Real Estate, Construction and Growth in Central and Eastern Europe: Impact on Competitiveness?

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This paper studies recent developments in the construction sector in Central and Eastern Europe (CEE) against a number of benchmarks including a set of mature OECD countries. In addition to analyzing the recent rapid increase in the importance of the construction sector in CEE countries, the paper also asks whether rapid growth in this sector may have negative implications for the long-term competitiveness of the CEE economies. In order to address this question, we look at negative Dutch disease-style repercussions on the manufacturing sector by the recent strong growth in construction in the CEE countries. We find some tentative evidence for such effects although the strong growth of the construction sector in the CEE countries is a rather recent phenomenon.

1 Introduction

Most CEE countries experienced rapid economic growth and real convergence in recent years. One of the drivers of this growth was the rapid expansion of the construction sector – in particular, but not only, in the Baltic countries.[3]

This rapid expansion was mainly stoked by strong growth in real estate prices, the inflow of FDI in the real estate and construction sectors and the relatively large share of public (infrastructure) investment. These factors are in turn linked to the relatively low housing and infrastructure endowment in the CEE countries, as regards both the quality and quantity of dwellings and infrastructure.

Recent information provides mixed evidence across countries as to how long the growth in the construction sector will continue. While some (Baltic) CEE countries show a clear slowdown in the prices for real estate, in particular residential real estate, these prices are still growing in other CEE countries. In addition, considerable inflows of funds granted in the context of the EU's Cohesion Policy are likely to further stoke growth in public construction works in the CEE countries over the coming years, given that a significant share of these funds will be used for infrastructure investments.[4]

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3 *In this study, we analyze 11 CEE countries, namely Bulgaria, the Czech Republic, Estonia, Croatia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia. The choice of countries – also for the different subsections of this paper – has been largely determined by the availability of data. In particular, it would have been desirable to include more Southeastern European countries. Due to data limitations, this was, however, not possible.*

4 *For the period from 2007 to 2013, the CEE countries can expect to receive financial support by the EU that equals around 2.4% of their GDP per year on average (European Commission, 2007). As a rough estimate, up to 50% of these funds can be expected to be used for infrastructure investments, which in turn are largely used to fund construction activities. See also ECB (2008) and Kamps, Leiner-Killinger and Martin (2009).*

In this paper, we analyze the recent increase in the importance of the construction sector in the CEE countries and compare these developments with the situation in the euro area and in Ireland and Spain, two "old" EU countries that – irrespective of the current sharp slowdown in their real estate markets – experienced very rapid growth in the construction sector in recent years. In addition, we also examine whether rapid growth in this sector may have negative implications for the long-term competitiveness of the CEE economies. The question we seek to answer in this context is whether rising real estate prices and the resulting increase in the construction sector may have detrimental Dutch disease-style effects for the long-term competitiveness of the manufacturing (and services) sector.[5]

The Dutch disease framework can, of course, not be applied one to one to the possible problems associated with a construction-led period of rapid growth. Dutch disease-style effects due to strong growth in the construction sector, however, may result in comparable resource movement and spending effects, thus negatively affecting the international competitiveness of the economy and causing the manufacturing sector to shrink. Once the expansion of the construction sector draws to a close, e.g. owing to a saturation of the real estate market and adequate infrastructure improvements, the resulting contraction of the construction sector may cause a more widespread downturn of the economy.[6] This risk is particularly pronounced if the competitiveness of the export-oriented sector has suffered during the construction-led economic boom and if the economy is not sufficiently flexible to adjust rapidly, e.g. if considerable downward wage rigidity prevents the export-oriented sector of the economy from rapidly regaining its competitiveness.[7]

The strong growth in the construction sectors of CEE countries is a rather recent phenomenon, which reduces the likelihood that we find already now clear empirical answers to the questions presented above. Nevertheless, this study also develops econometrically testable relationships with regard to the transmission of the resource movement and spending effects on the relative prices of nontradables and the resulting deindustrialization, i.e. a shrinking manufacturing sector relative to the rest of the economy. We focus on CEE countries and a set of mature OECD countries that may provide a benchmark in the longer run.[8]

[5] *Recent applications of the Dutch disease framework can be found in Oomes and Kalcheva (2007) and Beck, Kamps and Mileva (2007) for Russia and in Égert and Leonard (2008) for Kazakhstan.*

[6] *Looking at the economic performance of Ireland and Spain, Ahearne, Delgado and von Weizsäcker (2008), for example, emphasise the role of the housing boom and the subsequent slump in residential investment in the recent economic downturn. For a more general analysis of the role of asset prices in boom-bust cycles, see Martin, Schuknecht and Vansteenkiste (2007).*

[7] *Indicators for labor market flexibility in the CEE countries available e.g. from Eurostat, the Fraser Institute and the World Bank provide a mixed picture. Taking the euro area as – admittedly imperfect – benchmark, the CEE countries' institutional features tend to be more supportive of wage flexibility and some aspects of "numerical" flexibility. At the same time, non-standard types of employment, working time flexibility or regional mobility tend to be less pronounced on average in the CEE countries than in the euro area.*

[8] *An alternative natural benchmark would be emerging market economies, e.g. in Asia or Latin America. The lack of comparable data on housing markets in these countries, however, makes it very difficult to identify suitable countries.*

The remainder of the paper is organized as follows. Section 2 discusses in more detail how and to what extent a fast-growing construction sector may produce Dutch disease-style effects in terms of resource reallocation and relative price adjustments. In section 3, we move on to develop the testable relationships and describe our dataset and estimation strategy. Section 4 presents stylized facts with regard to house price and construction developments in a number of CEE countries as well as Ireland and Spain, while section 5 presents our estimation results. Finally, we conclude by summing up and by drawing the policy conclusions emerging from our analysis.

2 Can the Expansion of the Construction Sector Cause Dutch Disease-Style Competitiveness Effects?

In a country that is rich in natural resources, rising commodity prices can trigger a chain of events that may ultimately lead to a mighty commodity sector and a shrunken manufacturing sector. Analogously, a rapid increase in real estate prices, specifically in the residential and commercial property market, together with large infrastructure investments may generate a dominant construction sector.[9] This is, however, not conditioned on prior economic structures – unlike in resource abundant economies – and could potentially be at work in any country.

Rising real estate prices and large infrastructure projects encourage more investment in the construction sector – as the supply of construction investment bears a positive relation to prices – so that more people can be hired. As a result, wages will rise in the construction sector, thus attracting labor from other sectors of the economy. Corden (1984) coins this phenomenon the (direct) resource movement effect, which results in direct deindustrialization. In addition, an indirect resource movement effect may occur if the relative price of (non-construction) nontradables relative to that of tradables rises as a result of the expansion of the construction sector, drawing more labor to the (non-construction) nontradables sector.

