Measuring Competition in CESEE: Stylized Facts and Determinants across Countries and Sectors

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Using the Amadeus firm-level database, this paper examines sector-specific indicators of competition in a number of Central, Eastern and Southeastern European (CESEE) countries. More specifically, it provides an overview of two key indicators of the level of competition, namely profit margins and the concentration of sales, across 27 industries in 13 CESEE countries. We discuss the advantages and disadvantages of various indicators of competition that are commonly used in the literature and explain why we use the aforementioned proxy variables for the intensity[2] of competition. The paper then provides a cross-country and cross-sector overview of the differences in these competition indicators for the period from 1999 to 2007 before empirically identifying the main determinants of these differences. We find large differences between individual sectors, while differences between countries are considerably smaller. Profit margins and concentration ratios are notably high in communications, finance, housing, and miscellaneous goods and services. Manufacturing achieves, on average, lower profit margins and concentration ratios than other sectors. Over time, profit margins have increased in most sectors as a result of the rapid catching-up process in the CESEE region, while concentration ratios have declined, suggesting that the region is still in a phase of rapid market expansion. We observe some indication of an increase in competition in only a handful of sectors, e.g. housing and utilities, passenger transport, and information services. At the same time, in many retail trade sectors and in financial services, both profit margins and concentration ratios displayed disproportionately high growth in our sample period. All remaining sectors show diverging trends for both indicators.

1 Introduction

Economic theory suggests that competitive markets exert a positive influence on the economic development of countries. Competitive markets encourage the entry of new firms and act as a powerful selection mechanism for existing companies, ensuring that only the most efficient survive. As argued by Schumpeter back in 1942, incumbent firms with market power are constantly threatened by existing competitors as well as new market entrants. Given this permanent threat of competition, firms need to innovate, which in turn spurs productivity growth. Competition thus improves the allocation of production factors across and within sectors, creates powerful incentives for innovation and productivity growth and ultimately contributes to economic growth. Hence, economic policymakers have strong incentives to ensure a highly competitive environment. This is further corroborated by the view that highly competitive markets will also ensure that consumer needs are served best through an appropriate product range, high-quality

[2] *Please note that we use the terms "intensity," "degree" and "level" of competition interchangeably throughout this study.*

products and services, and low prices. It is therefore no surprise that competition policy plays an important part in the economic policy framework of most countries and of the EU.

In principle, the positive effects of competition on economic growth apply to all economies. As far as Central, Eastern and Southeastern European (CESEE) countries are concerned, however, there are some special aspects. First, most CESEE countries are (very) small economies. In particular in the nontradable sectors, where outside producers cannot increase the level of domestic competition via imports, the number of companies is therefore likely to be limited. This in turn increases the danger of oligopolistic or even monopolistic market structures. Second, the economic "starting point" of all CESEE countries 20 years ago was characterized by state-owned monopolies. Unlike countries with an uninterrupted capitalist history, the CESEE countries had to (re-)create competitive market structures and functioning competition policies from scratch, a process which was (and in some cases still is) certainly driven by the process of EU accession and the associated adoption of the acquis communautaire. Third, future economic growth in CESEE may have to rely more on domestically generated productivity gains than in the past, when imported capital was readily available and acted as a key driver of growth. Given the above-mentioned positive effects that competitive markets are likely to have on productivity growth and consumer welfare, it is of particular importance to look at the level of competition in CESEE.

To our knowledge, no paper has yet systematically examined the country- or sector-specific differences in indicators of the intensity of competition in CESEE. Nor have the determinants of these differences been analyzed. Against this backdrop, in this paper we use the Amadeus firm-level database to provide an overview of two key indicators of the intensity of competition that are commonly used in the literature, namely profit margins and the concentration of sales, across 27 sectors in 13 CESEE countries.[3] In the next section, we review the literature on competition in CESEE. In section 3, we discuss conceptual issues related to the measurement of competition and justify our choice of indicators. Section 4 provides an exposition of the database and describes the level of competition in our sample across different sectors and countries as well as over time. Section 5 then presents an empirical investigation of the determinants of the country- and sector-specific differences in the indicators of competition, and section 6 concludes.

2 What Do We Know about Competition in CESEE?

Several arguments suggest that the degree of competition should differ between developing and emerging economies as opposed to highly mature markets. Graddy and Klepper (1990) observe empirical regularities in the evolution of new industries, which suggest that the early phases of industrialization are characterized by growing numbers of firms, followed by a phase of decline or shakeout in firm numbers. In the final phase, the number of firms stabilizes. Each stage is likely to be characterized by different forms of competition (price versus quality) and a different intensity of competition. While the first phase is marked by less intense competition pressures

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[3] *Bosnia and Herzegovina (BA), Bulgaria (BG), the Czech Republic (CZ), Estonia (EE), Croatia (HR), Hungary (HU), Lithuania (LT), Latvia (LV), Poland (PL), Romania (RO), Serbia (RS), Slovenia (SI) and Slovakia (SK).*

compared with the second, the outcome in the final phase is unclear.[4] Graddy and Klepper (1990) show that the competitive outcome in the third phase depends on specific developments in the early phases of market development, thus assigning an important role to competition policy in the early stages of industrialization. Clearly, industries in developing and emerging markets are expected to be predominantly in the first or second phase, which calls for the careful monitoring of the evolution of market structures for the long-term benefit of consumers.

In the CESEE countries, a number of industries may already have reached or completed the shakeout stage. The existing literature on competition in CESEE is, however, limited. Moreover, most papers focus on competition policy and the impact of competition on economic performance. Hölscher and Stephan (2004), for example, provide an overview of competition policy in a number of CESEE countries prior to their accession to the EU. They find that competition policy in these countries was already well established in the late 1990s but caution that a one-to-one adoption of EU competition policies in CESEE may not be the optimal solution, given that these countries' small size but high level of economic integration creates particular difficulties in defining the "relevant market." Vagliasindi (2006) analyzes the link between competition policy and the intensity of competition in CESEE. The author uses survey results to assess the implementation of competition policy on the one hand and the intensity of competition on the other. A key finding of the paper is that the implementation of competition policy has a significant positive impact on the intensity of competition. At the same time, Vagliasindi argues that privatization helps create functioning markets only if it is accompanied by suitable institutional reforms.

