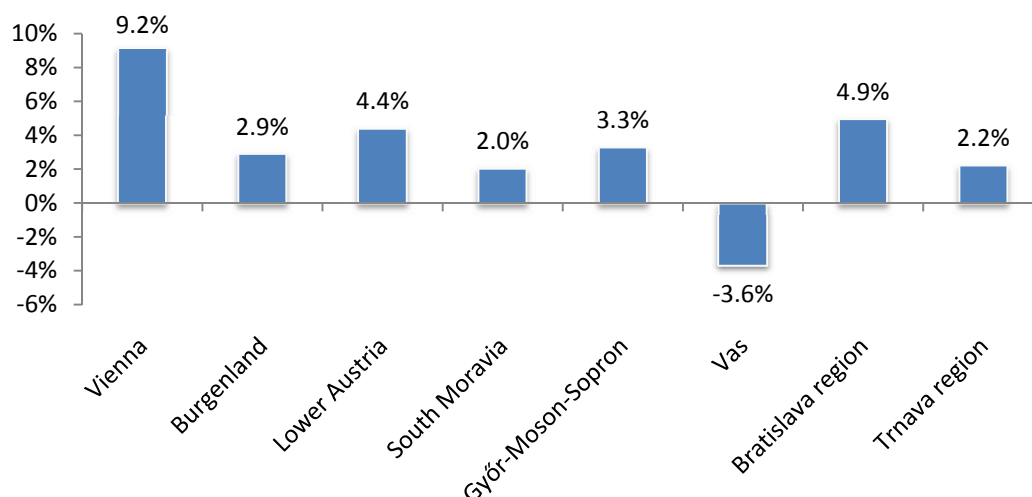
Source: own calculations, national statistics offices.

The rapid increase in population of the Vienna region also increased the population share of the Austrian CENTROPE in the total of CENTROPE's population by one percentage point until 2010 (figure 5.1). The Austrian regions of Vienna, Lower Austria and Burgenland therefore together represent the highest share on total CENTROPE population with 54.1% followed by the regions of Bratislava and Trnava with 17.4% and South Moravia with 17.4%. The Hungarian regions represent 10.6% of CENTROPE's total population.

5.2.2. Changes in the age structure of population

In order to provide a better picture on the demographic changes, it is necessary to divide the population into individual age groups. The first group we analyse consists of the population in the pre-productive age (0-14 years). The second and largest group is the population at productive age (15 – 64 years) and the last group is composed of citizens in the post-productive age (65 years and older).

The changes of the individual age groups during the last decade show a similar basic pattern in all CENTROPE regions. We can observe a general decline in the pre-productive population and an increase in the population at productive age but an especially rapidly growing number of people in the post-productive age.

Figure 5.3: Share of individual regions on total CENTROPE population, 2001 – 2010
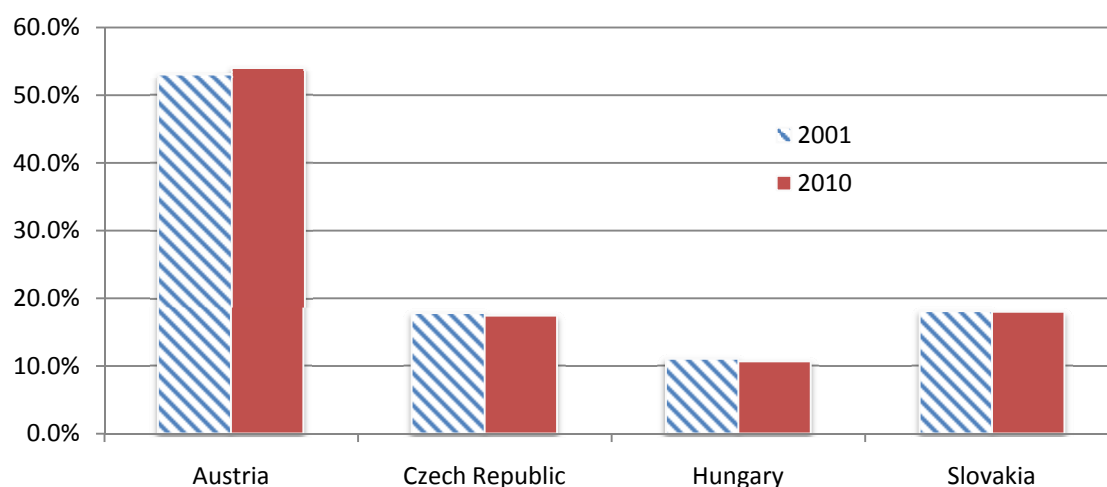
Source: own calculations, national statistics offices.

Table 5.1:   Changes in the population by age groups in 2010 relative to 2001

	Total			Women			Men		
	0 - 14	15 - 64	65+	0 - 14	15 - 64	65+	0 - 14	15 - 64	65+
Vienna	13.69	89.97	39.43	6.40	45.51	12.31	7.29	44.46	27.12
Burgenland	−3.96	6.16	5.83	−1.90	3.76	2.03	−2.06	2.40	3.81
Lower Austria	−22.62	37.83	52.53	−11.31	22.52	20.51	−11.31	15.31	32.02
South Moravia	−14.69	13.94	23.87	−7.33	3.73	11.55	−7.37	10.21	12.32
Győr-Moson-Sopron	−4.23	11.25	7.21	−2.01	5.29	5.02	−2.22	5.96	2.19
Vas	−7.95	−4.60	2.76	−3.84	−2.61	1.88	−4.11	−1.99	0.89
Bratislava region	−5.97	26.61	9.0	−3.10	12.01	5.44	−2.87	14.60	3.56
Trnava region	−18.49	21.78	8.87	−8.99	9.39	5.39	−9.50	12.39	3.49
Total CENTROPE	**−64.22**	**202.93**	**149.51**	**−32.08**	**99.59**	**64.12**	**−32.14**	**103.34**	**85.39**

Source: own calculations, national statistics offices.

The only region in CENTROPE which has recorded an increase in the pre-productive age group in the last decade is Vienna with an increase of the population aged between 0 and 14 years by 13,686 citizens. This is due to on the one hand side the suburbanisation processes going on between Vienna and Lower Austria, which leads to many productive age persons moving to the Lower Austrian suburbs and on the other hand side to higher fertility rates among the younger foreign born immigrant population in Vienna. Moreover the region of Lower Austria, due to the already mentioned suburbanisation processes and a large share of more rural peripheral

regions (such as e.g. the Waldviertel) is experiencing the highest increase in the post-productive age population and largest decline in the pre-productive age population.

The development in the individual regions resulted in an increase of productive age population by 202,930 and post-productive age population by 149,507 in CENTROPE in the last decade. The increase of population in the pre-productive age in Vienna was not able to compensate for the general decline in all remaining regions, so that in 2010 64,218 fewer people in the age for 0 to 14 years lived in the CENTROPE than a decade ago.

Table 5.2: **Share of individual age groups on total population of the individual regions (%)**

	2001			2010			Changes in p.p.		
	0 - 14	15 - 64	65+	0 - 14	15 - 64	65+	0 – 14	15 - 64	65+
Vienna	14.7	69.4	15.9	14.2	68.8	16.9	−0.4	−0.5	1.0
Burgenland	15.2	66.7	18.1	13.4	67.0	19.6	−1.8	0.3	1.5
Lower Austria	17.0	66.8	16.1	14.9	66.4	18.7	−2.1	−0.5	2.6
South Moravia	15.7	69.9	14.4	14.1	69.8	16.2	−1.6	−0.2	1.8
Győr-Moson-Sopron	16.0	69.5	14.5	14.5	69.8	15.7	−1.4	0.3	1.1
Vas	16.1	68.6	15.2	13.7	69.4	16.9	−2.5	0.8	1.6
Bratislava region	15.1	72.9	12.0	13.4	73.7	12.9	−1.7	0.8	0.9
Trnava region	17.5	71.2	11.3	13.8	73.5	12.6	−3.7	2.3	1.3
CENTROPE	15.9	69.2	14.9	14.2	69.3	16.5	−1.7	0.1	1.6

Source: own calculations, national statistics offices.

The shift in the individual age groups also resulted in changes of the share of individual age groups in the individual CENTROPE regions. During the last decade, the share of population in the pre-productive age declined mainly in Trnava region (by 3.7 percentage points) followed by Vas (by 2.5 percentage points) and Lower Austria (by 2.1 percentage points). In the CENTROPE the share of population in pre-productive age declined by 1.7 percentage points in the last decade.

The changes in the share of productive population by contrast differ substantially among regions. The share of productive aged population in Vienna, Lower Austria, and South Moravia declined (Table 5.2). In the remaining regions, the share of productive population went up, with the Trnava region being the region with highest increase (by 2.3 percentage points). Therefore, the productive age population in the CENTROPE grew only by a minor 0.1 percentage points and reached 69.3% of total CENTROPE population in 2010.

The highest increase in population in the post-productive age has been recorded in Lower Austria by 2.6 percentage points, South Moravia by 1.8 percentage points and Vas by 1.6 percentage points. This leads to the conclusion that in these regions, demographic ageing is more rapid compared to other CENTROPE regions. Among the CENTROPE regions the increase in the share of post-productive population was above average only in Lower Austria and South Moravia.

Table 5.3:   Average age by gender, changes relative to 2001 in percentage points

	Average age	Average age Males	Average age Females
	2010	**2010**	**2010**
Vienna	0.0	2.7	2.1
Burgenland	2.3	2.4	1.7
Lower Austria	2.1	1.9	1.8
South Moravia	1.9	1.7	1.9
Győr-Moson-Sopron	1.8	2.4	2.7
Vas	2.6	2.1	2.1
Bratislava region	1.4	2.8	2.8
Trnava region	2.9	2.1	1.8
CENTROPE	**1.9**	**2.2**	**2.1**

Source: own calculations, national statistics offices.

Table 5.4:   Changes in the deaths per 1,000 population and life expectancy of population in 2010 relative to 2001

	Deaths per 1 000 population	Life expectancy at birth Males	Life expectancy at birth Females
	2010	**2010**	**2010**
Vienna	−1.3	1.8	1.2
Burgenland	0.5	2.5	1.5
Lower Austria	−0.1	2.0	1.8
South Moravia	−0.3	2.4	2.1
Győr-Moson-Sopron	0.6	2.5	0.3
Vas	0.8	1.3	0.8
Bratislava region	0.3	2.1	1.8
Trnava region	0.1	2.3	2.1
CENTROPE	**0.1**	**2.1**	**1.5**

Source: own calculations, national statistics offices.

The average age of the population of CENTROPE reached 39.4 years in 2010. From a gender perspective the average age of males reached 39.6 years and females 42.9.

Since 2001 the average age in CENTROPE grew by 1.9 years. The highest increase has been recorded in the Trnava region by 2.9 years, Vas region by 2.6 years, Burgenland by 2.3 years and Lower Austria by 2.1 years. Vienna is the only CENTROPE region, in which the total average age did not change since 2001. From a gender perspective the increase in the average age in CENTROPE was slightly higher for men than for women. The highest increase in average age of men was recorded in the Bratislava region (by 2.8 years) followed by Vienna (by 2.7 years). The highest increase of average age of women was also recorded in the Bratislava region (by 2.8 years) followed by Györ-Moson-Sopron (by 2.7 years).