There are two good reasons why the relative price of (non-construction) nontradable goods may rise as a result of a construction boom. The first reason is the increase in nominal and real wages in the construction sector. If wages tend to equalize across sectors, this will also lead to higher wages in other sectors of the economy. This outcome is also predicted by the traditional Balassa-Samuelson (BS) effect.[10] Second, the relative price of (non-construction) nontradables rises in the event that higher profits and wages in the construction sector are spent on nontradable goods *(spending effect)*.[11]

One consequence of the above-mentioned rise in the relative prices of (construction as well as non-construction) nontradable goods is the appreciation of the real exchange rate. However, this increase can overlap with the BS effect due to

[9] *This analogy holds to the extent that commodity prices and real estate prices follow cycles.*

[10] *It is worthwhile noting that other sectors may also lead the wage-setting process. The Balassa-Samuelson (BS) model and the Dutch disease models assume that the tradable sector and the commodity sector, respectively, are the wage setter. In practice, large wage hikes in the public sector may also affect other parts of the economy.*

[11] *Assuming that the income elasticity of demand for (non-construction) nontradables is positive.*

Table 1

Dutch Disease Effects Caused by a Strong Expansion of the Construction Sector

Stages
1. Increase in the relative size of the construction sector (caused by strong growth in real estate prices or infrastructure development)
2. Labor reallocation – Labor moves from other sectors to the construction sector – Labor moves from other sectors (except construction) to non-construction services
3. Wages rise in the construction sector – Wages rise in the rest of the economy – (Non-construction) Relative prices rise
4. Appreciation of the real exchange rate
5. Relative decline in manufacturing

Source: Authors' compilation.

productivity gains in the manufacturing sector.[12] This appreciation – irrespective of whether it comes from the construction sector or from the BS effect – can be regarded as harmless with regard to competitiveness as long as the real exchange rate for tradable goods (the manufacturing sector) remains untouched. If productivity gains in manufacturing are, however, insufficient to dampen the real exchange rate appreciation affecting the manufacturing sector (and generated by the wage equalization process), the manufacturing sector is likely to lose competitiveness. This in turn is expected to manifest itself in a decline in output and employment.[13]

Another source of real exchange rate appreciation of the manufacturing sector can be the appreciation of the nominal exchange rate due to the inflow of foreign capital, a spin-off of the rise in investment in the construction sector.

Table 1 below summarizes the main characteristics of a strong expansion of the construction sector that in turns produces Dutch disease-style competitiveness effects.

3 Testable Relationships

Rapid growth in the construction sector implies that the relative price of nontradable goods to that of tradable goods increases ($\Delta(p^{NT}/p^{T})$) because labor moves to the construction sector and because relatively more income generated in the construction sector is spent on nontradables. In addition to that, (i) the BS effect may overlap with these factors, (ii) the relative price of nontradables can increase due to a more general economic catching-up process that implies that households

[12] *If wage increases originating from the construction sector are higher than those in the manufacturing sector that are linked to productivity increases, the construction sector would dominate the BS effect.*

[13] *It should be noted that the share of the (non-construction) nontradable sector in GDP and in total employment should decrease according to the resource movement effect and it should increase according to the spending effect (see Oomes and Kalcheva, 2007). Note, however, that an increase in the share of nontradables in total employment may also occur if productivity gains are higher in manufacturing than in the nontradable sector. The resulting rise in nontradable prices (BS effect) gives rise to an increase in the share of nontradables in GDP at current prices. This is something which can be observed in many advanced countries over time (Rowthorn and Ramaswamy, 1997).*

spend more money on nontradables as they grow richer, and (iii) services prices will grow faster in countries with initially lower services price levels.[14]

From an empirical viewpoint, we need to identify variables that capture the above-listed effects. The *resource movement effect* is reflected in the change in relative employment between the construction sector (C) and the services sector (NT) ($\Delta(emp^C / emp^{NT})$). The *spending effect* is based on the idea that higher wage income in the expanding construction sector and the associated improvements in the labor market as a whole are spent on services. This could be captured by the nominal wage increase in the construction sector relative to that in manufacturing (T) ($\Delta(w^C / w^T)$) or to the rest of the economy ($\Delta(w^C / w^{T+NT})$). We use the changes in the productivity differential to account for the BS effect ($\Delta(prod^T / prod^{NT})$). Other catching-up effects related, for instance, to mismeasured quality improvements may be captured by the evolution in per capita income ($\Delta(capita)$), and we use the relative price level of consumer services in 1999 (the first year for which Eurostat publishes this figure for the countries under investigation) for the initial price level ($plserv^{99}$). Equation (1) below summarizes these effects:

$$\Delta(\frac{p^{NT}}{p^T}) = f(\Delta(\overset{+}{\frac{emp^C}{emp^{NT}}}), \Delta(\overset{+}{\frac{w^C}{w^{T+NT}}}), \Delta(\overset{+}{\frac{prod^T}{prod^{NT}}}), \Delta(\overset{+}{capita}), \overset{-}{plserv^{99}}) \qquad (1)$$

The second impact of rapid growth in the construction industry we would like to test – in addition to the increase in the price of nontradable goods – is the hollowing-out of the manufacturing industry. We can test this effect by looking at whether strong investment in the construction sector brings about changes in real output of the manufacturing sector (T) relative to real output of the non-manufacturing sectors (NT+C)($\Delta(\frac{y^T}{y^{NT+C}})$). The effect of investment can be split into the resource movement effect measured by the ratio of employment in the manufacturing industry to employment in the construction sector and the wage (competitiveness) effect, measured by the ratio of wages in manufacturing (T) over wages in construction (C):

$$\Delta(\frac{y^T}{y^{NT+C}}) = f(\Delta(\overset{-}{\frac{inv^C}{inv^{T+NT}}})) \qquad (2)$$

$$\Delta(\frac{y^T}{y^{NT+C}}) = f(\Delta(\overset{+}{\frac{w^T}{w^C}}), \Delta(\overset{+}{\frac{emp^T}{emp^C}})) \qquad (3)$$

4 The Construction Sector in the CEE Countries – Stylized Facts

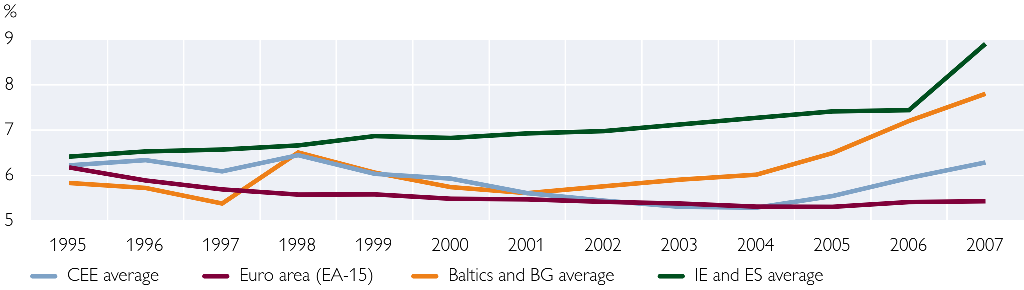
In this section, we briefly analyze recent developments in the construction sector in the CEE countries. More specifically, we look at the percentage share of construction in overall gross value added (GVA) and employment.