A number of papers look at the link between competition and economic performance. Djankov and Murrell (2002) survey the available literature on the impact of product market competition on enterprise efficiency in transition economies. They find that in Eastern European countries, product market competition – through both domestic and import competition – has a significant effect in terms of improving enterprise performance.[5] Carlin, Schaffer and Seabright (2004) find that monopolies in transition countries innovate less and grow more slowly than firms facing at least a minimum of rivalry. The authors also argue that the presence of only a few rivals enhances firm performance more than the presence of many competitors. The evidence they present for the second finding is, however, empirically weaker. The authors use the results of the cross-country Business Environment and Enterprise Performance Survey (BEEPS), in which firms were asked, inter alia, to provide a self-assessment of the intensity of competition that they are facing.[6] Using the same database, Commander and Švejnar (2007) find that competition (as well as foreign ownership) has a positive impact on firms' performance, defined as the level of sales adjusted for inputs. Fernandes (2009)

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[4] Glen, Lee and Singh (2001) find that the persistence of profitability of firms in emerging markets tends to be smaller than that of firms in mature economies. This finding, which the authors regard as evidence of relatively more intense competition in emerging markets, is, however, based on non-European emerging market economies.

[5] They also find, however, that increased competition may have negative effects on efficiency when incentives are weak, as was often the case during the early transition period (Djankov and Murrell, 2002, p. 763).

[6] Specifically, firms were asked to report the number of competitors in the market for their main product, the expected impact of a price increase by 10% and their price-cost margin (Carlin, Schaffer and Seabright, 2004, p. 16).

looks at the structure and performance of the services sector in transition economies. Using EBRD transition indices to capture progress in liberalization, she finds a positive and significant impact of liberalization on productivity growth in services sectors and in downstream manufacturing industries. She therefore argues that product market barriers that limit competition in various services sectors should be removed to enhance productivity growth.[7] Gradzewicz and Hagemejer (2007) argue that both domestic competition and foreign competition (imports) significantly lower the level of markups. Their measure of domestic competition is the Herfindahl index of market concentration. Ospina and Schiffbauer (2010) find competition to have a positive impact on firm productivity. This study is based on firm-level data from the World Bank Enterprise Survey, and the indicators of competition used by the authors are markups and cost competition. Like the BEEPS indicator of competition intensity, the World Bank survey is based on firms' self-assessment.

3 How to Measure Competition

Although economists tend to attribute a significant role to the intensity of competition, there is a clear lack of suitable concepts and data to measure competitive pressure. Choosing suitable indicators for the analysis of competition intensity thus involves difficult choices and compromises.

The papers surveyed above focus on competition policy or the impact of competition on economic performance. Although most of them use one or more indicators of competition, the selection of these indicators is not their primary concern. There are, however, also a few papers which aim specifically to find the most suitable indicators for measuring competition. A report for the U.K.'s Office of Fair Trading (OFT, 2004) e.g. lists 32 suitable indicators, which are grouped into the categories barriers to entry, productivity, concentration, profitability, prices, consumer complaints, innovation, switching costs and others. However, some of these indicator groups (e.g. consumer complaints) are mainly relevant for specific analyses (in this case consumer protection) rather than for a general assessment of the intensity of competition. In addition and more importantly, for most or all CESEE countries, many of the underlying data needed for the construction of indicators for barriers to entry, innovation and switching costs are not available. Another recent study looking at the measurement of competition is Creusen, Minne and van der Wiel (2006). The authors of this study use only four measures of competition, the so-called relative profit measure, the price-cost margin, the Herfindahl concentration index and the labor-income ratio, but analyze their pros and cons in some detail. They find that the different indicators frequently contradict each other as regards changes in the intensity of competition over time. According to the authors, "these differences can partly be traced back to differences in their economic concepts […] because they respond differently to a reallocation of output from inefficient to efficient firms" (Creusen, Minne and van der Wiel, 2006, p. 1).

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[7] *Campos and Coricelli (2002) provide a useful overview of the impact of liberalization and institutions on growth.*

The two indicators most commonly used in the literature are concentration measures and profit margins.[8] However, in neither case is the interpretation of a change in the indicator free of theoretical ambiguity.[9] Relatively high profit margins would a priori indicate less intense competition, but very low or negative profit margins may also point to predatory behavior by (some) market participants. In addition, what are considered normal profit margins is likely to depend strongly on the characteristics of the industry; moreover, profit margins tend to increase over time as the surviving firms' cost-effectiveness is higher without this having a detrimental effect on competition.
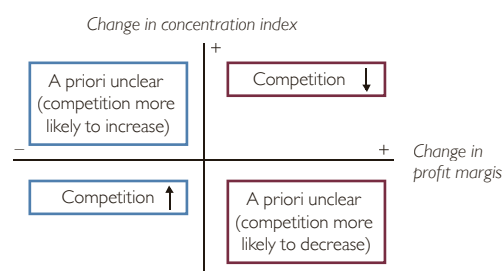
Lower concentration as a result of lower entry barriers to a market would normally be seen as an indication of an increase in competition. However, when firms in a market act more aggressively, thus driving out less efficient firms, the subsequent rise in concentration does not automatically imply less competition. This behavior was recently observed in the telecommunications sector of many Western European countries. A rise in competition tends to increase the market share of more efficient firms. This reallocation effect may even lead to a counterintuitive positive correlation between concentration, profit margins and competition.

This discussion makes clear that, when looking at just one indicator in isolation, the risk of misleading results is particularly high. We therefore use two alternative indicators of competition in our analysis, describing both indicators and their evolution over time and across countries. Thus, our analysis delivers a fuller picture of key indicators of competition in the CESEE region.

When we look at the two indicators of competition together, there are four possible scenarios, each of which suggests different changes in the level of competition (see chart 1). If profit margins and the concentration index fall, the intensity of competition in the market concerned is likely to increase. Conversely, if both measures rise, the intensity of competition is likely to decline. The two "mixed" scenarios are obviously more difficult to interpret. On balance, however, it would appear more likely that a drop in profit margins indicates an increase in the intensity of competition even if the concentration in the relevant market rises, and vice versa. This is because more recently and based on theoretical considerations, profit margins have by and large come to be seen as the relatively more important indicator of competition, although the above-mentioned caveats in interpretation still apply (Janger and Schmidt-Dengler, 2010; Boone, 2004).

Chart 1

Combined Interpretation of Key Competition Indicators

Change in concentration index

+

| A priori unclear (competition more likely to increase) | Competition ↓ |

− | Change in profit margis | +

| Competition ↑ | A priori unclear (competition more likely to decrease) |

−

Source: OeNB.

[8] The vast majority of studies on the link between product market competition and enterprise restructuring surveyed in Djankov and Murrell (2002) for example use only one indicator of competition, usually a measure of concentration, e.g. sales concentration.

[9] For further details, see also OFT (2004) and Boone, van Ours and van der Wiel (2007).

4 A Map of Competition in CESEE

4.1 Definition of Indicators and Data Sources

The main source of data for our study is the Amadeus firm-level database. This database can be used to calculate a limited number of sector-specific competition indicators for the CESEE countries without having to exclude too many countries or sectors due to lack of data. These indicators can be grouped under the categories firm profitability and market concentration. While profitability can be measured using profit margins and return on assets, the Herfindahl index on sales (herfSALE) and the Herfindahl index on employment (herfEMPL) can be used to assess concentration.