A Similar development can be seen in the life expectancy of the population. The life expectancy of men has grown by 2.1 years and life expectancy of women went up by 1.5 years during the last decade. Here the life expectancy of women is generally higher than that of men. In 2010 the highest life expectancy of men was in Burgenland and Lower Austria (77.6 years) and the lowest in the Vas region (68.8 years) in 2010. The highest life expectancy of women was again in Burgenland (83.4 years) and the lowest in the Vas region (77.9 years) in 2010.

5.2.3. Ageing

In sum therefore, while in the last decade both the population as well as the active aged population increased in CENTROPE, ageing was also a phenomenon found in all regions. The issues related to ageing became apparent nearly three decades ago (in 1982), when the United Nations General Assembly held the first World Assembly on Ageing in Vienna. It addressed issues (such as health and nutrition, protecting elderly consumers, housing and environment, family, social welfare, income security and employment, education and collection and analysis of research data) related to the general trend of ageing in the world:

Twenty years later in Madrid the second Assembly was held. It adopted a political declaration and the Madrid International Plan of Action on Ageing. The Plan of Action called for changes in attitudes, policies and practices at all levels to fulfil the enormous potential of ageing in the twenty-first century[20].

The development of the population structure and main demographic indicators implies long-term tendencies of gradual ageing and changes in age structure of the population in all developed countries. As fertility rates decline and life expectancy increases, the

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[20] http://social.un.org/index/Ageing/Resources/UNReportsandResolutions/SecondAssemblyonAgeing.aspx

proportion of persons aged 60 and over are expected to double between 2007 and 2050, and their actual number will more than triple, reaching 2 billion by 2050. In most countries, the number of those over 80 is likely to quadruple to nearly 400 million by then[21].

Figure 5.4: Total dependency ratio in 2001 and 2010
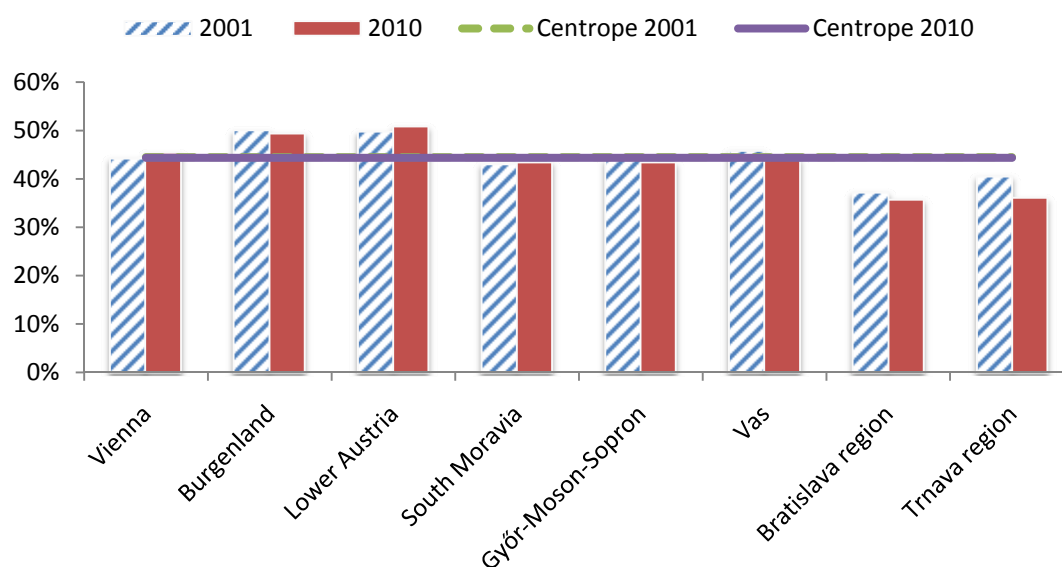
Source: own calculations, national statistics offices.

In consequence the projections made by national statistical offices as well as the Organisation for Economic Cooperation and Development (OECD) indicate a substantial shift in age structures in the Czech Republic, Austria, Hungary and Slovakia up to 2050.The development of dependency ratios confirms this general trend towards ageing in CENTROPE in the next decades.

According to Eurostat's definition, the total age-dependency ratio is a measure of the age structure of the population. It relates the number of individuals who are likely to be "dependent" on the support of others for their daily living – the young and the elderly – to the number of those individuals who are capable of providing this support. The total-age-dependency ratio is therefore the sum of two ratios: the young-age-dependency ratio and the old-age-dependency ratio. These indicators can be used to measure the burden imposed on the productive age population by persons who are of working age.

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[21] http://www.un.org/en/globalissues/ageing/

Although the total dependency ratio (figure 5.4) has been declining in the last decade, due to a decreasing number of young people in the population, projections of population growth show that in most of the CENTROPE regions the opposite will apply in the future. The demographic forecasts of the individual CENTROPE countries lead to the conclusion that the currently existing excess reduction of youths over the increase of elderly will gradually change in the next years as the number of children declines and life expectancy increases.

Figure 5.5: Old age dependency ratio in 2001 and 2010
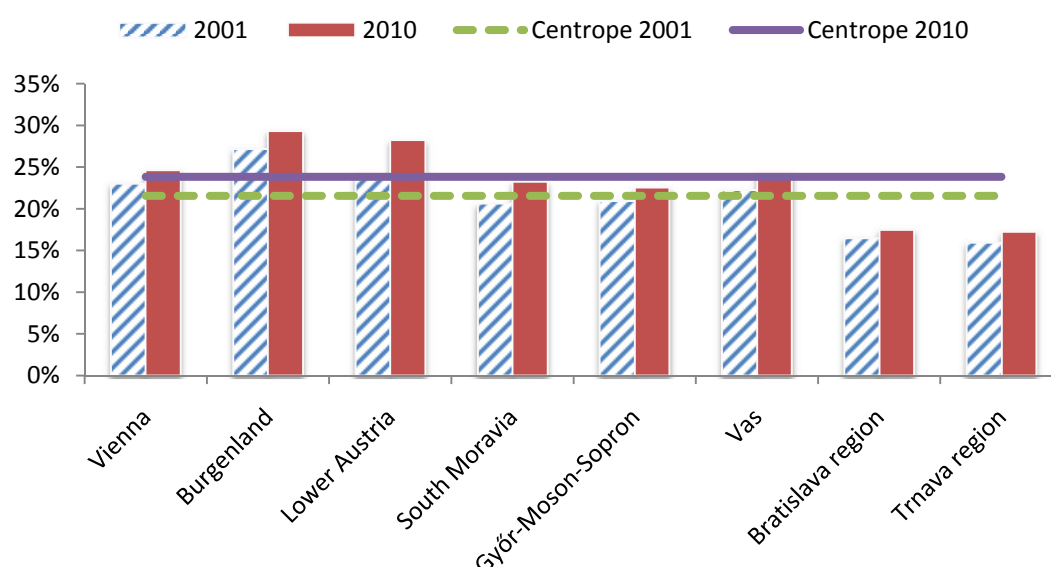
Source: own calculations, national statistics offices.

The old-age-dependency ratio is the ratio of the number of elderly people at an age when they are generally economically inactive (i.e. aged 65 and over), compared to the number of people of working age (i.e. 15-64 years old). The old-age-dependency has grown in all CENTROPE regions in the last decade. The still prevailing positive development of the total dependency ratio is therefore offset by a favourable development of the young-age-dependency ratio in most of the CENTROPE countries (see Figure 5.5). [22]

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[22] The young-age-dependency ratio (figure 16) is the ratio of the number of young people at an age when they are generally economically inactive, (i.e. under 15 years of age), compared to the number of people of working age (i.e. 15-64).

Figure 5.6: Young-age-dependency ratio
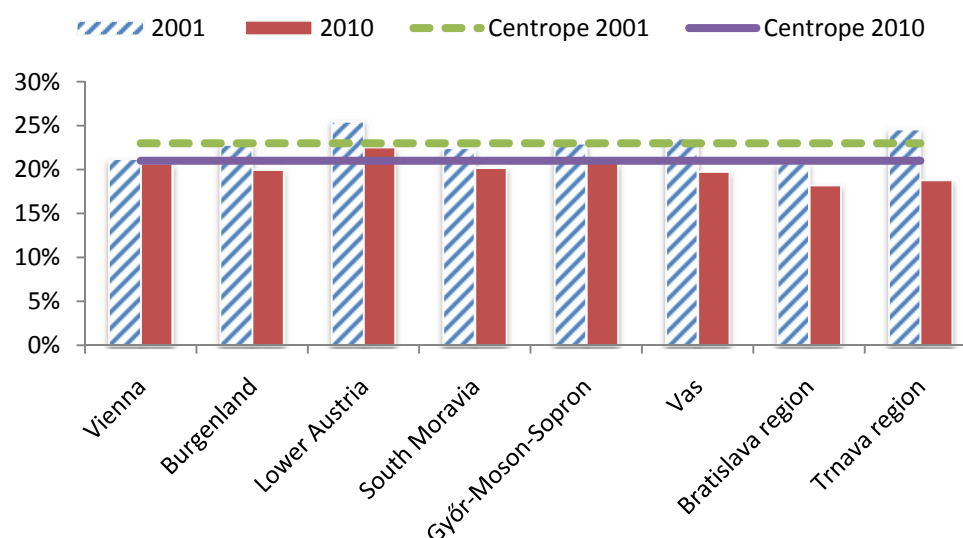
Source: own calculations, national statistics offices.

Figure 5.7: Index of ageing
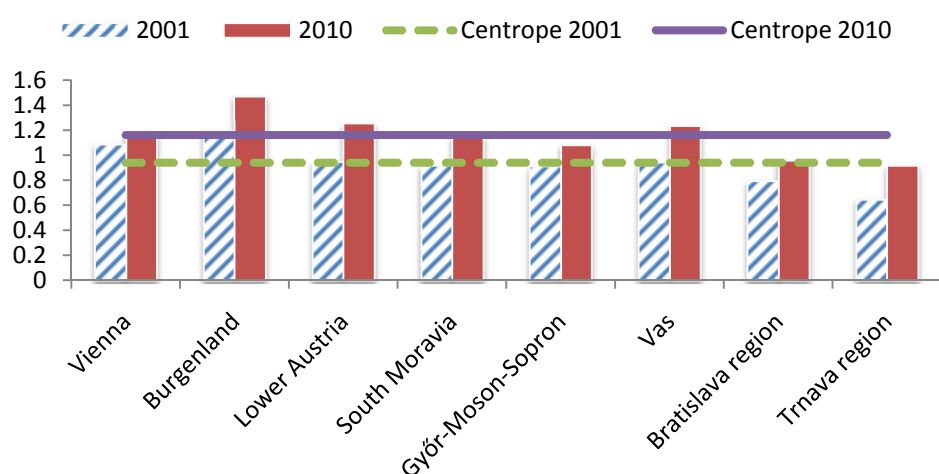
Source: own calculations, national statistics offices.