Starting with the relative share of GVA, charts 1 and 2 show the share of GVA in the construction industry relative to overall GVA in the CEE countries, the euro area, Ireland and Spain. Chart 1 focuses on the period from 1995 to 2007

[14] *See e.g. Égert (2007) on price level convergence in Central and Eastern Europe.*

Chart 1

GVA in Construction as a Percentage of Overall GVA in 4 Country Groups



Source: Eurostat.

Chart 2

GVA in Construction as a Percentage of Overall GVA in Individual Countries

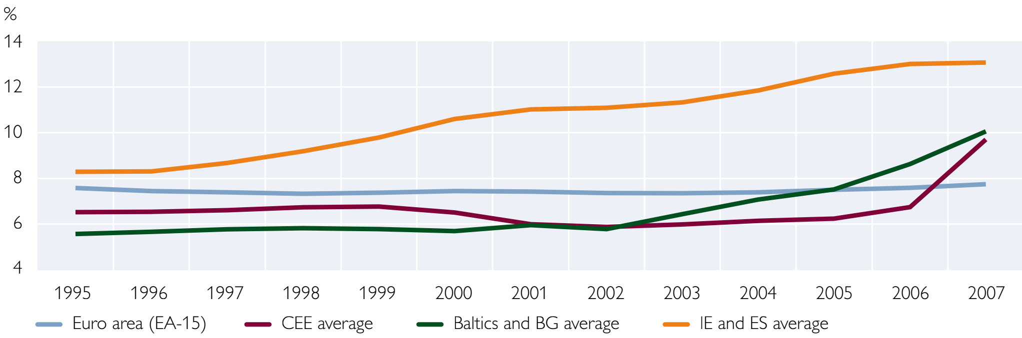
Source: Eurostat.

and shows the development of the construction sector's share for four country groups: the average for all CEE countries, the average for the Baltic countries and Bulgaria, the euro area average, and the average for Ireland and Spain. Chart 2 looks at the situation country by country for three subperiods: 1995 to 1999, 2000 to 2004 and 2005 to 2007.

During the period from 1995 to 2004, the construction sector's average share in GVA tended to decline gradually in the CEE countries and was almost identical with the euro area average in the period 2002 to 2004. More recently, however, this share has on average increased considerably in the CEE countries, whereas it has remained almost flat in the euro area. Chart 1 also shows that the importance of the construction sector is substantially larger for two subgroups: the three Baltic countries and Bulgaria on the one hand, and the euro area members Ireland and Spain on the other hand. Moreover, in particular the Baltic countries and

Chart 3

Employment in Construction as a Percentage of Overall Employment in 4 Country Groups



Source: Eurostat.

Chart 4

Employment in Construction as a Percentage of Overall Employment in Individual Countries

Source: Eurostat.

Bulgaria have shown a persistently strong increase in recent years. Chart 2 confirms significant differences between individual CEE countries. Apart from the Baltic countries and Bulgaria, only two other countries in the sample had a construction sector share in GVA that exceeded 6% (the CEE average) during the most recent time period, namely Romania and the euro area member Spain.

Moving from construction to manufacturing, in CEE the average share of manufacturing in GVA in 2007 was still clearly above the euro area average (24.4% versus 19.8%). This, however, is mostly due to the rather large share of GVA in manufacturing in the Czech Republic, Hungary, Poland and Slovakia. The average share for the Baltic countries and Bulgaria (18.6% of total GVA) is below the euro area level, and as small as 11.4% in the case of Latvia.

Turning back to the increased role of the construction sector, charts 3 and 4 show the sector's share in total employment in the CEE countries, the euro area, Ireland and Spain. In line with the previous two charts, the results are presented both for country groups as well as for the countries individually. The period covered is again 1995 to 2007.

Looking first at the country group averages, chart 3 shows that in the CEE countries, the relative importance of the construction sector in total employment remained broadly stable between 1995 and 2005. Since 2005, however, we can observe a marked increase in the relative importance of the construction sector, which now clearly exceeds the share in the euro area. In the Baltic countries and Bulgaria, this share started to rise earlier (around 2002) and is now close to 10% on average, well above the euro area average. A strong increase, which started already in the late 1990s, can also be seen in the case of Ireland and Spain, where the share of employment in construction is now around 13% – irrespective of the current sharp slowdown in their real estate markets – compared with just below 8% on average in the euro area.[15] Chart 4 again confirms very significant differences between individual CEE countries. The share of employment in construction in total employment increased particularly sharply in the three Baltic countries, but there is also a clear recent upward trend in Bulgaria, Hungary and Romania. This trend is even more pronounced in the case of the two euro area countries Ireland and Spain.

Despite the increase in the construction sector's share in total employment, the average share of employment in the manufacturing sector in total employment in CEE was still clearly above the euro area average in 2007 (20.8% versus 16.4%). As in the case of the GVA share, this is mostly explained by the large share of employment in manufacturing in the Czech Republic, Hungary and Slovakia. For the Baltic countries and Bulgaria, the average share of employment in manufacturing (18.0%) is closer to the euro area level and on a clear downward trend.