All competition indicators are calculated directly, using indicators available from the Amadeus database. Profit margins (PRMA) are defined as profit and loss before taxes in relation to operating revenue:

$$PRMA=(PLBT/OPRE)*100$$

Profit and loss before taxes (PLBT) includes operating and financial profits. Operating revenue (OPRE) is equal to EBIT (earnings before interest and taxes) and includes sales plus stock variations plus other operating revenues but not value-added tax (VAT).[10]

Return on assets (RTAS) is calculated as profit and loss before taxes divided by total assets, where total assets are the sum of fixed assets (FIAS; intangible, tangible and other assets) and current assets (CUAS; stocks, debtors and other assets such as cash and cash equivalents):

$$RTAS=(PLBT/(FIAS+CUAS))*100$$

The Herfindahl index for a given industry sector is defined by the sum of the squared market shares:

$$HI=\sum_{j=1}^{N}s_j^2$$

with s_j denoting firm j's share of economic activity in total industry activity

$$s_j=(a_j/\sum_{j=1}^{N}a_j)$$

and N the number of firms operating in the respective industry sector. Economic activity a corresponds once to employment (herfEMPL) and once to sales figures (herfSALE). Note that the Herfindahl index lies in the interval $1/N$ (no concentration, meaning each firm

Table 1

Pairwise Correlation Coefficients between Different Indicators of Competition

	herf-SALE	herf-EMPL	RTAS	PRMA
1999–2007				
herfSALE	1			
herfEMPL	0.60	1		
RTAS	−0.05	0.01	1	
PRMA	0.06	0.06	0.53	1
1999–2001				
herfSALE	1			
herfEMPL	0.60	1		
RTAS	−0.14	−0.03	1	
PRMA	0.12	0.18	0.63	1
2002–2004				
herfSALE	1			
herfEMPL	0.56	1		
RTAS	0.01	0.09	1	
PRMA	0.19	0.17	0.64	1
2005–2007				
herfSALE	1			
herfEMPL	0.59	1		
RTAS	0.01	0.04	1	
PRMA	0.10	0.10	0.48	1

Source: Authors' calculations.

Note: Calculations are based on the Amadeus dataset.

[10] *Ideally, we would have been able to construct a price-cost margin from the Amadeus database, however the information available on the different cost components of firms was unfortunately too sketchy for many industries and countries. In order to work with a reasonably large dataset and ensure sufficient comparability across countries and sectors, we chose to define profit margins as above.*

has the same market share) and 1 (total concentration, only one firm is in the market).

Given the multidimensionality of the dataset, which covers a large number of sectors and countries, we decided to limit the number of competition indicators that we use for our analysis to one per category. This facilitates the visualization and interpretation of the results. As a first step in this selection process we look at the correlations by sector and by country between the different indicators within the same category and across categories.[11]

We find a high correlation between Herfindahl concentration indices based on sales and on employment as well as between PRMA and RTAS. There is no sign of a strong correlation between the two categories of profitability and concentration. Thus, we decided to concentrate on one indicator from each category in order to paint a more complete picture of key indicators of competition in the CESEE countries. The main criterion for selection within each category is the availability of data. In this paper, we thus decided to focus on profit margins and the Herfindahl concentration index based on sales.

4.2 Choice of Sectoral Disaggregation

The sector composition we use has been guided by two considerations: First, we wanted to aggregate firms according to the distance from the final consumer at which they operate. Thus, we distinguish between manufacturers, wholesale traders and retail traders. Second, we wanted to arrive at a classification which could be matched as closely as possible to existing subcomponents of the Harmonised Index of Consumer Prices (HICP). Thus, we aggregated four-digit NACE (Revision 2) codes into 35 sectors.[12] Of these 35 sectors, we selected 27 for our analysis.[13] The sectors covered in this paper can broadly be divided into five groups:
— Manufacturing (group M, containing seven sectors)
— Wholesale trade (group HH, containing seven sectors)
— Retail trade (group HR, containing seven sectors)
— Consumer services (group H, containing two sectors)
— Business services (group S, containing two sectors)
In addition, we single out two sectors which show significantly higher concentration ratios than all other sectors and therefore deserve particular attention. These are communication services (sector H08) and financial services (sector S02).

These economic groups allow us to take a horizontal as well as a vertical look at the intensity of competition. Thus, for example, we can analyze the competitive environment in the manufacturing sectors as opposed to the distribution and other

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[11] Only limited data for 2008 were available at the time of writing this article. Although including the beginning of the crisis in 2008 in the analysis would have been of obvious interest, it would also have had a significant negative impact on the overall quality of the dataset.

[12] This paper is part of a larger research project, in which we will analyze how different competitive environments relate to price level and inflation developments. Of the selected sectors, 20 can be mapped directly to HICP subcomponents. More specifically, we have 12 HICP-compatible activities, of which 8 are counted separately at the wholesale and retail level. A recent related study on this issue is Janger and Schmidt-Dengler (2010).

[13] The final choice of sectors was determined by data availability. In addition, we excluded a number of sectors where the government is expected to have a major impact on competition intensity, e.g. public services and education. We also excluded agriculture, forestry, mining and quarrying given their diminishing economic importance. Table A2 in annex 2 gives a complete list of all sectors used in the analysis.

service sectors and identify possible qualitative differences at the level of production, wholesale and retail trade.

4.3 Evolution of Competition in CESEE (1999–2007)

This section provides stylized facts on the intensity of competition across countries and sectors as well as changes in intensity over time.[14] More specifically, it identifies those sectors or countries where the selected indicators for competition intensity are particularly high or low relative to other sectors or countries.

Charts 2 and 3 show country-by-country box plots of profit margins and the Herfindahl sales concentration index for the period from 1999 to 2007 for all 27 sectors. The box plots show the minimum, 25% quartile, 50% quartile, 75% quartile and the maximum value of the underlying distribution. Observations falling above or below 1.5 times the interquartile range are marked as outliers.

The profit margin box plot (chart 2) suggests that in most countries the distribution of profit margins is fairly concentrated. Exceptions to this rule are Bosnia and Herzegovina (BA) and – in particular – Serbia (RS), where profit margins are also notably higher than in other countries. The sector-specific outliers are concentrated in a few sectors, namely communications (H08), retail sales of miscellaneous goods and services (HR12) and finance (S02). In Poland (PL) and Croatia (HR), a few sectors have negative average profit margins.