The index of ageing is the ratio of the number of old people (i.e. above 65 years) compared to the number of young people (i.e. less than 15 years of age). The highest value of this index was reached in Burgenland region (1.47) followed by Lower Austria (1.25) and in the Vas region (1.23) in 2010. The Bratislava region and Trnava region have the lowest values of the index of ageing i.e. the lowest share of old people relative to the number of young people. Since 2001 the highest increase in the index was

recorded in Lower Austria by 0.3, followed by the region of Vas by 0.29, Burgenland by 0.28 and Trnava region by 0.27. In other words, in these regions the number of people aged 65 years has grown faster than the number of young people aged 15 years or less.

Table 5.5:   Old age dependency ratio in 2010 and 2050 in CENTROPE countries (%)

	Men		Women		Total	
	2000	**2050**	**2000**	**2050**	**2000**	**2050**
Austria	17.2	44.3	28.5	57.0	22.8	50.6
Czech Republic	15.2	48.5	24.5	62.3	19.8	55.3
Hungary	16.8	38.3	27.2	52.8	22.1	45.5
Slovakia	12.7	43.8	20.3	62.4	16.6	52.9

Source: OECD, own calculations.

Figure 5.8: Population by age group and gender in 2000 and 2050 in Austria. (In percentage of total population in each group)
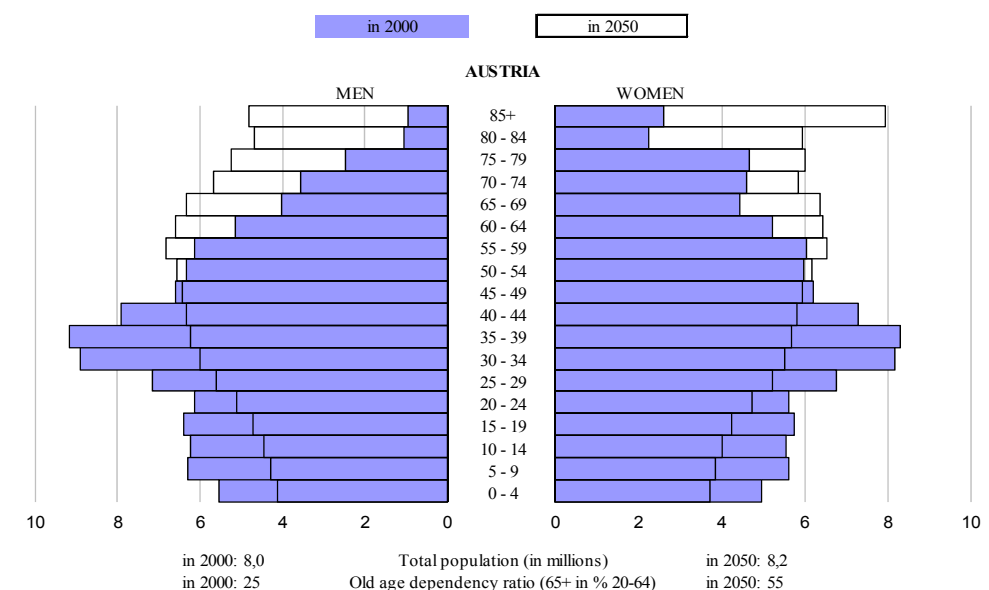
Source: OECD.

5.3. Population projections for CENTROPE countries up to 2050

5.3.1. National Population Forecasts

The population projections made by the OECD confirm the general trend towards ageing in all CENTROPE countries. According to these forecasts the share of

economically inactive population, especially of the elderly, will rise dramatically while the number of young people will go down until 2050:[23]

In Austria the increase in the number of elderly people (aged 64 and more) will rise to 2.4 million and represent 30% of total population in 2050. The number of young people will decrease by approximately 0.4 million and productive population by 0.6 million. The index of ageing will rise from 0.91 in 2000 to 2.42 in 2050. Moreover, the old-age-dependency ratio will rise from 22.8% to 50.6%. This means that for one elderly person there will be only two people in the productive age population in 2050 (4.4 in 2000). The more detailed projections of population changes in individual age groups (figure 5.8) however suggest that Austria will be the CENTROPE country with the second lowest old-age-dependency ratio in 2050.

Figure 5.9: Population by age group and gender in 2000 and 2050 in Czech Republic. (In percentage of total population in each group)
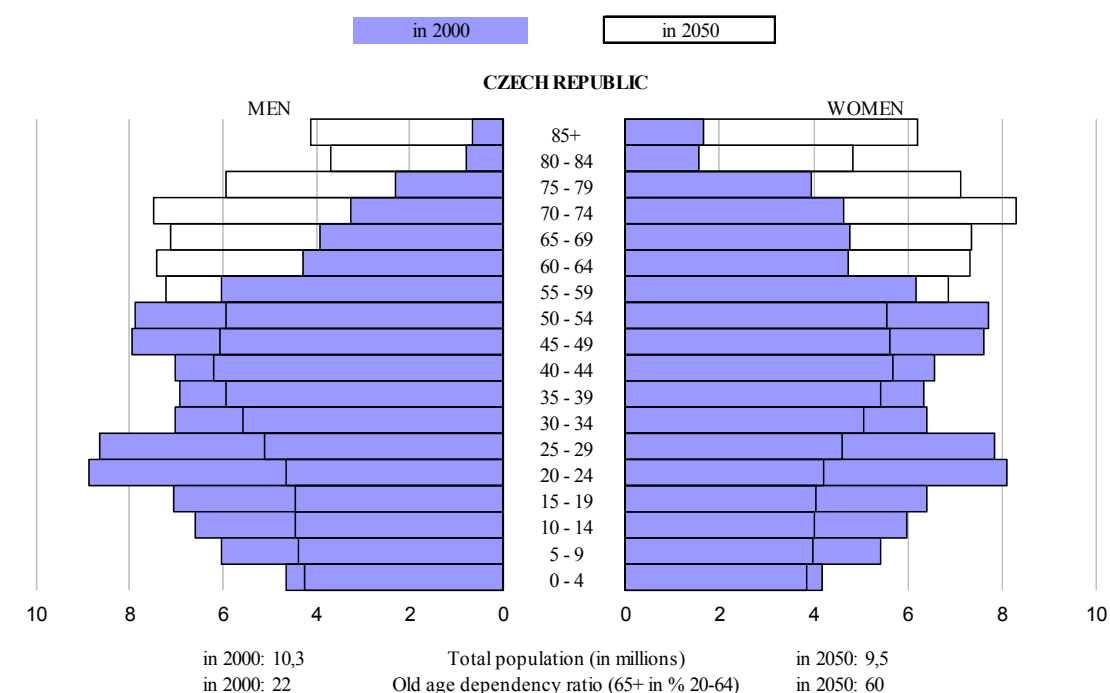
Source: OECD.

The population projections for Czech Republic are the least favourable in comparison with the rest of CENTROPE countries. The share of elderly people in total population will reach 31.1% in 2050 and the old-age-dependency ratio will rise from 20% in 2000 to 55% in 2050. This will put substantial burdens on the productive population to

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[23] It should be pointed out, that the purpose of the projections is to identify general trends and not to precisely quantify the population number in the respective countries.

sustain the large number of economically inactive. For one elderly person, there will be only 1.8 persons in productive age. The index of ageing (the ratio of elderly people compared to the young people) will rise significantly from 0.84 in 2001 to 2.51 in 2050 (Figure 5.9)

The population projections for Hungary are the most favourable compared to the rest of the CENTROPE countries (figure 5.10). Yet, although demographic developments in Hungary are expected to be less negative than in the rest of the CENTROPE countries, the development is not unproblematic. The old-age-dependency ratio is expected to rise from 22.1% in 2000 to 45.5% in 2050. The index of ageing will rise from 0.9 to 1.94 in 2050. The share of elderly population on total population will rise to approximately 26%. There will be only 2.2 persons in productive age for one elderly person in 2050.

The changes in population structure in Slovakia, by contrast, follow the patterns of the other CENTROPE countries. The share of elderly in Slovakia will rise from 11.4% in 2000 to 30% in 2050. The index of ageing is projected to grow from 0.59 in 2001 to 2.28 in 2050 and the number of people necessary to support the non-productive population will decrease dramatically. In other words, there will be only 1.9 persons in productive age for one elderly person in 2050.

Figure 5.10: Population by age group and gender in 2000 and 2050 in Hungary. (In percentage of total population in each group)
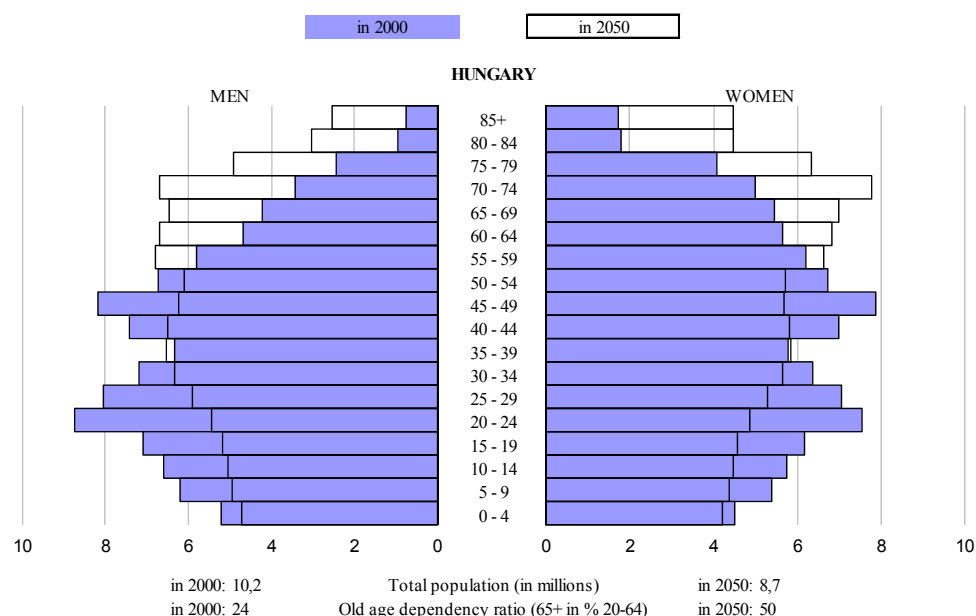
Source: OECD