Turning to the main drivers of the strong construction sector growth in the CEE countries, three main aspects can be identified: first, the strong increase in residential property prices in recent years, second, the impact of FDI, and third, relatively high levels of public investment. Looking first at residential property price developments, the available data show that house prices are growing rapidly in most CEE countries.[16]

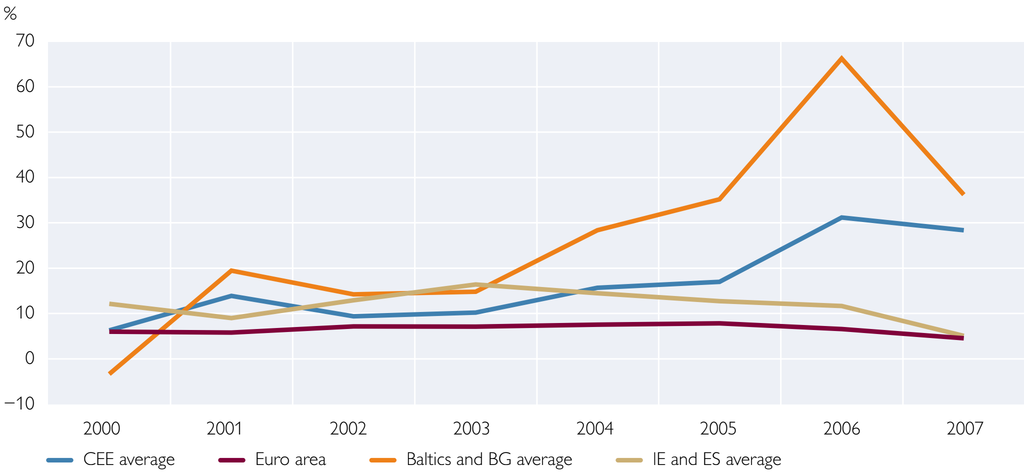
Chart 5 provides a breakdown by country groups and shows that, compared with recent developments in the CEE countries overall and in particular in the Baltic countries and Bulgaria, growth rates of residential property prices were moderate not only in the euro area as a whole but also in Ireland and Spain. When comparing residential property price changes in these country groups, it needs to be noted, however, that the starting point, i.e. the price level in the late 1990s, was significantly lower in the CEE countries and, in particular, in the Baltic countries and Bulgaria than in the euro area including Ireland and Spain.

[15] *More recent figures are likely to be underestimated because employment data for Romania and Croatia, which recently both recorded strong growth in the construction sector, are only available until 2005 and 2004, respectively.*

[16] *Unfortunately there is still a clear lack of comparable and sufficiently long real estate price series for the CEE countries, and no data are available for Romania. In addition, it should be noted that residential property prices relate to home building, which only represents a certain part of overall construction activity. No comparable price series are available for other assets that would trigger construction activities such as commercial real estate (offices, retail space) or (largely public) infrastructure.*

Chart 5

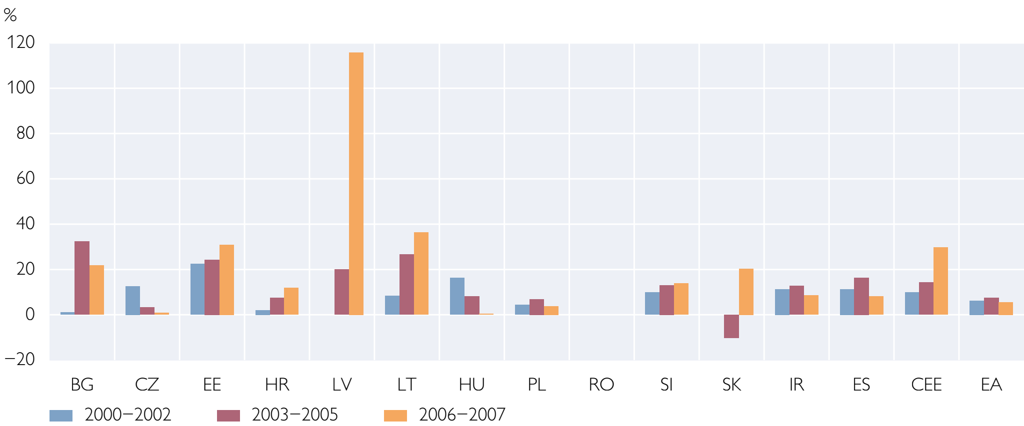
GVA in Construction as a Percentage of Overall GVA in 4 Country Groups



Source: BIS and national central banks.

Chart 6

Residential Property Price Developments in Individual Countries

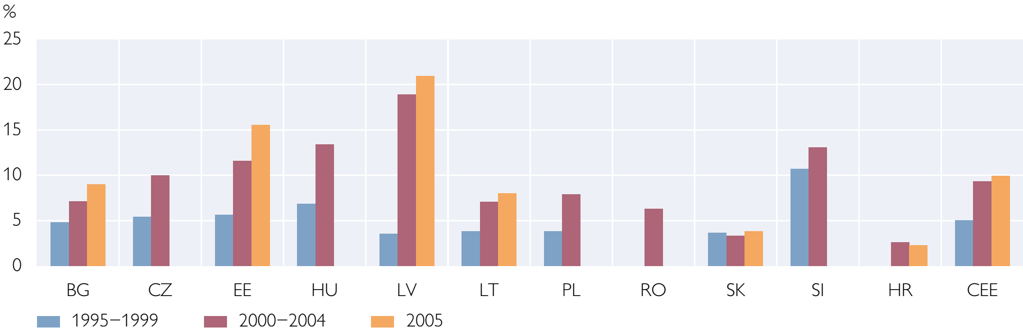


Source: BIS and national central banks.

Looking at the period from 2006 to 2007, house prices in all CEE countries covered in this paper (except for the Czech Republic, Hungary and Poland) grew by more that 10% per year (see chart 6). Bulgaria and the Baltic countries recorded average annual house price increases by between 22% and 116% per year, and the Baltic countries (in particular Latvia) as well as Slovakia show a clear acceleration of growth compared with the period from 2003 to 2005. The very latest annual and quarterly data available for the Baltic countries in particular show, however, that this trend has reversed at least partially: The growth of residential property prices has declined significantly. In some countries and quarters, even nominal price falls occurred. Given the very buoyant growth in Baltic residential property prices in recent years (e.g. Latvia +160% in 2006), this

Chart 7

Share of Real Estate and Construction in the Total FDI Stock in CEE Countries



Source: wiiw.

partial reversal is not surprising. It raises the question, however, how strong and pronounced the correction will be.[17]

Foreign direct investment (FDI) is another important driver of growth in the CEE countries' construction sectors. Chart 7 shows the share of FDI in the real estate and construction sectors as a percentage of the total FDI stock in the CEE countries.[18]

Overall, chart 7 shows a steady increase in the share of real estate and construction in the total FDI stock. The rates of growth, however, are very different across countries. In 2005, the share of real estate-related FDI in Estonia and Latvia was above 15%, while the average share for the CEE countries as a whole climbed only from around 5% in the period from 1995 to 1999 to around 10% in 2005.