As to the concentration of sales, chart 3 shows that across many countries covered by this study, sales in the communications sector (H8) are highly concentrated

Chart 2

Distribution of Profit Margins across Countries (1999–2007)
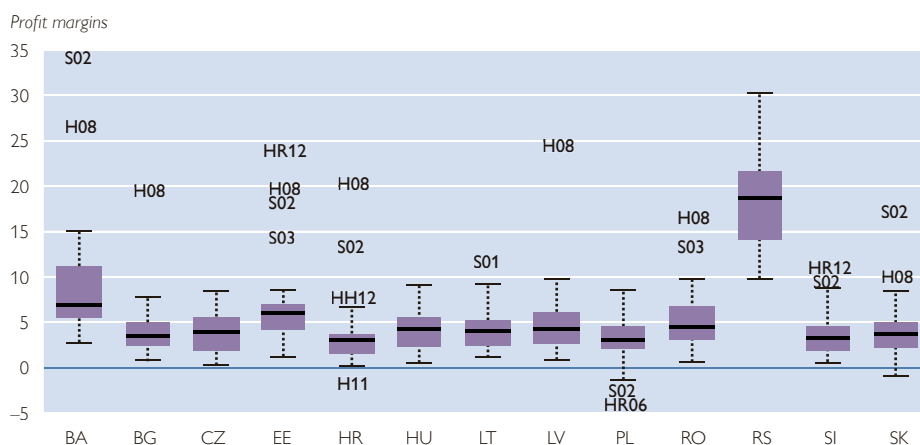
Source: Authors' calculations.

Note: See table A2 for a description of sector codes used.

[14] *Standardized accounting and disclosure rules, which cannot automatically be assumed for data in the Amadeus database, are crucial for cross-country comparisons. A further caveat are changes over time in the firms included in the database, which in turn affects the indicators of competition we use. We thus compared the coverage of employment in Amadeus with employment data provided by Eurostat (see annex 1). It turns out that employment coverage is fairly good for most countries. There is no obvious data source against which the representativeness of the profit margin or sales data contained in the Amadeus database can be checked. However, the strong correlation between employment- and sales-based Herfindahl indices suggests that Amadeus sales data are also fairly representative.*

Chart 3

Distribution of Sales Concentration across Countries (1999–2007)

Index of sales concentration (0 = lowest, 1 = maximum)

Source: Authors' calculations.

Note: See table A2 for a description of sector codes used.
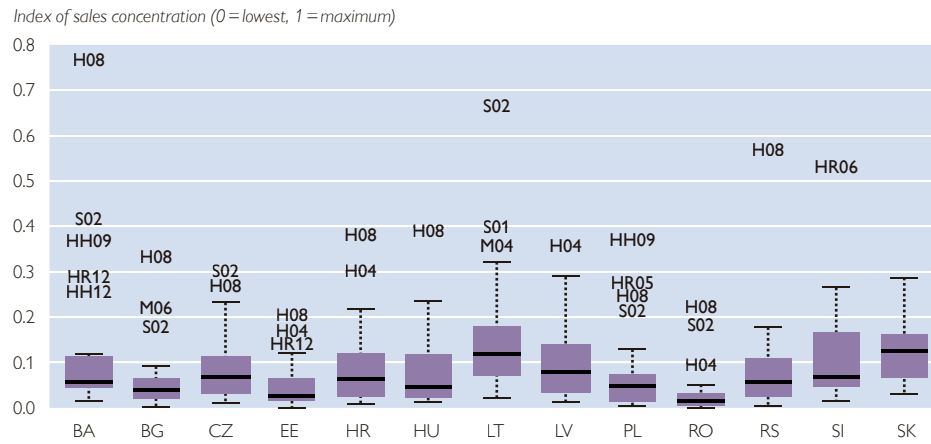
relative to other sectors. A fairly high degree of sales concentration can also be found in the finance (S02) and housing (H4) sectors. More generally, chart 3 suggests that sales concentration exhibits far more sector-specific outliers than profit margins.

Charts 4 and 5 present the two competition indicators from a sectoral perspective, complementing the country-by-country description above. Examining first the distribution of profit margins across sectors (chart 4) confirms some of the findings outlined above. The communication sector (H08) and the finance sector (S02) are again identified as the sectors with the largest variation in profit margins as well as the highest average profit margin levels. Also, Serbia and to a lesser extent Bosnia and Herzegovina again frequently appear as outliers. In addition, Estonia appears to have particularly high profit margins in some sectors.

Chart 4

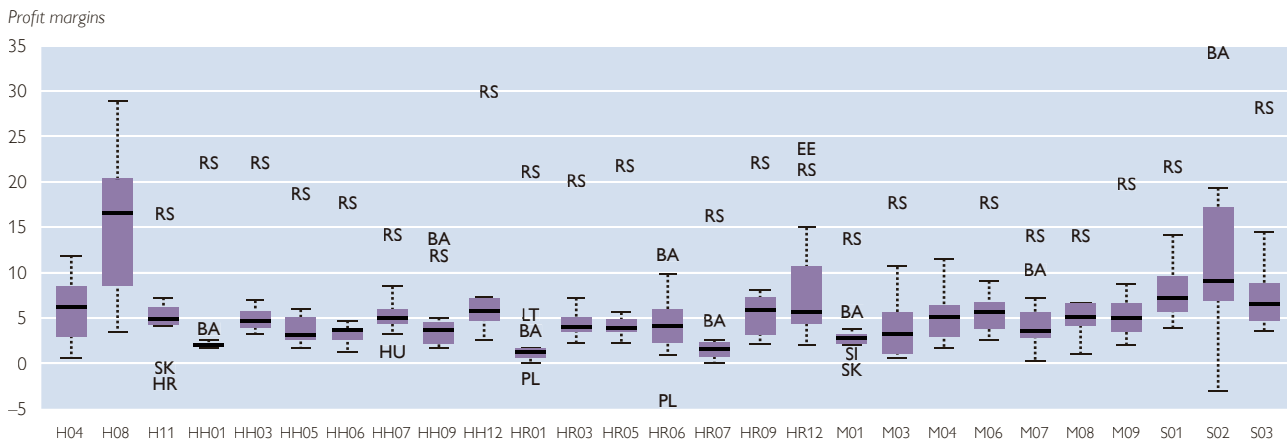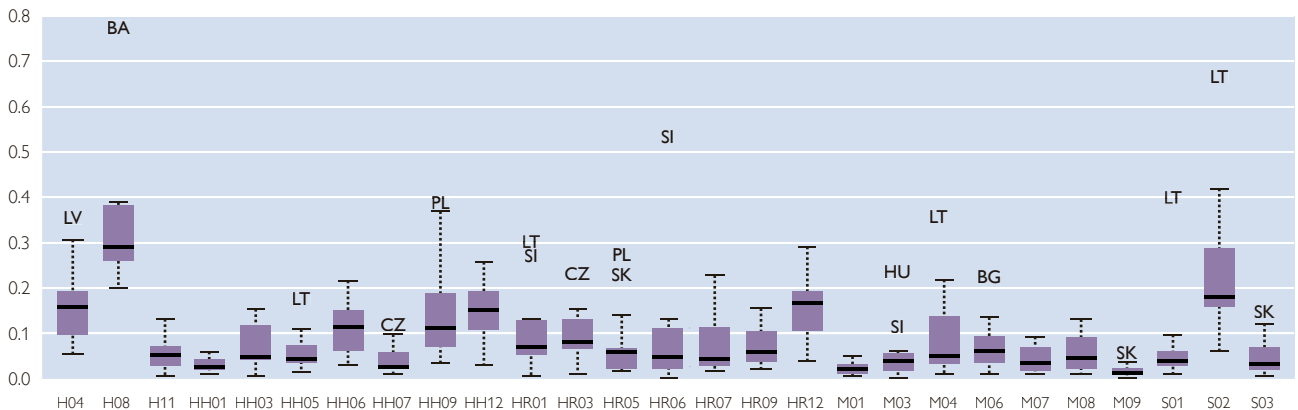**Distribution of Profit Margins across Sectors (1999–2007)**