Figure 5.11: Population by age group and gender in 2000 and 2050 in Slovakia. (In percentage of total population in each group)
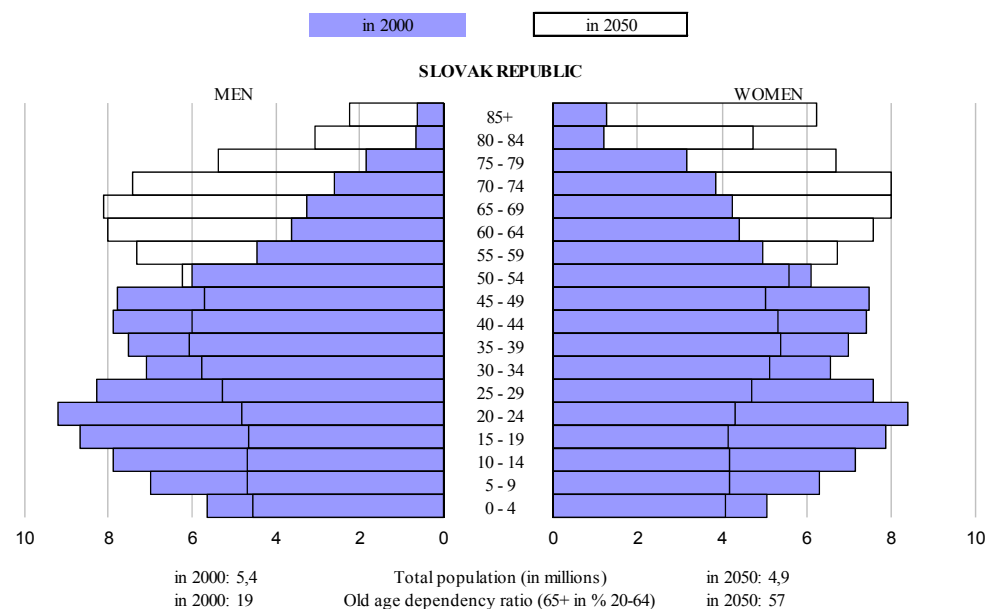
Source: OECD

5.3.2. Regional Forecasts

The national population forecasts therefore suggest rather different demographic developments in the CENTROPE countries in the next few years. As, however, shown in the second section of this chapter demographic developments across regions also vary substantially within countries. This suggests that – aside from national data – also regional information is needed when focusing on population projections. Unfortunately, such projections are much more rare (and often also of a lower quality) than national ones. Thus in this section we first of all summarize the population projections as derived on a NUTS 2-level in a recent EUROSTAT project (EUROCPOP, 2010) for 2030 and second of all based on national forecasts for Austria (Statistik Austria, 2011) and Slovakia (INFOSTAT, 2004) as well as previous developments in population for the Hungarian and Czech CENTROPE, present estimates of population growth for the CENTROPE on a NUTS 3-level.

Table 5.6:   **Regional population forecasts according to EUROSTAT**

	Absolute Number			In% of total Population	
	2010	**2030**	**2030 in% of 2010**	**2010**	**2030**
	Total Population				
Southeast	1652.0	1614.0	97.7	100.0	100.0
West-Transdanubia	996.6	965.0	96.8	100.0	100.0
Burgenland	282.7	295.7	104.6	100.0	100.0
Lower Austria	1613.8	1774.4	110.0	100.0	100.0
Vienna	1708.4	1996.8	116.9	100.0	100.0
Bratislava region	615.2	625.7	101.7	100.0	100.0
Western Slovakia	1862.1	1802.2	96.8	100.0	100.0
				100.0	100.0
CENTROPE (NUTS 2-level)	7244.1	7621.3	105.2	100.0	100.0
	Population aged 0 to 64				
Southeast	1389.3	1231.5	88.6	84.1	76.3
West-Transdanubia	830.2	740.1	89.2	83.3	76.7
Burgenland	226.7	213.5	94.2	80.2	72.2
Lower Austria	1312.1	1334.4	101.7	81.3	75.2
Vienna	1423.1	1619.4	113.8	83.3	81.1
Bratislava region	535.8	491.2	91.7	87.1	78.5
Western Slovakia	1616.3	1384.1	85.6	86.8	76.8
CENTROPE (NUTS-2-level)	6083.2	5905.9	97.1	84.0	77.5
	Population aged 65 or more				
Southeast	262.7	382.5	145.6	15.9	23.7
West-Transdanubia	166.4	224.8	135.1	16.7	23.3
Burgenland	56.0	82.2	146.9	19.8	27.8
Lower Austria	301.8	440.1	145.8	18.7	24.8
Vienna	285.3	377.4	132.3	16.7	18.9
Bratislava region	79.4	134.5	169.5	12.9	21.5
Western Slovakia	245.8	418.1	170.1	13.2	23.2
CENTROPE (NUTS 2-level)	1160.9	1715.4	147.8	16.0	22.5

Source: EUROSTAT (2010).

Considering first the population forecast at NUTS 2-level from the EUROPOP project (table 5.6), we see that although national tendencies of population growth are also reflected in regional forecasts, with in general forecasts predicting a decline in the population in the EU 10-parts of CENTROPE but an increase in the Austrian part of CENTROPE there are also important differences between regions. In particular – reflecting developments in the last decade – population forecasts predict a much higher population growth than in the respective national averages in the two capital city regions of CENTROPE, than in the other regions. Thus in Vienna population, according to this forecast, is likely to increase by almost 17% in the next two decades and by 1.7% in Bratislava, which is the highest growth rate within the respective countries. The

strongest decline in population is, however, predicted to occur in the Czech Southeast (-3.3%) and in West-Transdanubia and Western Slovakia (–4.2% each). Despite these individual declines, however, in aggregate population is expected to increase by 5.2% in CENTROPE in the next two decades.

This is, however, only due to a substantial increase in the population in the age of 65 years or older, since according to these forecasts in 2030 almost every fourth person (22.5% of the population) will be aged 65 or older, with Lower Austria (24.8%) and Burgenland (27.8%) being the oldest regions and Vienna (18.9%) the youngest region.

Table 5.7: **Contribution of components of population change**

	Births and deaths (natural growth)			Net migration (mechanical growth)		
	Births	**Deaths**	**Balance**	**International**	**Internal**	**Total**
Southeast	327	414	−87	73	−28	45
West-Transdanubia	185	293	−108	38	34	72
Burgenland	47	76	−29	12	33	45
Niederösterreich	315	404	−89	82	191	273
Wien	475	344	131	367	−168	199
Bratislava	120	146	−26	20	19	39
Western Slovakia	318	472	−154	46	40	86
CENTROPE (NUTS 2)	1,787	2,149	−362	638	121	759

Source: EUROSTAT (2010).

The population aged less than 65 years – and in consequence also the active aged, – by contrast, is going to decrease by 2.9% relative to 2010, with this decrease amounting to more than 10% in all of the EU 10-parts of CENTROPE but Bratislava. The only regions where a continued increase in the active age population is expected are Vienna (13.8%) and Lower Austria (1.7%).

Table 5.8: Regional population forecasts for 2025 according to trend extrapolation and national studies

	2010			
	Total	**0-14**	**15-64**	**65+**
South Moravia	1,154,654	162,565	805,399	186,690
Györ-Moson Sopron	449,967	64,851	314,083	71,033
Vas	257,688	34,559	179,314	43,815
Burgenland	284,897	37,907	191,331	55,659
Lower Austria	1,611,981	238,809	1,071,877	301,295
Vienna	1,714,142	244,259	1,180,946	288,937
Bratislava	628,686	84,274	463,486	80,926
Trnava	563,081	77,799	414,068	71,214
CENTROPE	6,665,096	945,023	4,620,504	1,099,569
	2025			
South Moravia*	1,133,290	140,559	746,646	246,086
Györ-Moson Sopron*	473,658	64,623	316,897	92,138
Vas*	245,498	27,174	165,256	53,067
Burgenland**	299,159	37,865	187,169	74,125
Lower Austria**	1,743,872	253,944	1,103,705	386,223
Vienna**	1,848,510	277,232	1,223,929	347,349
Bratislava***	557,642	60,478	402,808	132,517
Trnava***	426,762	53,402	288,922	84,438
CENTROPE	6,763,219	918,609	4,421,817	1,422,794
	2025 in % 2010			
South Moravia	98.1	86.5	92.7	131.8
Györ-Moson Sopron	105.3	99.6	100.9	129.7
Vas	95.3	78.6	92.2	121.1
Burgenland	105.0	99.9	97.8	133.2
Lower Austria	108.2	106.3	103.0	128.2
Vienna	107.8	113.5	103.6	120.2
Bratislava	88.7	71.8	86.9	163.8
Trnava	75.8	68.6	69.8	118.6
CENTROPE	101.0	97.0	95.7	129.0

Source: EUROSTAT (2010) * based on extrapolation of previous population growth trends by age group and gender, ** based on forecasts by the Austrian statistical office, *** based on forecasts by infostat.

Furthermore, as shown in table 5.7 the balance of births over deaths will be negative in all of the CENTROPE NUTS 2-regions from 2008 to 2030 so that in the CENTROPE aggregate this balance will lead to reduction of 362 thousand inhabitants in this time period. An even deeper decline of the active aged population is therefore only prevented by an immigration of 638 thousand people from abroad (of this 461 thousand only to the Austrian CENTROPE) and 121 thousand people from other regions of the same country.

These results are also corroborated by the results reported in table 5.7 where we assemble regional population projections at the NUTS 3-level taken from national sources for those countries where such data are available (Austria and Slovakia) and extrapolations of previous population trends for those countries where such information is not available. Although the numbers presented in these tables differ somewhat from those generated by the EUROPOP project, with in particular the Slovak regional projections by INFOSTAT (2004) being substantially more pessimistic than those of EUROSTAT, the general tendencies are confirmed by these estimates. In general the only regions where an increase in the active aged population (15-64 years old in these forecasts) can be expected in the next one and a half decades are Vienna and Lower Austria. In addition only Györ-Moson-Sopron can expect an about stagnating active aged population, while in all other regions the active aged population is expected to decline by between 3.2% (Burgenland) and – due to very pessimistic assumptions of national forecasters for Slovakia – 31.4% (in Trnava).

In consequence – despite a continued increase in total population (by around 1%) until 2025, according to these forecasts, – which, however, are very pessimistic about the developments in the Slovak CENTROPE in the CENTROPE aggregate active aged population will decline by 4.3%

5.3.3. Potential Effects on Labour Supply

In sum therefore available regional population projections – even though they sometimes contradict on the concrete numbers for individual regions – suggest that in the next two decades CENTROPE as an aggregate will experience a decline in the active aged population of between 3% to 4%. This quite naturally leads to the question of whether this reduction will also lead to a reduction in labour supply in the region. The answer to this question is, however, complicated by the fact that aside from depending on demographic developments labour supply also depends on the future development of activity rates (i.e. the percentage of inhabitants that enter the workforce in a particular region).

Table 5.9: **Regional active population 2025 according to different scenarios on the development of activity rates**

	Active Population	Activity rate	Active Population (Status Quo change Scenario)*		Active Population (Best Practice Scenario**)		Break even increase in activity rate ***
	2010		Absolute	Relative to 2010	Absolute	Relative to 2010	
South Moravia	576.2	71.5	534.2	92.7	625.7	108.6	5.6
Gyor-Moson-Sopron	204.0	65.0	205.8	100.9	265.6	130.2	−0.6
Vas	115.6	64.5	106.5	92.2	138.5	119.8	5.5
Burgenland	141.6	74.0	138.5	97.8	156.8	110.8	1.6
Lower Austria	809.7	75.5	833.7	103.0	924.9	114.2	−2.2
Vienna	859.8	72.8	891.1	103.6	1,025.7	119.3	−2.6
Bratislava region	342.6	73.9	297.7	86.9	337.6	98.5	11.1
Trnava region	304.1	73.4	212.2	69.8	242.1	79.6	31.8
CENTROPE	3,353.6	72.6	3,209.4	95.7	3,705.5	110.5	3.3

Source: EUROSTAT (2010), Statistik Austria, INFOSTAT, own calculations. * Column reports active population in 2025 under the assumption of an unchanged activity rate ** column reports active population under the assumption of an 83.3% activity rate (as in Denmark in 2010) in each region, *** Table reports increase in activity rate (in percentage points) necessary to maintain a constant activity rate.