Turning to the third driver of the strong growth in the CEE countries' construction sectors, chart 8 compares general government gross fixed capital formation as a percentage of GDP in the CEE countries as a whole, the Baltic countries and Bulgaria, and the euro area.

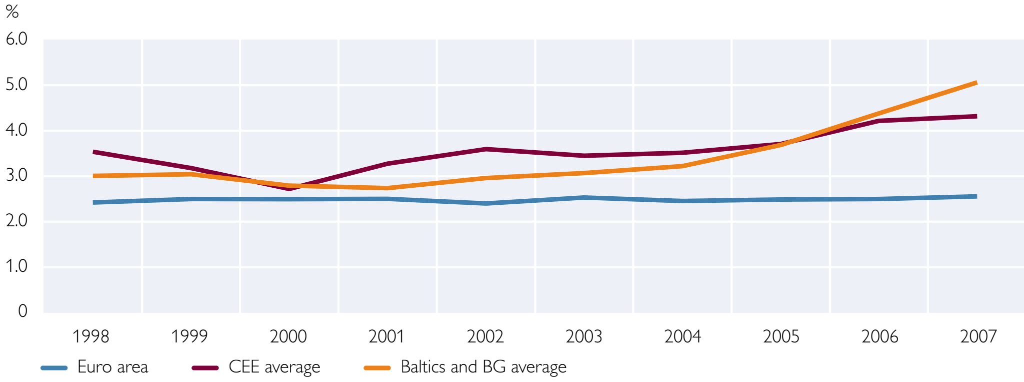
Throughout the period from 1998 to 2007, general government gross fixed capital formation in the CEE countries was on average above comparable public investment in the euro area. More specifically, since 2001, public investment as a percentage of GDP has shown a broadly increasing trend in the CEE countries as a whole, and in particular in the Baltic countries plus Bulgaria. In 2007, public investment as a percentage of GDP in the Baltic countries and Bulgaria was on average around twice as high as in the euro area. Although detailed comparable data are not readily available, it is realistic to assume that a significant share of

[17] *For recent information on real estate developments in CEE countries, see e.g. Urban Land Institute and PriceWaterhouseCoopers (2008) and UniCredit Group (2008).*

[18] *For a few countries (Latvia, Lithuania and Slovenia), data are available from 1995 onward, but for most countries, data are only available as of 1997 or 1998. The data reported here combined two separate categories of FDI as reported by the The Vienna Institute for International Economic Studies (wiiw), namely "real estate, renting and business activities" and "construction," with the former being by far the more important of the two. The data comprises not only homes but also commercial real estate such as office space, warehouses or hotels. Comparable data for Spain and Ireland are not available, but anecdotal evidence suggests that at least in Spain, tourism-related FDI in the coastal areas has had a significant impact on construction investment.*

Chart 8

Share of General Government GFCF in GDP in 3 Country Groups



Source: European Commission AMECO database.

public investment expenditure relates to infrastructure investment, which in turn implies construction works, thus contributing to the increasing role of the construction sector in the CEE economies.

Summing up, the following pattern emerges with regard to the recent role of the construction sector in the CEE countries. The importance of the sector (in terms of its share as a percentage of total GVA and employment) has clearly increased, in particular in the Baltic countries and Bulgaria, but also in the CEE countries as a whole, although developments within the CEE group are at times diverse. With regard to recent changes in the construction sector's relative importance, developments in the Baltic countries and Bulgaria show similarities to those observed in Ireland and Spain prior to the current sharp slowdown in the two countries' real estate markets. However, the most recent available GVA and employment data still tend to reveal differences between the two groups, owing to the earlier start and longer duration of the period of rapid growth in the construction sectors in Ireland and Spain. In this context, it is also interesting to note that the relative GVA and employment shares in manufacturing in the Baltic countries and Bulgaria are below, respectively close to, the euro area levels.

Looking at the drivers of the strong expansion of the construction sectors in the CEE countries and in particular in the Baltic countries and Bulgaria, residential real estate price developments as well as FDI inflows and the relatively strong investment activity of CEE governments are likely to have played a role.

When assessing the strong recent pickup in construction activity in a number of CEE countries, it should be kept in mind that this development can of course have also quite positive implications. First of all, the housing stock in most post-transition CEE countries is still inferior to that in other countries such as most "old" EU Member States. Second, also the endowment with commercial real estate space and physical infrastructure in the CEE countries is mostly insufficient, and construction activities that contribute to removing bottlenecks emerging from these shortcomings are welcome. The question we will address empirically in the next section of the paper, however, is whether rapid growth in the construction sector may have also negative implications for the long-term competitiveness of the CEE economies.

5 Empirical Results

5.1 Data Issues

In section 3, we developed a number of testable relationships (equations 1 to 3) in order to check empirically whether any negative Dutch disease-style effects on competitiveness owing to strong construction sector growth can be found in the CEE countries. We estimate equations 1 to 3 for two panels. Panel 1 includes 10 CEE countries: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. Croatia is excluded because data on the relative price variable were not available for this country.[19] Panel 2 contains 14 "old" EU Member States: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.[20]

Regarding equation 1, we construct three alternative measures of the relative price ratio. Services prices are compared with goods prices (rel1), industrial goods prices (rel2) and non-energy industrial goods prices (rel3). The data were obtained from the NewCronos database of Eurostat. Data for the initial price level of services (relative to the EU-27 average in 1999) are also drawn from NewCronos. The productivity differential is obtained as the ratio of labor productivity in the manufacturing sector over labor productivity in the services sectors (excluding construction services). Wages are measured by nominal compensation per employee in the manufacturing, construction and services sectors. Sectoral employment figures refer to the number of employees in the construction and services sectors. Finally, growth rates of per capita income are calculated on the basis of per capita income measured in purchasing power standards (PPS). Data for productivity, wages, employment and per capita income are taken from the AMECO database of the European Commission.

For equations 2 and 3, three variants of relative manufacturing output are considered. While man1 is obtained by dividing GVA in manufacturing by GVA in the total economy, man2 and man3 use construction and services, respectively, in the denominator instead of the total economy. GVA and investment data are again drawn from AMECO.[21]

5.2 Estimation Strategy

Even though the variables in equations 1 to 3 are given in growth rates, we use the Levin-Lin-Chu (LLC) panel unit root test to see whether the variables are stationary. We use the LLC test that imposes homogeneous unit root processes on the panel cross-sections because of the low number of observations per country. A constraint related to the use of HICP data is that the series start in 1996 (and for some CEE countries only in 2000 or later). Estimation results reported in the appendix indicate that all series (expressed in growth rates) are stationary.