Profit margins

Source: Authors' calculations.

Note: See table A2 for a description of sector codes used.

Chart 5

Distribution of Sales Concentration across Sectors (1999–2007)

Index of sales concentration (0 = lowest, 1 = maximum)

Source: Authors' calculations.

Note: See table A2 for a description of sector codes used.

The Herfindahl concentration index for sales (chart 5) identifies a particularly high level of concentration and/or an above-average degree of dispersion in this competition indicator in the finance (S02), communications (H8) and housing (H4) sectors. A number of other wholesale and retail trade sectors are, however, not far behind. As regards country outliers, chart 5 paints a rather mixed picture. Almost all countries covered in the paper appear at least once, and no countries clearly stand out.

Besides looking at the distribution of our two competition indicators across countries and sectors, it is also interesting to see how the different indicators have evolved over time and whether there are large variations between the different sector groups, namely manufacturing (M), retail and wholesale trade (H, HH and HR) and services (S). In addition, the finance and communications sectors are displayed separately.

For all sector groups, the charts show an increase in profit margins over time. This increase appears to have accelerated toward the end of the observation period, possibly due to the strong growth and catching-up process in the CESEE countries during these years.[15] The average profit margins for the manufacturing and the wholesale and retail trade sector groups are similar, whereas profit margins in the service sector group were somewhat higher throughout the 1999–2007 period. Profit margins in finance rose sharply from 2002. In 2007, they even exceeded those generated in communication, which displayed the highest profit margins by a rather wide margin in all other years.

The Herfindahl concentration index declined in all sector groups during most of the period under review, a development which was initially particularly pronounced in the service sector group. In the finance sector, the concentration of sales picked up again from 2004, whereas in the other sector groups this did not happen until 2007, and to a much smaller extent. Finally, sales concentration in the communication sector has shown a strong decline since 2002.

[15] At the time of writing, it was impossible to obtain sufficient data for 2008. It appears very likely, however, that the recession in many CESEE countries during 2008 resulted in a reduction in profit margins.

Chart 6

Evolution of the Two Competition Indicators over Time

Herfindahl Index of Concentration

Profit Margins

M sector aggregate — HH sector aggregate — S sector aggregate — S02 (financial services)
H sector aggregate — HR sector aggregate — H08 (communication services)

Source: Authors' calculations.
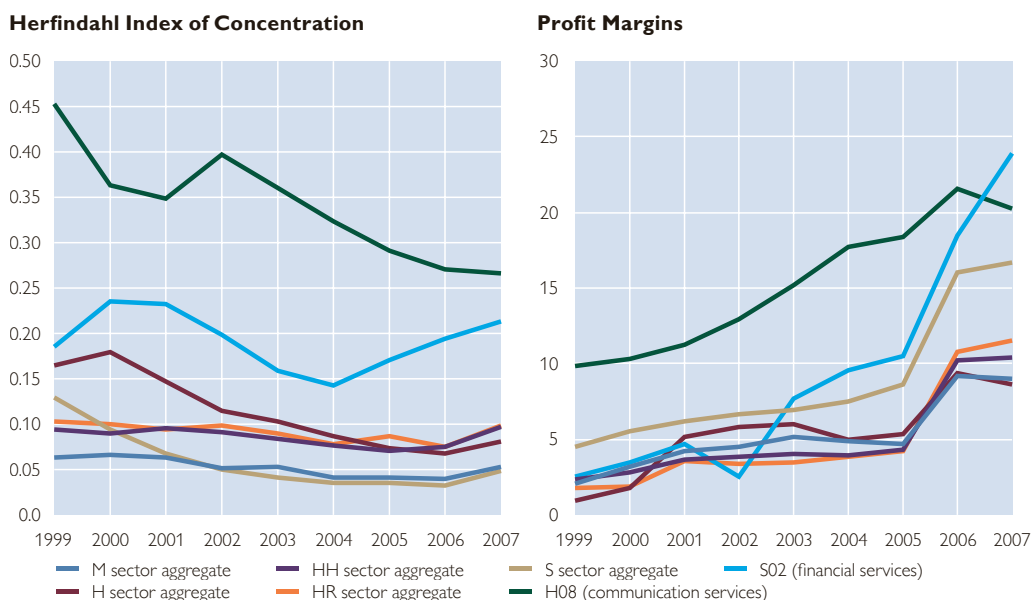
Using the framework for the combined interpretation of key competition indicators introduced in chart 1, we obtain a rather mixed picture across the different sectors. Chart 7 suggests that only a few sectors, notably housing, water, electricity, gas and other fuels as well as passenger transport and information, have seen an increase in the level of competition since 1999. In some of these sectors this could be interpreted as a result of the sector-specific regulatory reforms that have taken place in these industries in recent years. Most of the sectors in which the intensity of competition appears to have fallen are retail trade sectors; the finance sector also displays the same characteristics.[16] In a few other sectors (e.g. real estate and business services, communications, restaurants and hotels) the intensity of is also more likely to have fallen but the picture is less clear given that the two competition indicators point in opposite directions. This also holds for the fourth group of sectors, which consists mainly of manufacturing and wholesale trade industries. For this group, however, the relative decline in profit margins suggests that on balance the intensity of competition has risen despite the increase in the level of market concentration.