To address this issue in table 5.9 based on the results reported in table 5.9 we estimate the potential development of the economically active population i.e. labour supply in CENTROPE and its' regions under two alternative scenarios. In the first scenario (the status quo scenario) we estimate the number of economically active in the year 2025 under the assumption that activity rates in all CENTROPE regions remain at their 2010 levels in all the regions of CENTROPE until 2025. Unsurprisingly this scenario therefore predicts a reduction in labour supply of equal magnitude as the active aged population.

This scenario, however, seems a little extreme. Given that a falling labour supply all else equal should imply lower unemployment and higher wages for those employed, at least some of those currently not taking part in the labour market should be encouraged to do so. In the second scenario (the so called best practice scenario) we therefore assume that by 2025 CENTROPE can achieve rates of economic activity equivalent to the highest national rates found in the EU in 2010 (this is the Danish activity rate which is currently at 83.3%). As can be seen from the table such an increase in the activity rate will result in a massive increase in the labour supply of CENTROPE, by over 10.5% in aggregate, and may result in increase of the activity

rate of over 30% in individual regions such as Györ-Sopron-Moson. The only regions which under these assumptions would still experience a reduction i labour supply are the Slovak regions (Bratislava -1.5%, Trnava -21.4%) – for which we, however, think that the relevant national sources on regional population forecasts are extremely pessimistic.

In general this result therefore suggests that the decline in active aged population in CENTROPE can be accommodated without detrimental effects for labour supply if activity rates can be increased sufficiently. In the last column of table 5.9 we therefore also calculate the (percentage point) change in activity rates necessary for labour supply in the region to stay unchanged. Clearly these changes are negative for regions that can expect active aged population to increase until 2025 (Vienna, Lower Austria but also Györ-Moson-Sopron), but even for most regions with population declines changes of less than 6 percentage points are necessary and for the CENTROPE in total an increase of 3.3 percentage points is necessary.[24] Such changes can clearly only be achieved if policy is supportive of increasing labour market participation: They are however also not unparalleled in history, since for instance according to EUROSTAT data the Czech Republic increased its activity rate by 4.4 percentage points in the years from 2008 to 2010 and countries like Sweden have seen an increase in excess of 5 percentage points since 2005.

5.4. Conclusions

This chapter therefore shows that the development of basic demographic indicators in CENTROPE confirms the general trend towards longer life expectancy, a growing average age of population, a growing share of elderly people in the total population and a decreasing share of young people in the population.

This development has specific implications on a number of issues such as increasing pressures on existing pension and healthcare systems and the long–term sustainability of public finances and intergeneration solidarity, the need for a shift in existing economic and social policies focused on demographic changes and an increasing need for lifelong education and training and requalification of the population as well as potential labour market shortages and subsequent need for migration flows from developing countries to developed countries.

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[24] The only regions where substantially higher increases are necessary are the Slovak regions, where however, as we have mentioned many times already, the existing forecasts are extremely pessimistic,

Population projections of the OECD, suggest a general trend towards ageing in all CENTROPE countries. The share of economically inactive population, especially the elderly people, will rise dramatically while the number of young people will reduce substantially until 2050. This will, however, occur at a regionally rather differentiated pace:

- In Austria the elderly population (aged 64 and more) will increase to 2.4 million and represent 30% of the total population in 2050. The number of young people by contrast will decrease by approximately 0.4 million and productive population by 0.6 million. Moreover, the old-age-dependency ratio will rise from 22.8% to 50.6%. This means that for one elderly person there will be only two people in the productive age population in 2050.

- The population projections for Czech Republic are the least favourable in comparison with the rest of CENTROPE countries. The share of elderly people in total population will reach 31.1% in 2050 and the old-age-dependency ratio will rise from 20% in 2000 to 55% in 2050. This will put an enormous burden on the productive population to sustain the large number of economically inactive. For one elderly person, there will be only 1.8 persons in productive age.

- The population projections for Hungary are the most favourable compared with the rest of the CENTROPE countries. Although the development of population in Hungary is expected to be less negative than in the rest of CENTROPE countries, it is far from unproblematic. The old-age-dependency ratio is expected to rise from 22.1% in 2000 to 45.5% in 2050. The index of ageing for the total population will rise from 0.9 to 1.94 in 2050. The share of elderly people in total population will rise to approximately 26%. There will be only 2.2 persons in productive age for one elderly person in 2050.

- The changes in population structure in Slovakia follow the same pattern as in the other CENTROPE countries. The share of elderly people in Slovakia will rise from 11.4% in 2000 to 30% in 2050. The index of ageing is projected to grow from 0.59 in 2001 to 2.28 in 2050. The number of people necessary to support the non-productive population will decrease dramatically. There will be only 1.9 persons in productive age for one elderly person in 2050.

Furthermore, the available regional population projections suggest that total population in CENTROPE will continue to increase by somewhere between 1% to 5% depending on the forecast. Active aged population (i.e. population in the age between 15-64 will, however, reduce by somewhere between 3% to 4%, with these declines being most pronounced in the Slovak CENTROPE and a further increase being expected only in Vienna, Lower Austria and potentially Györ-Moson-Sopron. This therefore naturally leads to the question of whether CENTROPE in the long-run is threatened by general

labour shortages. Our calculations suggest that such a shortage can be prevented by an increase of the activity rate by about 3.3 percentage points for the CENTROPE in average and an increase of less than 6 percentage points in most regions where demographic decline is expected.

This therefore suggests that policy should in particular focus on increasing activity rates among the population. Here the results of Rozamhel et al. (2012), who find that in all CENTROPE regions elderly have very low employment and activity rates, as well as the results of this report which suggest that also low skilled workers are rarely active in CENTROPE imply that policy could in particular focus on activating older and less skilled persons. For the less skilled this will probably require intensive training measures aiming at providing them with skills that are in demand on labour markets. For the older, by contrast; policies that combine elements of retaining the capability to work (i.e. focusing on the health status of the elder through preventive action), retaining employability (e.g. through training and life-long learning) and awareness building among both employers and workers for the needs and capabilities of older workers seem to be most promising.

Finally, our results also suggest that demographic decline is a smaller problem in the CENTROPE than in other EU-regions and applies mainly to the new member states part of the CENTROPE as well as to rural peripheral regions in the Austrian part, ageing of the population is a phenomenon that is common to all regions of CENTROPE though. Although this reflects positively on CENTROPE in an EU-comparison, demographic developments still represent a serious challenge to the economies of CENTROPE, which will necessitate developing long-term and coherent strategies to maintain living standards and quality of life for citizens in all age groups.

6. Conclusions

Two major factors impacted on the development of CENTROPE since 2009 the first of these is the impact of the macro-economic crisis and its aftermath and the second are the institutional changes concerning labour mobility in the CENTROPE in 2011. Given that both of these events have been considered with some sorrow by analysts as well as policy makers. This years' issue of the CENTROPE Regional development report aside from providing an update on the economic development of the individual CENTROPE countries as well as the CENTROPE and its regions also deals with the long term growth performance and structural change as well as demographic changes faced by policy makers in CENTROPE. The two central aims of this report are therefore to first of all assess the economic development of CENTROPE and its individual sub-regions in the aftermath of the economic crisis of 2009 and to second of all analyze some of the more long term challenges that the region is currently facing.

6.1. Macroeconomic development in the CENTROPE Countries

With respect to the first aim of the report a country level analysis highlights the difficult macroeconomic environment in which the CENTROPE countries are currently operating. The economic crisis, culminating in a quite dramatic recession in the year 2009, left its traces, and the recuperation phase in 2010 and 2011 appears to be of little stability. Thus, after the economic downturn in 2009 in all four countries the economy started to grow again in 2010, and continued to do so in 2011. Still, economic recovery was quite differentiated between the individual countries. Slovakia tended to grow fastest out of the crisis, at over 4% per year in terms of GDP in 2010, and thus by around 1.5 to 2 percentage points ahead of the Czech Republic and Austria and by almost 3 percentage points faster than Hungary. For 2011 estimates are that recovery continued, though a bit slower than the year before in the Czech Republic and Slovakia (by around 1 percentage point in each country), while in Austria and Hungary economic growth in 2011 was, if in the latter case only slightly, higher than in 2010.

As a matter of fact, growth prospects in the last quarter of 2011 already started to deteriorate, due to a softening of global demand, widespread fiscal consolidation measures as a more or less rational reaction to the sovereign debt crisis, a tightening of credit conditions and a generally low level of consumer and business confidences. As a consequence current forecasts suggest that economic growth in the CENTROPE countries will be anaemic in 2012. Again, Slovakia will be the fastest growing country, but still GDP is expected to grow only by around 1.5%. Austria and the Czech Republic

will see some positive economic growth, at around 0.5% on a year by year basis, while the Hungarian economy is bound to decline by 1%.

For 2013 more stability in financial as well as global markets is expected, which should have some positive impacts on the confidences levels, leading to higher growth of GDP, fuelled by a rebounding consumption and investment demand as well as by an increase in net exports. Consequently, GDP growth is expected to be around 2% to 3% in the CEE CENTROPE countries and around 1.4% in Austria.

One source of the weak growth in 2012 is the low level of internal demand. Consumer and business confidence currently is low (despite some improvements in the latest months), which might depress investment and consumption expenditures. Additionally, employment levels are decreasing – and unemployment levels increasing – leading to a reduction in aggregate wages, which also dampens private consumption. Contrastingly counter-cyclical movements of household savings, as households tend to smooth their consumption over the business cycle, keep demand levels from falling too low. At the same time financing conditions for enterprise investments are much more difficult as before the crisis given the commercial banks' attempts to deleverage. In sum this will result in low growth of both, private consumption and private investment levels in CENTROPE in 2012, whereby in Hungary even a decline in projected.

No economic stimulus is to be expected from the government side, as all CENTROPE countries' governments are running austerity packages, quite independent of the fact of whether the countries have low levels of debt, like Slovakia and the Czech Republic, or whether such a package could be assumed to be more in place, like in Hungary and Austria. In any case the consequence of this is a low growth or even a decline in public consumption and investment in 2012.

Finally foreign demand is subdued due to a weakening of global markets, so that the contributions from net exports to GDP are in most cases moderate, too. The exception to this is Hungary, where a devaluating currency plus an improvement in the unit labour cost (relative to the main competitor countries) is beneficial for the exporting sector while at the same time tends to reduce imports, so that as a result net exports will grow strongly in 2012 and thus also are the only source of economic growth of the Hungarian economy in this year.