[19] *The relative price variable is constructed using HICP components and figures that are currently not available for Croatia.*

[20] *Luxembourg had to be excluded due to lack of available data.*

[21] *Sectoral investment data are not available for Bulgaria, Estonia, Hungary, and Latvia.*

The low number of observations makes it impossible to employ mean group estimators that rely on country-specific coefficient estimates. Instead, we use either time-fixed effects (if the initial price level variable is included, which precludes the use of country-fixed effects) or country- and time-fixed effects (if initial price levels are not included).

The explanatory variables may be linked to dependent variables in a nonlinear fashion. We check for this eventuality by using the two-regime and three-regime threshold models proposed by Hansen (1999) of the following form:

$$Y = \begin{cases} \alpha_1 + \sum_{j=1}^{n-k} \beta_j \cdot X_j + \sum_{i=1}^{k} \phi_{1i} \cdot X_i + \varepsilon & if \;\; T \le \rho \\ \alpha_2 + \sum_{j=1}^{n-k} \beta_j \cdot X_j + \sum_{i=1}^{k} \phi_{2i} \cdot X_i + \varepsilon & if \;\; T > \rho \end{cases} \qquad (4a)$$

$$Y = \begin{cases} \alpha_1 + \sum_{j=1}^{n-k} \beta_j \cdot X_j + \sum_{i=1}^{k} \phi_{1i} \cdot X_i + \varepsilon & if \;\; T_1 \le \rho \\ \alpha_2 + \sum_{j=1}^{n-k} \beta_j \cdot X_j + \sum_{i=1}^{k} \phi_{2i} \cdot X_i + \varepsilon & if \;\; T_2 \ge \rho > T_1 \\ \alpha_3 + \sum_{j=1}^{n-k} \beta_j \cdot X_j + \sum_{i=1}^{k} \phi_{3i} \cdot X_i + \varepsilon & if \;\; \rho > T_2 \end{cases} \qquad (4b)$$

where T, T_1 and T_2 are the thresholds values and ρ denotes the threshold variable. X_i is the variable that behaves nonlinearly in the different regimes. We may have several (k) nonlinear variables at the same time.

In our case, nonlinearity in equations (1) to (3) may arise because of differences in the size of the construction sector in the economy – relative prices may develop differently given a less important construction sector or a very dominant construction sector. Therefore, we use the share of the construction sector in total GVA as the threshold variable.

Along the lines of Hansen (1999), we select linear and nonlinear models as follows. We first estimate the linear model and the two-regime model. A grid search with steps of 1% of the distribution is carried out to find the value of the threshold variable that minimizes the sum of squared residuals of the estimated two-regime model. Hansen (1999) shows that $\phi_{1i} = \phi_{2i}$ and $\phi_{1i} = \phi_{2i} = \phi_{3i}$ can be tested using a likelihood ratio test and he proposes to derive the distribution of the test statistic via bootstrapping with repeated random draws with replacements (Hansen, 1999), given that it does not follow a standard asymptotic distribution.

If the likelihood ratio test statistic rejects the null hypothesis of the linear model against the two-regime model (on the basis of the bootstrapped critical values), we also analyze whether there are three different regimes instead of two regimes. A three-regime model is estimated based on two threshold values of the threshold variable that minimize the sum of squared residuals across the estimated models.[22] The bootstrap procedure described above is applied to the two-regime and three-regime models.

5.3 Estimation Results

The estimation results for the relative price equation suggest that relative prices are not much influenced by developments in the construction sector (table 2). For the EU-14 panel, the sectoral employment ratio (resource movement effect) does have the statistically significant and expected positive sign if we use only country-fixed effects (rather than country and time effects). For the CEE as well as the EU-14 countries, the relative wage ratios also turn out to be statistically positive but only for the third relative price measure (service prices over non-energy industrial goods prices). The coefficient estimates of 0.04 for the CEE and 0.09 for the EU-14 would suggest that a 10% change in relative wage growth in the construction sector would go in tandem with a change of 0.4% (CEE) and 0.9% (EU-14) in the growth of relative prices of nontradable goods. Overall, however, the results suggest that the country- and time-fixed effects dominate the other explanatory variables. Hence, the regressions do not provide systematic evidence in favor of a significant impact of the resource movement and spending effects on relative prices.

[22] *The threshold from the two-regime model is held fixed and a grid search is used to identify the second threshold. We impose the restriction that the two thresholds should be separated at least by 25% of our sample observations. Once the second threshold is identified, a backward grid search is done to identify the first threshold as suggested by Hansen (1999).*

Table 2

Estimation Results – Relative Prices of Nontradables, 1997 to 2006

$$\Delta(\frac{p^{NT}}{p^{T}}) = f(\Delta(\overset{+}{\frac{emp^{C}}{emp^{NT}}}), \Delta(\overset{+}{\frac{w^{C}}{w^{T+NT}}}), \Delta(\overset{+}{\frac{prod^{T}}{prod^{NT}}}), \Delta(\overset{+}{capita}), \overset{-}{plserv^{99}})$$

	rel1	rel2	rel3	rel1	rel2	rel3
	Country-fixed effects			Country- and time-fixed effects		
CEE-10						
$\Delta(\frac{emp^{C}}{emp^{NT}})$	−0.038	0.025	−0.061	−0.002	0.045	0.012
$\Delta(\frac{prod^{T}}{prod^{NT}})$	0.022	0.038	0.028	0.026	0.032	0.027
$\Delta(\frac{w^{C}}{w^{T+NT}})$	0.001	0.053*	0.020	0.012	0.054	0.044*
$\Delta(capita)$	0.010	−0.091	−0.020	0.078	0.055	0.028
$plserv99$	0.016	0.034	−0.005			
R^2	0.419	0.264	0.190	0.516	0.401	0.438
R^2adj	0.253	0.054	−0.028	0.256	0.080	0.157
Countries	10	10	10	10	10	10
Observations	64	64	67	64	64	67
EU-14						
$\Delta(\frac{emp^{C}}{emp^{NT}})$	0.084***	0.099***	0.094***	−0.049	−0.048	−0.038
$\Delta(\frac{prod^{T}}{prod^{NT}})$	0.019	0.028	0.039	−0.001	0.009	0.018
$\Delta(\frac{w^{C}}{w^{T+NT}})$	0.073	0.128	0.122	0.028	0.086	0.094**
$\Delta(capita)$	0.028	0.060	0.085	−0.038	−0.012	−0.013
$plserv99$	−0.0003	−0.003	0.012			
R^2	0.292	0.419	0.146	0.739	0.783	0.780
R^2adj	0.203	0.346	0.038	0.670	0.726	0.722
Countries	14	14	14	14	14	14
Observations	126	126	126	126	126	126

Source: Authors' estimates.