In summary, one can say that a number of stylized facts emerge from the descriptive analysis. First, some countries (Bosnia and Herzegovina, Serbia, Romania and Estonia) appear to be outliers as regards some of their competition indicators. In particular, they show high profit margins relative to other countries in the sample, at least in some sectors. The same applies to a number of sectors, notably communications, finance, housing and miscellaneous goods and services,

[16] *Since we are looking at the deviation of each individual sector from the average rise in profit margins, we are quite confident that our graphical description in chart 7 reflects something other than simply the results of rapid catching-up and prosperous economic development. Hence, we attribute this rise in profit margins to a change in competition intensity. A more detailed analysis of possible underlying determinants follows in section 5.*

Chart 7

Relative Changes in Key Competition Indicators

Change in sales concentration
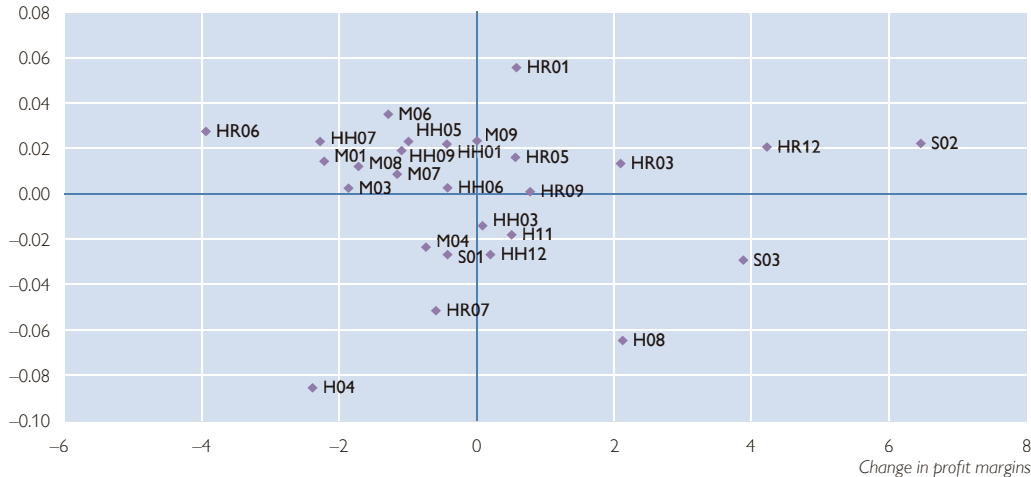
Source: Authors' caclulations.

Note: Sector-specific deviations from the average change in profit margins and the concentration index between the periods 1999–2001 and
       2005–2007; see table A2 for a description of sector codes used.

which are characterized by a large degree of concentration and high profit margins, suggesting a more limited intensity of competition than in other sectors. More generally, the distribution of the competition indicators seems to be more varied across sectors than across countries – apart from the exceptions mentioned above. Over time, profit margins tended to increase, whereas concentration rates tended to decline during the observation period. Looking at the two indicators of competition in combination, various sectors display a pattern that diverges from this trend, reflecting great sectoral heterogeneity in the evolution of competition intensity during the observation period.

5 Determinants of Competition Intensity

Having identified differences in the distribution of the two competition indicators across sectors and countries, we now empirically investigate possible determinants of these differences. Again, we base our analysis on the two selected competition indicators. We first present country-wide results where all activities are pooled across the whole economy and then results for the different sector groups mentioned above (manufacturing, wholesale and retail trade, business and consumer services). In addition, we analyze the two sectors which emerged as outliers in the descriptive analysis, namely communications and finance, separately.

5.1 Estimation Strategy

Just as theory does not deliver a unique and ready-to-use indicator that allows us to unambiguously measure the intensity of competition in a market, it does not give a clear-cut indication of possible determinants of competition either. Given this fuzziness with respect to both our dependent and our explanatory variables, it seems most appropriate to adopt a rather agnostic, data-driven research approach.

The limited literature available suggests a wide range of macroeconomic and institutional and/or political variables which may have an impact on the indicators of competition used in this paper. We have classified the possible explanatory variables into six broad categories:

— The stage of economic development – measured by the per capita GDP level (Glen et al., 2001)[17];
— Economic dynamics – measured by GDP growth (which also reflects catching-up in our sample) (Glen, Lee and Singh, 2001);
— Economic integration – measured by exporting activity (ratio of exports to GDP) and FDI (ratio of inward FDI stocks to GDP) (Francois and Wooton, 2000; Medvedev and Zemplinerova, 2005)[18];
— Country size – measured by population numbers (Badinger, 2007);
— Market size – measured by the sum of total sales in the sector (Vagliasindi, 2006);
— Competition policy – measured by the EBRD transition score as an indicator for the prevailing regulatory framework[19] (Vagliasindi, 2006).

We further interacted the EBRD competition policy indicator with economic growth and the stage of economic development, allowing for possible repercussions between progress on institutional transition and the stage of economic development. Finally, we controlled for possible interdependencies between our two measures of competition by including the concentration ratio in the estimation of profit margins and vice versa.[20]

The descriptive analysis revealed that our indicators of competition are highly persistent. We therefore estimate a dynamic specification, whereby we include the lagged dependent variable. This does not, however, remove the potentially strong endogeneity which is present between economic performance and other market characteristics on the one hand and our measure of competition on the other. In order to address this problem, we include all exogenous variables with a one-period time lag. Taking all these considerations into account, we arrive at the following specification for country i, sector k and time point t:

$$PRMA_{ikt} = \alpha + \gamma * PRMA_{ikt-1} + \delta * herfSALE_{ikt-1} + \beta_1 * pop_{it-1} + \beta_2 * gdp\_growth_{it-1} +$$
$$+ \beta_3 * gdp\_pc_{it-1} + \beta_4 * exp_{it-1} + \beta_5 * fdi_{it-1} + \beta_6 * sales_{ikt-1} + \beta_7 * EBRD_{it-1} +$$
$$+ \beta_8 * EBRD_{it-1} * gdp\_growth_{it-1} + \beta_9 * EBRD_{it-1} * gdp\_pc_{it-1} + \varepsilon_{it}$$

[17] *Alternative indicators for the stage of development, such as the share of agriculture in value added and the share of urban population, also showed a significant correlation with profit margins and sales concentration. However, we decided to include only purely orthogonal determinants in the final regression model, and hence we did not include these two variables along with per capita GDP.*

[18] *We try to capture both outward orientation and inward orientation in our specification. When firms export and serve a foreign market, they are subject to competition from foreign producers in the foreign market. This exposure may also influence their home market behavior and thus introduce changes in home market structure. By contrast, all firms operating in the domestic market are subject to competition from foreign firms through imports by these firms or more directly as a result of foreign-owned firms operating in their respective market. Since import and export ratios are highly correlated, we avoid including them both and use only inward FDI stocks as a proxy for additional competitive pressures through foreign penetration.*

[19] *Since the individual EBRD transition indicators are all highly correlated, the results are not sensitive to the use of alternative EBRD indicators. Moreover, the results achieved by using the overall EBRD indicator are qualitatively similar.*

[20] *The results are not sensitive to the inclusion of the alternative competition measure, reflecting the low correlation between the two measures.*

We estimate this model both for all sectors in the sample together and for each individual sector group mentioned in section 3. Within each category, we pool individual sectors across countries. This increases the number of observations in the estimation and avoids problems related to averaging across sectors.[21] Thus, we have a panel of 13 countries times a varying number of sectors (between three and seven within each sector group) over a nine-year period (1999–2007). All variables apart from the EBRD competition index (EBRD) and economic growth (gdp_growth) are in logarithms.