6.2. Regional development in CENTROPE

Despite these bleak outlooks for the next year, in the last decade, the economic development of the CENTROPE was characterized by above European average

growth of GDP at market prices as well as GDP per capita at purchasing power standard and productivity and declining unemployment rates. During this period the region also experienced significant internal convergence.

While the CENTROPE countries were harder hit by the crisis than the EU 27, the actual development confirmed that the CENTROPE region was not. The average economic growth in 2009-2011 was higher by 0.5 percentage points than the EU 27 average, so that despite substantially lower growth rates relative to the period 2004 to 2008 the relative growth performance of the region remains favourable. However, the economic development in the individual CENTROPE regions has been rather different. While the Austrian regions and Gyor-Moson-Sopron experienced even higher average growth rates than before the crisis since 2009, the rest of the regions experienced substantial decrease in average growth rates (which in the Slovak case, however, remained higher than in the Austrian CENTROPE). Despite the slowdown of economic growth, the Slovak regions maintained relatively high growth rates also during this period. The most significant growth in terms of GDP per capita in PPS has been recorded in the Bratislava region, which made the region the richest region in the CENTROPE in 2011 according to preliminary estimates.

The growth rate in CENTROPE region is also expected to be well above the EU-average in future years. The only exception is the Hungarian region of Vas which is facing a long-term decrease in nominal GDP growth rates. The economic performance of the urban (metropolitan) regions is still significantly better, with in particular Vienna showing a noticeably improved relative growth performance in the 2009 to 2011 period. The rest of the individual regions are only slowly converging to the EU-average and/or the CENTROPE average. Due to the specific nature of the two urban regions of Bratislava and Vienna this should not be considered a significant problem. Most regions, with the exception of the Hungarian Vas region, have been able to retain positive growth in the long term.

The most significant impact of the economic and financial crisis has a decline in labour productivity growth as measured as GDP at market prices per person employed. In pre-crisis period 2004 to 2008 the productivity in the CENTROPE region grew by 3.5% in average. In the period 2008–2011 productivity growth slowed down to 0.5% in average, and was even slightly below the EU-average. In this period therefore the convergence process to EU productivity levels came to a halt, as labour productivity in CENTROPE decreased by 0.2 percentage points relative to the EU-average. Again, only the Slovak regions experienced convergence to the EU-average. Labour productivity in Bratislava region grew by 1.7 percentage points and in Trnava region an

increase by a modest 0.5 percentage points was registered (table 3.1). On the opposite side the Austrian regions and Vas were mostly affected by the impact of economic crisis in terms of productivity growth. However, productivity levels are still higher than in EU-average in Lower Austria and Vienna.

In addition the development of the nominal compensation per employee implies that there are still substantial differences among the individual CENTROPE regions. In nominal terms the Austrian CENTROPE is still well ahead the rest of the CENTROPE region. The difference is especially visible in the case of Bratislava region and Vienna. Although there is convergence in terms of GDP and productivity, the convergence process related to nominal compensation per employee is still lagging behind. However, in nominal terms the average growth is the strongest in the Slovak CENTROPE, especially in Bratislava region with average growth at 9.7% followed by Western Slovakia by 6.7% in 2008 – 2011. In general the economic crisis resulted in decrease of average annual growth of compensation per employee especially in the new member states, although it remained still significantly high especially in the Slovak CENTROPE.

Finally crisis has also been associated with substantial structural change, which, however, has followed rather different patterns in the individual regions. The development of GVA by sectors shows the following development patterns:

- A significant impact of the crisis on agriculture in the Hungarian CENTROPE and Trnava region, construction in the Austrian CENTROPE and manufacturing in Vas, South Moravia and Trnava region.

- Tendencies towards recovery of sectoral GVA growth in 2011 – 2014, although with different rates in individual regions.

- A strong resilience of financial services and non-market services, which recorded positive GVA growth also during the crisis in all regions except the Hungarian regions and the highest growth rates in Bratislava and Trnava region.

- An adverse effect on personal services (Trade, Hotels & Restaurants, and Transport & Communication) of the economic crisis which should, however, be reversed according to forecasts for 2011 – 2014 especially in Slovak and Czech parts of the CENTROPE.

In addition forecasts for 2011 – 2014 suggests that CENTROPE will grow faster than the EU 27 only on account of above average growth rates in manufacturing and non-market services.

The impact of economic crisis also negatively influenced the development on labour markets. Most of the regions experienced rising unemployment rates. The average unemployment rate reported by Eurostat in 2010 in CENTROPE reached 6.5% which was 2.1 percentage points below the EU 27 average of 9.6% but also by 1.8 percentage points higher than the record low level of 2008. A more detailed look at the data shows that this privileged position of CENTROPE applies to almost all of its regions. Only 2 regions recorded an above EU 27 unemployment rate (Trnava and Vas).

The increases in the crisis have, however also differed substantially among regions. Especially the Bratislava region, with traditionally low unemployment rate experienced increase of unemployment by 2.8 percentage points between 2008 and 2010. Moreover, the most unfavourable development has been recorded in the Trnava region, where the unemployment rate went up by from 5.9% (in 2008) to 9.9% (in 2010). The main reason for this increase in unemployment was the decline of external demand of in export oriented industries localised in this region. Similarly high increases of unemployment have been recorded in Vas (by 3.3 percentage points), South Moravia (by 3.2 percentage points) and Gyor-Moson-Sopron (by 2.8 percentage points). By contrast, the Austrian CENTROPE regions experienced only minor increases in Vienna (by 0.5 percentage points), Burgenland (0.3 percentage points.) and in Lower Austria (by 0.2 percentage points). Thus on the labour market the Austrian CENTROPE regions gave proven to be substantially more resilient to crisis than the other regions of CENTROPE.

6.3. Long term growth performance and structural change in CENTROPE

A detailed analysis of longer term growth processes in CENTROPE region and a comparison of CENTROPE to other cross-border metropolitan regions suggests a number of further stylized facts that are particular to the development of the CENTROPE relative to the EU-average as well as to other cross-border metropolitan regions in the EU in the time period from 1995 to 2011. In particular:

- CENTROPE until the economic crisis was not only a high growth region relative to the EU 27-average but also relative to most of the European cross-border metropolitan regions. This applies both to productivity growth and GDP growth. While cross-border metropolitan regions in Europe in general exhibited below average real labour productivity growth rates in the last one and a half decades, CENTROPE's labour productivity growth rate was by 1.8 percentage points

higher than the EU-average in the 1996 to 2000 period, by 0.9 percentage points higher in the 2000 to 2004 period and by 5.8 percentage points higher in the period from 2004 to 2008. The only other cross-border metropolitan region that showed similarly high productivity growth rates in this time period was the Silesian-Moravian cross-border metropolitan region, which, however started from much lower productivity levels.

- Similar observations apply to real gross value added (GVA) growth, although here CENTROPE outperformed the other cross-border metropolitan regions only in the last few years. In the period from 2004 to 2008 GVA growth rates exceeded the EU 27-average by a startling 6.1 percentage points.

- The same does, however, not apply to employment growth. Here due to high productivity growth, below EU-average employment growth marks most of the growth experience of CENTROPE in the last one and a half decades. Only since 2008 did the employment growth rate of the region exceed the EU 27 average.

Similar to the findings on the recent developments in CENTROPE, according to preliminary estimates, both GVA and employment growth also exceeded the EU 27 average in the post crisis period 2008 to 2011. Productivity catch-up was, however, much slower than previously. Thus growth patterns in CENTROPE moved substantially from a more intensive to a more extensive growth pattern since 2008. From a policy perspective this thus raises the issue of how – in the light of the still existing productivity gap to the EU 27 average – a more intensive growth path can be re-established in this region in the future.

Furthermore, analysing the interaction of structural change and economic growth we also find that also the improved growth performance both in terms of GVA and employment that started with accession to the EU and has continued until 2011 has been primarily associated with a rapid improvement in the regional growth effect. This suggests that much of the good growth performance has been due to an improved general competitiveness of the region. Although according to preliminary data for 2008 to 2011 some of this improvement in regional competitiveness has been lost during the crises, CENTROPE still had the second highest regional growth effect among all polycentric cross-border metropolitan regions in EU 27 and may thus be considered as a highly competitive location of production in the EU 27.

While these factors reflect positively on the development on the competitiveness of CENTROPE in the EU and in particular among the cross-border metropolitan regions, we also find large regional disparities in the causes of regional growth among the

individual CENTROPE NUTS 3-regions. Here while above EU-average productivity growth rates are a feature of almost all CENTROPE NUTS 3-regions there are still sizeable productivity differences between the EU 15-country and EU 10-country parts of this region and the in aggregate much improved regional effect on employment and GVA growth in the period 2004 to 2008 as well as the slight reduction in the 2008 to 2011 period seems to be strongly linked to the developments in the Slovak NUTS 3-regions of CENTROPE.

6.4.Demographic development in the CENTROPE

While growth experiences of the CENTROPE in the last one and half decades thus suggest a rapid growth and improvement of competitiveness, with, however, productivity growth slowing down somewhat in recent years the demographic trends, which reflect the long run situation with respect to labour supply, in the region show rather moderate changes in the last decade in all CENTROPE regions, with a still increasing population in almost all CENTROPE regions with the exception of Vas.

In 2010 the total population of CENTROPE regions reached 6.6 million. From 2001 to 2010 the population increased by 288,219 persons. Compared with 2001, the highest increase of population by 143,087 has been recorded in the Austrian region of Vienna. In relative terms the population of Vienna grew by 9.2%. The Bratislava region was the second best performing region in terms of population growth with 4.9% followed by Lower Austria with 4.4% and Györ-Moson-Sopron with 3.3%. Thus – in contrast to many other European regions and despite repeated phases of labour shortage – population decline does not seem to have been a limiting factor on economic growth in most CENTROPE regions in this time period.

However, a closer look at the structure of this population change suggests rather varied demographic developments in individual regions. This reflects the rather different nature of demographic problems in the different parts of CENTROPE. Thus, for instance, the rapid increase in population of Vienna but also the more modest growth in the Slovak and Czech CENTROPE regions was primarily driven by in-migration, with migration in the EU 10 parts of CENTROPE (in particular in Bratislava) often coming from other parts of the country and Vienna also experiencing substantial inflows of migrants from abroad. This therefore suggests that while the ethnic diversity of the population is rising in almost all CENTROPE regions, the only region which has substantial challenges to face from integrating a large foreign born labour force into the labour markets is Vienna.

By contrast, the old-age-dependency ratio (i.e. the ratio of the number persons older than economically active age (aged 65 and over), relative to the working age population) has grown in all of the CENTROPE regions (with exceptions of Vienna and Lower Austria), with particularly strong increases found in the EU 10-parts of CENTROPE and in the more peripheral regions of the Austrian CENTROPE (e.g. Waldviertel). Therefore challenges coming from the ageing of the population are most likely to arise in these regions.

Finally population projections, suggest a general trend towards ageing in all CENTROPE countries. The share of economically inactive population, especially the elderly people, will rise substantially while the number of young people will reduce substantially until 2050. This will, however, occur at a regionally rather differentiated pace. The available regional population projections suggest that total population in CENTROPE will continue to increase by somewhere between 1% to 5% depending on the forecast. Active aged population (i.e. population in the age between 15-64 will, however, will reduce by somewhere between 3% to 4% in the next two decades, with these declines being most pronounced in the Slovak CENTROPE and a further increase being expected only in Vienna, Lower Austria and potentially Györ-Moson-Sopron.