*Note: While rel1 is obtained by dividing service prices by goods prices, rel2 and rel3 use industrial goods prices and industrial goods prices excluding energy goods prices, respectively. *, ** and *** show statistical significance at the 10%, 5% and 1% levels, respectively.*

By contrast, the estimation results for relative real manufacturing output provide more support for the hypothesis that strong growth in the construction sector may have a negative impact on relative real manufacturing output (table 3). The first observation is that we can establish a negative relationship between changes in relative investment in construction and changes in the relative real manufacturing output for both country groups, even though this effect is statistically significant only for the CEE group. The results suggest that a 10%

Table 3

Estimation Results – Relative Real Manufacturing Output

$$\Delta(\frac{y^T}{y^{NT+C}}) = f(\Delta(\overset{-}{\frac{inv^C}{inv^{T+NT}}}))$$

$$\Delta(\frac{y^T}{y^{NT+C}}) = f(\Delta(\overset{+}{\frac{w^T}{w^C}}), \Delta(\overset{+}{\frac{emp^T}{emp^C}}))$$

	man1	man2	man3	man1	man2	man3
	Country-fixed effects			Country- and time-fixed effects		
	CEE-10					
$\Delta(\frac{inv^C}{inv^{T+NT}})$	−0.111**	−0.099	−0.185***			
$\Delta(\frac{w^T}{w^C})$				0.115**	0.322***	0.141**
$\Delta(\frac{emp^T}{emp^C})$				0.111	0.379**	0.130
R^2j	0.431	0.279	0.484	0.407	0.358	0.384
R^2adj	0.210	−0.001	0.280	0.235	0.172	0.206
Countries	6	6	6	10	10	10
Observations	76	76	75	108	108	108
	EU-14					
$\Delta(\frac{inv^C}{inv^{T+NT}})$	−0.001	−0.006	−0.002			
$\Delta(\frac{w^T}{w^C})$				0.053	0.318***	0.067
$\Delta(\frac{emp^T}{emp^C})$				0.143***	0.601***	0.163***
R^2j	0.364	0.245	0.350	0.440	0.477	0.419
R^2adj	0.273	0.137	0.257	0.341	0.384	0.316
Countries	14	14	14	14	14	14
Observations	475	471	471	400	400	400

Source: Authors' estimations.

*Note: While man1 is obtained by dividing GVA in manufacturing by GVA in the total economy, man2 and man3 use construction and services, respectively, in the denominator instead of the total economy. *, ** and *** show statistical significance at the 10%, 5% and 1% levels, respectively. Sectoral investment data are not available for Bulgaria, Estonia, Hungary, and Latvia.*

increase in relative investment growth in construction is associated with a relative decline of between 1% and 2% in relative manufacturing output growth.

Table 3 shows that the resource movement effect and the wage or competitiveness effect are not equally important for the two country groups. For the CEE group, we have robust evidence that the competitiveness effect is important for the relative decline of manufacturing output irrespective of the chosen deindustrialization measure. By contrast, for the EU-14 group, the wage effect is significant only if we use man2 as the measure of relative decline of manufacturing. The size of the estimated coefficients indicates that a 10% increase in wage growth in the construction sector relative to that in the manufacturing sector goes hand in hand with a drop of between 1.2% and 3.2% in relative manufacturing output growth.

Table 4

Nonlinearity – Likelihood Ratio Tests and Bootstrapped p Values

		CEE-10		EU-14	
		LR	p-value	LR	p-value
rel1	linear vs. 2r model	6.33	0.098	5.48	0.083
	2r vs. 3r model	5.89	**0.046**	2.08	0.505
rel2	linear vs. 2r model	10.78	**0.010**	6.95	0.110
	2r vs. 3r model	1.56	0.492	0.82	0.705
rel3	linear vs. 2r model	4.15	0.206	8.03	**0.027**
	2r vs. 3r model	6.01	0.117	3.53	0.202
man1	linear vs. 2r model	7.91	0.074	8.88	**0.020**
	2r vs. 3r model	1.72	0.446	2.32	0.332
man2	linear vs. 2r model	12.10	**0.035**	27.86	**0.000**
	2r vs. 3r model	17.38	**0.000**	1.05	0.631
man3	linear vs. 2r model	2.56	0.431	7.43	**0.038**
	2r vs. 3r model	0.58	0.764	2.95	0.238

Source: Authors' estimations.

Note: *2r model and 3r model refer to the two-regime and three-regime models as set out in equations (4a) and (4b). LR is the likelihood ratio test, and p-values are obtained after 1,000 bootstrap replications. p-values lower than 0.05 and 0.01 show that the null hypothesis of the linear model (2-regime model) can be rejected against the alternative hypothesis of the two-regime model (three-regime model) at the 5% and 1% statistical significance levels, respectively.*

By contrast, the resource movement effect seems to be more robust in the EU-14 than in the CEE group, as it is always significant with the expected positive sign for the latter group and it is found to be significant only for man2 for the former group. Overall, we find that a rise by 10% of growth in employment in the construction sector relative to that in the manufacturing sector is linked to a decrease of between 1.4% and 6% in relative manufacturing output growth.

Turning to the issue of nonlinearity, we use the share of the construction sector in total GVA as the threshold variable and we allow for nonlinearity for the variables that are likely to indicate Dutch disease-style competitiveness effects due to the developments in the construction sector, namely: $\Delta(\frac{emp^{C}}{emp^{NT}})$ and $\Delta(\frac{w^{C}}{w^{T+NT}})$ in equation (1) and $\Delta(\frac{w^{T}}{w^{C}})$ and $\Delta(\frac{emp^{T}}{emp^{C}})$ in equation (3). The other variables are restricted to be the same across the different regimes.

Table 4 reports the likelihood ratio test and the corresponding bootstrapped p-values for the selection of the linear, two-regime and three-regime models. For the CEE-10, at the conventional 5% level, the two-regime model is selected over the linear model for rel2 and the three-regime model for man2. For the EU-14, the two-regime model is selected for rel3 and for all three measures of deindustrialization (man1, man2 and man3).

For the relative price equation, allowing for nonlinearity makes the coefficients significant, at least in one of the regimes (rel2) (table 5). For the CEE-10, relative wages and relative employment become significant with the expected positive sign in the lower regime (but not in the upper regime), while the same variables are positive and statistically significant in the higher regime for rel3 for the EU-14.