A priori we would expect a larger market, both in terms of greater country size (population) and industry size (sales), to lead to more intense competition, i.e. lower average profit margins and lower concentration ratios. In sectors that are characterized by large economies of scale, however, profit margins may also be positively correlated with market size.

Rapid market growth is likely to reduce competition in the short run but may increase it in the longer run as more companies exploit expanding business opportunities. The same logic applies if a market is growing as a result of increasing exports. However, greater export orientation also implies that more firms have to compete with foreign firms for market shares abroad, which suggests that the domestic market, too, will be subject to high competitive pressure.

The relationship between the stage of economic development (GDP per capita), the inward FDI ratio and the different indicators of competition is not clear a priori. In our sample of catching-up countries, profit margins expanded strongly with rising per capita incomes. But this cannot be seen as an indication of changes in the degree of competition. Inward FDI is used here as a proxy for competition arising from foreign firms, thus it should have a pro-competitive effect.[22] However, foreign-owned firms are often more efficient and may thus exhibit higher profit margins and drive out inefficient firms. The resulting composition effect might again lead to a positive relationship with profit margins at the industry level.

We expect the EBRD transition indicators to be negatively correlated with profit margins and sales concentration. Countries that are more advanced in regulatory terms should be characterized by a higher degree of competition since firms are closer to operating in an "ideal" market environment.

From an econometric as well as economic point of view, the estimation of dynamic panel models with lagged exogenous variables seems appropriate. Note that several explanatory variables might be considered endogenous. As was mentioned in the introduction, the relevant literature often emphasizes the importance of competition (or highly competitive markets) for economic development and sectoral growth. Variables measuring the stage of development (GDP growth, GDP per capita) might thus be determined together with the level of competition. In the same vein, one can argue that competition policy (measured by the respective EBRD indicator) is linked to certain country-specific characteristics which we have not taken into account in our specification. The simplest way to avoid this endogeneity is to use lags of the right-hand-side variables. A second econometric

[21] Results for all 27 individual sectors are available from the authors on request.

[22] In tradable sectors (by and large manufacturing and business services in our sample), pressure from foreign competition would primarily occur through imports, but also through FDI. Since import and export ratios are too highly correlated, we include only FDI here. In nontradable sectors, such as most consumer services and the distribution sector (wholesale and retail trade), this pressure occurs predominantly through FDI.

problem relates to the high persistence in our dependent variable. Thus, we also include a lag of our dependent variable. Since we have a panel dataset, we use the Arellano-Bond general method of moments (GMM) estimator to estimate this model, which is an efficient solution to take account of the autocorrelation caused by the inclusion of the lagged dependent variable and of the unobserved panel-level effects, which are by construction correlated with the lagged endogenous variable.[23]

5.2 Estimation Results

Before we take a look at the determinants of profit margins and the Herfindahl index of sales concentration in different economic sectors, table 2 provides an overview of the selected economies as a whole.

Our dynamic estimation confirms the high persistence in our dependent variables, in particular with respect to the estimation of profit margins.[24] We further find generally higher profit margins and greater concentration ratios in richer countries, suggesting more efficient and generally larger firms in more developed economies. The positive sign of the coefficient of economic growth corroborates this finding for profit margins. Taken by itself, this evidence is greatly at odds with our expectation that rapid economic growth or a more advanced stage of economic development would have a pro-competitive effect. The highly significant and positive coefficient on export orientation points in the same direction; however, it can easily be reconciled with stylized facts about international trade flows. Traditionally, international trade is dominated by a few large, highly efficient and productive firms. However, the negative coefficient on the inward FDI ratio suggests that more FDI penetration erodes the scope for high profit margins, suggesting competitive pressure arising from a larger share of foreign ownership in a country. Country size as measured by population shows a significant positive effect on concentration ratios, which is again contrary to our expectations. However, the aggregate masks important differences between individual groups, as we will see below. At industry level, we measure market size by the total sales volume and find, in line with our expectations, that this variable has a negative effect on both profit margins and sales concentration.

Finally, we control for the impact of the regulatory environment by including the EBRD indicator of transition progress in competition policy. While almost all countries have achieved the standards of an industrialized market economy in areas such as trade and foreign exchange regime, price liberalization and small-scale privatization, progress on competition policy is somewhat more limited in general. By the end of our sample period, most countries had reached a level of around 3 on

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[23] *Since the first-order autoregressive terms – AR(1) – are very far from being close to one in absolute magnitude, the results of the difference GMM estimation should be robust to using the alternative system GMM estimator. The latter was developed to avoid the problem of invalid instruments when using first differences – as is done for the difference GMM – in cases where the lagged dependent variable is close to one. However, the use of the system GMM – which estimates the equation jointly in levels and in first differences, thereby increasing the number of available instruments – also adds to the uncertainty over the invalidity or weakness of all the instruments included. For this reason we decided to rely on the results obtained from the difference GMM.*

[24] *The model for sales concentration is dynamically less well specified, as indicated by the still significant AR(2) test. The inclusion of a second lag of the concentration ratio (i.e. the endogenous variable) did not remedy this result for the pooled sample including all sectors. When pooling only within groups (such as manufacturing, wholesale trade, etc.), the model appears to be correctly specified. In addition, the sector-specific results (available from the authors on request) do not indicate the presence of second-order autocorrelation in these models either. We therefore report the results including one lagged dependent variable here.*

the index scale, which ranges from 1 (no transition progress yet) to 4.3 (standards of an industrialized market economy). While we find no significant direct effect from the regulatory environment, there is a significant negative effect from interacting the EBRD competition policy indicator with economic growth on profit margins. This implies that for a given level of economic growth, progress in competition policy has a competition-enhancing effect. This result also modifies our interpretation of the growth variable above: Beyond a certain level of transitional progress on competition policy, stronger economic growth exerts downward pressure on profit margins. In this sense, the regulatory environment does matter for our measures of market structure and economic policy as it has the potential to influence market structure in the desired direction through institutional and legal reforms. We must consequently keep a close watch on the evolution of competition in a high-growth environment, as was (and will again be) present in CESEE. Moving on to the results for individual sectors, the estimations for profit margins are reported in table 3. The economy-wide results are confirmed on the whole, while at the same time notable differences are revealed between economic groups. The positive correlation between per capita GDP and profit margins holds for business services and wholesale trade only, while the positive correlation with GDP growth is confirmed for all activities except business services. Interestingly, the positive relationship between export orientation and profit margins is not found for manufacturing, or for business and consumer services. It arises from wholesale and retail trade only, which are both highly domestically-oriented activities where exports play only a minor role as compared with manufacturing or business services. Similarly, inward FDI shows a significant negative effect in wholesale trade but also in manufacturing. While we found no significant correlation between profit margins and country size, we did observe some downward pressure on profit margins in retail trade for larger countries. The highly significant negative coefficient with respect to market size as measured by an industry's sales volume can be attributed entirely to the manufacturing sector and consumer services.