This therefore naturally leads to the question of whether CENTROPE in the long-run is threatened by general labour shortages. Our calculations suggest that such a shortage can be prevented by an increase of the activity rate by about 3.3 percentage points for the CENTROPE in average and an increase of less than 6 percentage points in most regions where demographic decline is expected.

Finally, our results also suggest that demographic decline is a smaller problem in the CENTROPE than in other EU-regions and applies mainly to the new member states part of the CENTROPE as well as to rural peripheral regions in the Austrian part, ageing of the population is a phenomenon that is common to all regions of CENTROPE though. Although this reflects positively on CENTROPE in an EU-comparison, demographic developments still represent a serious challenge to the economies of CENTROPE, which will necessitate developing long-term and coherent strategies to maintain living standards and quality of life for citizens in all age groups.

6.5. Policy Conclusions

In summary therefore the results of the current CENTROPE Regional Development Report – while casting a rather positive aggregate picture on the current and future growth prospects of the region as well as its resilience to the crisis – in addition to the

policy areas already discussed in previous reports highlights two further central policy issues that are likely to be important for future growth in CENTROPE.

The first of these is how– in the light of the still existing productivity gap to the EU 27-average – the recent phase of slower productivity growth in CENTROPE can be overcome and a more intensive growth path can be re-established in this region in the future. The second one is how the potential negative impact of population ageing and a declining number of active aged persons and potential labour shortages can be avoided in CENTROPE.

Clearly with respect to both these policy challenges sound national macro-economic and structural policies (such as labour market, industrial, tax, social security and many others) – which are beyond the scope of cross-border regional policies - are the most important ingredient to addressing these issues. Yet aside from these policies also cross-border co-operation can contribute to achieving these policy objectives.

6.5.1. Increasing competitiveness by cross-border co-operation in all fields of economic policy

In particular one of the recurrent results of the CENTROPE regional Development Report is that in CENTROPE cross-border interactions are still underdeveloped. This applies to all forms of co-operation and mobility analysed so far in this project, be it patent and cross-border R&D co-operation, migration and commuting, cross border student mobility or cross-border enterprise networks. In all these fields the region is deeply integrated into the international division of labour as is evidenced by substantial contacts to the EU 27 and rest of the world. Given the vicinity of the regions of CENTROPE to each other national borders (in particular those between Austria and the other countries), however, still remain surprisingly high barriers to exchange in all these areas.

This suggests that increased efforts to improve the exchange of goods, capital, people and ideas across borders are needed to better integrate the region and to secure the productivity growth effects that can be gained from a deeper interregional division of labour. In this respect a number of initiatives focusing on different topics such as furthering cross-border student exchange and collaborative cross-border R&D projects, developing cross-border business enterprises, improving the conditions for cross-border labour mobility are needed and a wide set of instruments (some of which have been discussed in more detail in previous Regional Development Report projects) reaching from general awareness building to concrete financial support should be

envisioned. In general the aim in all these policies should be to reduce border barriers in the region.

6.5.2. Developing Cross-border knowledge economy networks (in particular in knowledge –intensive service industries)

One area where such increased cross-border can yield particularly high returns in terms of productivity is in the area of the knowledge economy. As also already pointed out in previous studies in this respect the CENTROPE disposes of some important preconditions to be a strong pole of knowledge economy development in Central Europe. The capital cities of Vienna and Bratislava and also Brno are large university cities and important hubs of knowledge and research. Thus, there are many universities and art academies as well as ten universities of applied sciences in the region. In addition several hundred non-university research institutions and numerous technology-oriented and research-focused enterprises work in the CENTROPE and the share of students in the population both in general and in doctoral university education programs is well above the average in CENTROPE. It is therefore important to intensify the cooperation in international research programmes within the CENTROPE, increase co-financing opportunities from European sources and increasing mobility of graduate and postgraduate students as well as young scientists especially in technical disciplines in the region

Aside from this, however, also many of the more urban regions in CENTROPE have a strong specialisation on more knowledge intensive service industries and in general services have provided an important impetus to both GVA and employment growth in CENTROPE in recent years as well as having proven to be more resilient to macro-economic crisis. Furthermore some recent studies on individual CENTROPE countries and regions (e.g. Mayerhofer, 2010) have shown that in international comparisons the export intensity of knowledge intensive service industries is rather low in CENTROPE.

Fostering the co-operation of enterprises in such knowledge intensive services (as e.g. in business consulting, creative industries or also in communication industries) with the joint aim of entering new export markets, could therefore be another aim for cross-border policy

6.5.3. Preventing labour shortages through Co-operating in Labour market policy to secure high activity rates

These policies which are likely to contribute to sustaining growth in CENTROPE, however, will require adequate supply of labour in the region. As shown in the current

report this cannot be assumed automatically in the case of CENTROPE, since the active aged is population is expected to decline in this region in the next two decades. However the current report also shows that this decline in active aged population in CENTROPE can be accommodated without detrimental effects for labour supply if activity rates can be increased sufficiently. In most regions with expected population declines increases of activity rates by less than 6 percentage points are necessary and for the CENTROPE in total an increase of 3.3 percentage points is necessary. Such changes can clearly only be achieved if policy is supportive of increasing labour market participation: They are however also not unparalleled in history, since for instance according to EUROSTAT data the Czech Republic increased its activity rate by 4.4 percentage points in the years from 2008 to 2010 and countries like Sweden have seen an increase in excess of 5 percentage points since 2005.

This therefore implies that policy should in particular focus on increasing activity rates among the population. Here the results of Rozamhel et al. (2012), who find that in all CENTROPE regions elderly have very low employment and activity rates, as well as the results that also low skilled workers are rarely active in CENTROPE imply that policy could in particular focus on activating older and less skilled persons. For the less skilled this will probably require intensive training measures aiming at providing them with skills that are in demand on labour markets. For the older, by contrast; policies that combine elements of retaining the capability to work (i.e. focusing on the health status of the elder through preventive action), retaining employability (e.g. through training and life-long learning) and awareness building among both employers and workers for the needs and capabilities of older workers seem to be most promising.

6.5.4. Making CENTROPE more attractive for (high skilled) workers and increasing cross-border

Finally also attracting immigration from abroad as well as avoiding emigration to other countries could be important elements in a strategy to reduce the threat of declining labour supply. As also already stressed in previous analysis this would primarily require an increase in the competitiveness of CENTROPE in the worldwide competition for talent. This would on the one hand require making the university sector and the innovation system in the region more attractive for high skilled migrants from abroad, improving the conditions for high skilled mobility wherever possible and providing services geared towards the needs of migrants and reducing costs of integration.

Annex

Annex Table 1 – Deaths per 1000 population and life expectancy in 2001 and 2010

	Deaths per 1 000 population		Life expectancy at birth Males		Life expectancy at birth Females	
	2001	**2010**	**2001**	**2010**	**2001**	**2010**
Vienna	10.8	9.5	74.8	76.6	80.7	81.9
Burgenland	10.2	10.7	75.1	77.6	81.9	83.4
Lower Austria	9.9	9.8	75.6	77.6	81.2	83.0
South Moravia	10.3	10.0	72.3	74.7	78.9	81.0
Győr-Moson-Sopron	11.5	12.1	69.5	71.9	78.0	78.4
Vas	13.1	13.9	68.8	70.2	77.1	78.0
Bratislava region	9.3	9.5	71.5	73.6	78.3	80.1
Trnava region	9.9	10.0	69.5	71.7	77.1	79.2

Source: National statistic offices

Annex Table 2 – Average age by gender in 2001 and 2010

	Average age		Average age Males		Average age Females	
	2001	**2010**	**2001**	**2010**	**2001**	**2010**
Vienna	41.3	43.6	39.5	42.2	42.9	45.0
Burgenland	40.1	42.2	38.4	40.8	41.8	43.5
Lower Austria	39.2	41.1	37.5	39.4	40.9	42.7
South Moravia	38.9	40.7	37.1	38.8	40.6	42.5
Győr-Moson-Sopron	39.5	42.0	37.6	40.0	41.3	44.0
Vas	38.7	40.1	36.4	38.4	39.6	41.7
Bratislava region	36.7	39.5	35.1	37.9	38.1	40.9
Trnava region	41.3	43.6	39.5	42.2	42.9	45.0
CENTROPE	**39.4**	**41.3**	**37.6**	**39.6**	**41.0**	**42.9**

Source: National statistic offices

Annex Table 3 – Population by age groups in 2001 and 2010

	2001				2010			
	0 - 14	**15 - 64**	**65+**	**Total**	**0 - 14**	**15 - 64**	**65+**	**Total**
Vienna	229,336	1,083,983	249,217	1,562,536	**243,022**	**1,173,953**	**288,648**	**1,705,623**
Burgenland	41,982	184,318	50,031	276,331	**38,021**	**190,477**	**55,865**	**284,363**
Lower Austria	262,790	1,030,507	248,736	1,542,033	**240,171**	**1,068,335**	**301,266**	**1,609,772**
South Moravia	177,258	791,461	162,822	1,131,541	**162,565**	**805,399**	**186,690**	**1,154,654**
Győr-Moson-Sopron	69,288	301,745	63,176	434,209	**65,056**	**312,995**	**70,384**	**448,435**
Vas	43,431	184,698	41,020	269,149	**35,483**	**180,098**	**43,783**	**259,364**
Bratislava region	90,239	436,876	71,927	599,042	**84,274**	**463,486**	**80,926**	**628,686**
Trnava region	96,285	392,293	62,340	550,918	**77,799**	**414,068**	**71,214**	**563,081**
Total	1,010,609	4,405,881	949,269	6,365,759	946,391	4,608,811	1,098,776	6,653,978

Source: National statistic offices.

Annex Table 4 – Austria - Population by age group and gender, in percentage of total population in each group

	1980	2000	2050	1980	2000	2050
	MEN			WOMEN		
85+	0,5	0,9	4,8	1,3	2,6	7,9
80 - 84	1,1	1,0	4,7	2,4	2,3	5,9
75 - 79	2,4	2,5	5,3	4,0	4,7	6,0
70 - 74	3,6	3,5	5,7	5,3	4,6	5,9
65 - 69	4,2	4,0	6,3	5,7	4,4	6,4
60 - 64	3,2	5,2	6,6	4,2	5,2	6,4
55 - 59	5,2	6,1	6,8	6,7	6,0	6,5
50 - 54	5,9	6,3	6,6	5,8	6,0	6,2
45 - 49	5,8	6,6	6,4	5,2	6,2	5,9
40 - 44	6,6	7,9	6,3	5,8	7,3	5,8
35 - 39	7,4	9,2	6,2	6,5	8,3	5,7
30 - 34	7,2	8,9	6,0	6,3	8,2	5,5
25 - 29	7,2	7,2	5,6	6,4	6,8	5,2
20 - 24	8,3	6,1	5,1	7,4	5,6	4,7
15 - 19	9,3	6,4	4,7	8,2	5,7	4,2
10 - 14	8,8	6,2	4,4	7,6	5,5	4,0
5 - 9	7,1	6,3	4,3	6,1	5,6	3,9
0 - 4	6,2	5,5	4,1	5,3	4,9	3,7

Source: OECD.