Table 5

Nonlinear Models

		CEE-10	EU-14			
		rel2	rel3	man1	man2	man3
		Coefficient estimates				
$\Delta(capita)$		0.075	−0.02			
$\Delta(\frac{prod^T}{prod^{NT}})$		0.075	0.028			
$\Delta(\frac{emp^C}{emp^{NT}})$	Low regime	0.224**	−0.07**			
	High regime	−0.076	0.083**			
$\Delta(\frac{w^C}{w^{NT}})$	Low regime	0.109***	0.078			
	High regime	−0.004	0.178***			
$\Delta(\frac{w^T}{w^C})$	Low regime			0.099	0.511***	0.123
	High regime			0.036	0.278**	0.532
$\Delta(\frac{emp^T}{emp^C})$	Low regime			0.239***	0.933***	0.268***
	High regime			0.066**	0.418***	1.485
Threshold value		6.0%	7.5%	6.3%	7.0%	6.3%
Percentile in distribution		0.540	0.547	0.325	0.421	0.326

Source: Authors' estimations.

Note: *The threshold variable is the share of construction in total GVA. *,** and *** show statistical significance at the 10%, 5% and 1% levels, respectively.*

Regarding relative manufacturing output (variants of man), the coefficients are mostly insignificant for the CEE-10 (and are not reported here). At the same time, the impact of the resource movement effect (relative employment, $\Delta(\frac{emp^T}{emp^C})$) on relative manufacturing output seems to be considerably different for the EU-14: It is higher in the lower regime than in the upper regime. The same applies to the relative wage variable ($\Delta(\frac{w^T}{w^C})$) for man2: its effect is twice as high in the lower regime than in the higher regime.

Overall, there is some evidence for nonlinearity, although nonlinearity appears to be sensitive to the alternative measures of the dependent variables. In particular, for rel3 (services prices relative to the prices of non-energy industrial goods) in the EU-14, we find that relative wages and relative employment do have a much stronger effect on relative prices with an increase in the share of the construction sector.

6 Concluding Remarks

Against the background of the strong increase in construction activity in a number of CEE countries, this paper examines whether rapid growth in this part of the economy may have Dutch disease-style negative implications for the long-term competitiveness of the CEE economies. The stylized facts presented above suggest a strong expansion of the construction industry in particular in the Baltic countries and Bulgaria. In fact, developments in this country group appear to bear some resemblance to Ireland and Spain, which – irrespective of the current sharp slowdown in their real estate markets – experienced rapid growth in the construction sector in recent years. The situation in the other CEE countries is more heterogeneous across countries.

As argued above, the strong recent pickup in construction activity in a number of CEE countries is not surprising and not a priori a cause for concern. We identified three main reasons for this pickup. First, the recent strong house price growth in the CEE countries, which in turn was mainly triggered by the countries' easy access to international capital over the past several years. Second, the inflow of FDI in real estate and construction, and third, the relatively high share of government investment, which is mostly related to the construction of infrastructure. Given the relatively low housing and infrastructure endowment in the CEE countries, as regards both the quality and quantity of dwellings and infrastructure, there is a clear need for investment in these areas. In addition, improved endowment with commercial real estate (such as offices, retail space or hotels) as well as enhanced physical infrastructure can contribute to removing growth bottlenecks in the CEE economies.

The question we address empirically in this paper, however, is whether there are already signs that the rapid expansion of the CEE economies' construction sectors is contributing to increasing relative prices for nontradables, which in turn may have negative repercussions on the long-term competitiveness of the manufacturing sector in the CEE countries. In addition, the paper compares these developments in the CEE countries with those observed in the "old" EU Member States.

Our results show that there is little evidence as yet to confirm relative price adjustments between the tradable and the nontradable sectors due to the rapid growth in construction. But once we look at the two channels through which construction investment is expected to cause a relative decline in real manufacturing output, it turns out that wage increases in the construction sector in excess of those in the manufacturing sector appear to cause a decline in real manufacturing output relative to that in other sectors of the CEE economies. In the EU-14, this competitiveness effect is less pronounced and the resource movement effect (reallocation of labor across sectors) is found to play a larger role. We also find some evidence for nonlinearity in this context.

In the long run, these developments may result in a loss of competitiveness and a gradual relative decline of the manufacturing sector's importance in the CEE countries. This, in turn, may trigger other problems such as unsustainable external deficits and ultimately periods of relatively low GDP growth, in particular in countries with pronounced labor and product market inefficiencies and sticky prices, the incidence of which tends to differ significantly across countries. In order to avoid possible negative side-effects of the rapid growth of the construction sector in the CEE countries, it will be important for governments to pursue policies that discourage excessive shifts of resources to uses that are non-productive from the point of view of international competitiveness. This implies, in particular, avoiding policy incentives such as real estate tax breaks and insufficient lending standards for banks that may result in excessive private-sector construction activity. The situation should be seen in a somewhat different light when it comes to construction in infrastructure, which is often needed to enhance overall productivity in the CEE countries, as well as construction for commercial purposes such as office and retail space. However, also with regard to such productive construction activities, the situation in the construction sector as a whole needs to be taken into account.

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Appendix

Panel Unit Root Test (Levin-Lin-Chu)

	CEE-10		EU-14		CEE-10 + EU-14	
	p-values					
	c	c+t	c	c+t	c	c+t
$\Delta(\frac{prod^T}{prod^{NT}})$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(capita)$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(\frac{emp^C}{emp^{NT}})$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(\frac{emp^T}{emp^C})$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(\frac{w^C}{w^{T+NT}})$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(\frac{w^T}{w^C})$	0.00	0.00	0.00	0.00	0.00	0.00
$\Delta(\frac{inv^C}{inv^{T+NT}})$	0.00	0.00	0.00	0.00	0.00	0.00
$man1$	0.00	0.00	0.00	0.00	0.00	0.00
$man2$	0.00	0.00	0.00	0.00	0.00	0.00
$man3$	0.00	0.00	0.00	0.00	0.00	0.00
$rel1$	0.00	0.00	0.00	0.00	0.00	0.00
$rel2$	0.00	0.00	0.00	0.00	0.00	0.00
$rel3$	0.00	0.00	0.00	0.00	0.00	0.00

Source: Authors' estimations.

Note: Sectoral investment data are not available for Bulgaria, Estonia, Hungary and Latvia. c and c+t indicate the inclusion of a constant and a constant and a trend, respectively. The optimal lag length is chosen using the Schwarz information criterion.