Annex Table 5 – Austria - Population by age group and gender, in number of persons in each group

	1980	2000	2050	1980	2000	2050
	MEN			WOMEN		
85+	17,204	36,516	191,868	50,930	108,110	332,082
80 - 84	40,132	40,432	186,747	93,921	93,707	248,141
75 - 79	86,943	95,891	209,070	160,138	193,047	251,233
70 - 74	127,803	137,370	225,125	210,607	191,072	245,098
65 - 69	148,605	155,712	252,215	226,645	183,983	266,415
60 - 64	112,909	199,656	262,425	168,641	215,903	269,800
55 - 59	184,979	237,709	271,552	268,454	249,267	273,768
50 - 54	210,939	244,808	261,836	230,437	247,517	258,495
45 - 49	206,788	255,821	255,681	205,698	256,931	248,570
40 - 44	235,175	306,989	252,417	229,573	301,823	242,749
35 - 39	265,292	355,504	247,818	260,407	343,141	238,252
30 - 34	258,139	345,503	238,518	250,935	337,377	231,338
25 - 29	255,441	277,472	222,986	253,806	280,104	217,908
20 - 24	296,397	237,795	203,397	293,773	231,691	197,386
15 - 19	332,769	247,915	186,970	324,558	237,334	177,245
10 - 14	313,702	241,320	176,861	300,824	229,440	167,580
5 - 9	253,621	243,478	169,912	243,174	231,735	161,281
0 - 4	220,343	214,826	164,183	209,731	204,667	155,773
Total	3,567,181	3,874,717	3,979,581	3,982,252	4,136,849	4,183,114

Source: OECD.

Annex Table 6 - Czech republic - Population by age group and gender, in percentage of total population in each group

	1980	2000	2050	1980	2000	2050
		MEN			WOMEN	
85+	0,3	0,7	4,1	0,8	1,7	6,2
80 - 84	0,8	0,8	3,7	1,8	1,6	4,8
75 - 79	1,9	2,3	6,0	3,3	4,0	7,1
70 - 74	3,4	3,3	7,5	4,7	4,6	8,3
65 - 69	4,3	3,9	7,1	5,3	4,8	7,4
60 - 64	3,1	4,3	7,4	3,6	4,7	7,3
55 - 59	5,8	6,0	7,2	6,4	6,2	6,9
50 - 54	5,9	7,9	5,9	6,0	7,7	5,6
45 - 49	5,7	8,0	6,1	5,6	7,6	5,6
40 - 44	5,4	7,0	6,2	5,2	6,5	5,7
35 - 39	7,0	6,9	5,9	6,5	6,3	5,4
30 - 34	8,7	7,0	5,6	8,0	6,4	5,1
25 - 29	8,5	8,6	5,1	7,7	7,9	4,6
20 - 24	7,3	8,9	4,6	6,6	8,1	4,2
15 - 19	7,0	7,1	4,5	6,3	6,4	4,0
10 - 14	7,0	6,6	4,4	6,3	6,0	4,0
5 - 9	8,6	6,0	4,4	7,8	5,4	4,0
0 - 4	9,0	4,7	4,2	8,1	4,2	3,8

Source: OECD.

Annex Table 6 – Czech Republic - Population by age group and gender, in number of persons in each group

	1980	2000	2050	1980	2000	2050
		MEN			WOMEN	
85+	15,264	33,482	191,122	44,773	88,318	300,536
80 - 84	40,553	39,532	170,180	95,869	83,063	233,901
75 - 79	97,381	114,858	275,061	176,389	208,733	344,792
70 - 74	170,079	163,633	346,050	250,679	243,608	401,153
65 - 69	217,241	195,570	329,422	282,056	251,056	355,374
60 - 64	157,404	214,423	342,953	193,218	249,220	353,253
55 - 59	292,011	301,672	333,684	339,308	325,864	331,943
50 - 54	294,804	394,479	274,839	321,423	407,115	268,894
45 - 49	285,678	398,083	281,057	295,216	400,726	271,071
40 - 44	271,824	351,195	285,979	273,936	345,326	274,048
35 - 39	352,009	347,036	274,640	346,087	334,178	261,744
30 - 34	437,836	351,566	257,992	424,099	336,894	244,602
25 - 29	427,479	431,870	235,980	411,939	414,223	222,951
20 - 24	365,274	444,156	214,167	350,002	426,536	203,600
15 - 19	351,289	353,378	205,754	334,158	337,312	195,021
10 - 14	352,318	330,285	204,988	335,424	315,129	194,125
5 - 9	433,184	301,509	202,761	412,602	285,714	191,968
0 - 4	449,411	232,599	196,110	428,575	220,162	185,596

Source: OECD.

Annex Table 7 – Hungary - Population by age group and gender, in percentage of total population in each group

	1980	2000	2050	1980	2000	2050
		MEN			WOMEN	
85+	0,4	0,7	2,5	0,8	1,7	4,5
80 - 84	1,0	0,9	3,0	1,8	1,8	4,5
75 - 79	2,0	2,4	4,9	3,0	4,1	6,3
70 - 74	3,4	3,4	6,7	4,5	5,0	7,8
65 - 69	4,4	4,2	6,5	5,4	5,4	7,0
60 - 64	3,4	4,7	6,7	4,0	5,7	6,8
55 - 59	6,0	5,8	6,8	6,6	6,2	6,6
50 - 54	6,3	6,7	6,1	6,6	6,7	5,7
45 - 49	6,3	8,2	6,2	6,3	7,9	5,7
40 - 44	6,1	7,4	6,5	6,2	7,0	5,8
35 - 39	6,9	6,3	6,5	6,5	5,8	5,8
30 - 34	7,5	7,2	6,3	6,9	6,4	5,7
25 - 29	8,8	8,0	5,9	8,0	7,0	5,3
20 - 24	7,7	8,7	5,4	7,0	7,5	4,9
15 - 19	6,4	7,1	5,2	5,7	6,2	4,6
10 - 14	7,1	6,6	5,0	6,2	5,7	4,5
5 - 9	7,9	6,2	4,9	7,0	5,4	4,4
0 - 4	8,4	5,2	4,7	7,4	4,5	4,2

Source: OECD.

Annex Table 8 – Hungary - Population by age group and gender, in number of persons in each group

	1980	2000	2050	1980	2000	2050
		MEN			WOMEN	
85+	19,697	36,420	106,878	46,376	91,670	201,039
80 - 84	51,223	45,503	128,966	97,131	95,496	200,641
75 - 79	105,659	117,827	207,772	167,913	219,118	284,585
70 - 74	174,876	167,171	283,225	247,339	268,064	348,024
65 - 69	229,141	205,577	273,562	299,267	291,177	313,383
60 - 64	178,844	226,823	284,138	222,021	303,196	306,718
55 - 59	310,056	281,450	287,931	365,170	332,560	296,674
50 - 54	329,443	326,898	258,584	362,164	359,541	256,695
45 - 49	326,503	396,946	263,963	350,207	421,926	254,557
40 - 44	315,681	361,091	274,734	340,218	373,987	261,176
35 - 39	356,885	307,333	276,558	359,416	308,556	261,664
30 - 34	390,420	349,706	267,910	382,925	340,719	253,471
25 - 29	457,285	391,063	249,783	444,146	377,198	236,483
20 - 24	401,256	424,015	230,218	385,411	403,992	217,437
15 - 19	332,550	344,946	218,619	313,161	330,376	205,502
10 - 14	366,935	320,258	213,571	344,637	306,796	200,516
5 - 9	407,925	301,476	208,945	384,916	287,857	196,240
0 - 4	434,023	253,599	200,006	410,302	240,637	188,305
	5,188,402	4,858,102	4,235,363	5,522,720	5,352,866	4,483,110

Source: OECD

Annex Table 9 – Slovakia - Population by age group and gender, in percentage of total population in each group

	1980	2000	2050	1980	2000	2050
	MEN			**WOMEN**		
85+	0,3	0,6	2,2	0,6	1,3	6,2
80 - 84	0,8	0,7	3,1	1,3	1,2	4,7
75 - 79	1,7	1,9	5,4	2,4	3,2	6,7
70 - 74	2,7	2,6	7,4	3,5	3,9	8,0
65 - 69	3,5	3,2	8,1	4,1	4,3	8,0
60 - 64	2,7	3,6	8,0	3,0	4,4	7,6
55 - 59	5,2	4,4	7,3	5,7	5,0	6,7
50 - 54	5,4	6,0	6,2	5,6	6,1	5,6
45 - 49	5,5	7,8	5,7	5,6	7,5	5,0
40 - 44	5,2	7,9	6,0	5,4	7,4	5,3
35 - 39	5,8	7,5	6,1	5,8	7,0	5,4
30 - 34	7,3	7,1	5,8	7,0	6,5	5,1
25 - 29	9,2	8,3	5,3	8,5	7,6	4,7
20 - 24	9,1	9,2	4,8	8,4	8,4	4,3
15 - 19	8,6	8,7	4,7	7,9	7,9	4,1
10 - 14	8,0	7,9	4,7	7,4	7,2	4,2
5 - 9	9,1	7,0	4,7	8,5	6,3	4,2
0 - 4	10,1	5,6	4,6	9,3	5,1	4,1

Source: OECD

Annex Table 10 – Slovakia - Population by age group and gender, in number of persons in each group

	1980	2000	2050	1980	2000	2050
	MEN			**WOMEN**		
85+	7,086	15,957	52,471	14,982	35,484	156,929
80 - 84	19,293	17,553	72,105	33,650	33,743	119,531
75 - 79	40,487	48,643	127,121	61,667	87,444	168,696
70 - 74	67,234	68,080	175,176	88,491	107,268	201,696
65 - 69	85,959	85,228	191,279	103,325	118,116	201,919
60 - 64	66,430	95,308	189,435	76,236	121,858	191,061
55 - 59	127,345	116,693	172,860	143,829	137,425	169,418
50 - 54	131,184	157,868	147,145	142,592	169,064	140,673
45 - 49	133,672	204,576	134,175	141,224	207,850	127,083
40 - 44	128,288	207,331	141,522	135,570	205,300	134,398
35 - 39	142,471	197,363	142,915	147,203	193,512	135,651
30 - 34	179,019	186,176	135,797	176,429	181,740	129,245
25 - 29	224,631	216,991	124,341	216,179	210,712	118,850
20 - 24	223,884	241,433	113,659	213,782	232,816	108,654
15 - 19	209,805	227,646	109,768	200,414	218,115	104,582
10 - 14	195,367	207,346	110,386	186,637	198,837	105,220
5 - 9	222,910	183,410	110,692	214,275	174,927	105,510
0 - 4	246,596	148,089	107,607	236,185	140,777	102,619
	2,451,661	2,625,691	2,358,454	2,532,670	2,774,988	2,521,735

Source: OECD.

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