Table 2

Determinants of Competition Indicators – Overview

	Profit margins	Sales concentration
HerfSALE $_{t-1}$	0.031	0.317***
	0.89	2.00
PRMA $_{t-1}$	0.316***	0.013
	7.33	0.64
GDP per capita $_{t-1}$	1.684***	0.843***
	3.12	2.01
GDP growth $_{t-1}$	0.045***	0.007
	3.39	1.12
Export ratio $_{t-1}$	0.020***	0.024***
	5.28	6.90
Inward FDI ratio $_{t-1}$	−0.018***	−0.003
	−4.38	−1.02
Country size $_{t-1}$ (population)	0.349	8.115***
	0.12	3.43
Industry size $_{t-1}$ (sales)	−0.153***	−0.279***
	−3.71	−3.33
EBRD competition policy $_{t-1}$	−0.123	0.397
	−0.12	0.36
EBRD $_{t-1}$ * GDP growth $_{t-1}$	−0.036***	−0.008*
	−4.66	−1.87
EBRD $_{t-1}$ * GDP per capita $_{t-1}$	0.033	−0.029
	0.26	−0.21
Constant	−17.166	−130***
	−0.35	−3.57
Number of observations	1,923	1,923
Number of groups	341	344
Chi^2	179.1	75.4
AR(1) z-value	−5.808***	−4.246***
AR(2) z-value	−0.623	2.077**

Source: Authors' calculations.

*Note: GMM estimation (Arellano-Bond linear dynamic panel data estimator); t-values given below coefficients. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively; clustered standard errors used, allowing for correlation within sectors.*

In contrast to the insignificant results observed at the aggregate, economy-wide level, we sometimes find a positive coefficient on the EBRD competition policy indicator, suggesting higher profit margins in countries where more progress has been made toward an ideal market economy in terms of the regulatory environment (i.e. in wholesale trade and financial services). In all cases, this counterintuitive positive effect is dampened by negative interaction terms with economic growth and per capita GDP. Finally, the negative interaction between competition policy and economic growth is confirmed for all groups apart from business services (however, it is found in the financial services sector, which is part of this group).

Table 3

Determinants of Profit Margins

	Manufacturing (M group)	Business services (S group)	Wholesale trade (HH group)	Retail trade (HR group)	Consumer services (H group)	Financial services (S02 sector)	Communication services (H08 sector)
PRMA $_{t-1}$	0.256***	0.288***	0.341***	0.282***	0.138	0.149	−0.104
	5.87	*2.82*	*3.98*	*3.39*	*1.23*	*0.75*	*−0.92*
HerfSALE $_{t-1}$	0.012	0.243***	0.095	0.042	−0.103	0.012	−1.101***
	0.26	*2.73*	*0.9*	*0.59*	*−1.05*	*0.11*	*−2.34*
GDP per capita $_{t-1}$	0.823	4.509***	4.118***	0.160	−0.886	6.772***	1.395
	1.11	*3.2*	*3.76*	*0.14*	*−0.64*	*4.48*	*0.58*
GDP growth $_{t-1}$	0.036**	0.012	0.076***	0.048**	0.073***	0.308***	0.03
	2.14	*0.7*	*2.33*	*2.08*	*2.51*	*2.02*	*1.07*
Export ratio $_{t-1}$	0.005	0.014	0.035***	0.014*	0.023	0.028	0.024
	0.85	*1.29*	*4.53*	*1.78*	*1.48*	*0.76*	*1.11*
Inward FDI ratio $_{t-1}$	−0.010**	−0.02	−0.024***	−0.015	−0.014	−0.012	−0.037***
Country size $_{t-1}$ (population)	5.820	0.438	4.701	−10.079**	−1.804	24.866	4.094
	0.88	*0.04*	*1.07*	*−2.07*	*−0.27*	*1.29*	*0.49*
Industry size $_{t-1}$ (sales)	−0.136***	−0.066	−0.064	−0.096	−0.189*	−0.192	0.019
EBRD competition policy $_{t-1}$	−1.984	4.846*	5.035***	−2.626	−1.690	11.919***	2.079
	−1.57	*1.82*	*2.5*	*−1.08*	*−0.77*	*3.25*	*0.55*
EBRD $_{t-1}$*GDP growth $_{t-1}$	−0.025***	−0.011	−0.056***	−0.031***	−0.052***	−0.122*	−0.027
EBRD $_{t-1}$* GDP per capita $_{t-1}$	0.258	−0.608*	−0.618***	0.367	0.264	−1.290***	−0.251
	1.57	*−1.85*	*−2.48*	*1.21*	*0.92*	*−2.82*	*−0.51*
Constant	−95.082	−40.660	−110	155.911**	37.467	−440	−75.3
	−0.9	*−0.22*	*−1.46*	*2*	*0.35*	*−1.46*	*−0.54*
Number of observations	517	212	531	432	189	52	67
Number of groups	90	37	90	86	38	11	13
Chi²	70.408	76.204	124.119	72.651	15.851	458.769	71.94
AR(1) z-value	−3.409***	−1.858*	−3.145***	−2.768***	−2.356***	−1.288	−1.752*
AR(2) z-value	0.381	−1.179	−0.092	−0.682	0.130	−0.840	−1.066

Source: Authors' calculations.

*Note: GMM estimation; t-values given below coefficients. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively; clustered standard errors used, allowing for correlation within individual sectors.*

The economy-wide results for sales concentration are again by and large confirmed for individual groups (see table 4).[25] While the positive effect of per capita GDP only shows up in individual sectors (financial and communication services), the concentration-enhancing effect of export orientation is confirmed for all groups with the exception of consumer services. As in the pooled results, we find no significant coefficient for GDP growth or inward FDI on concentration ratios. Larger countries show higher sales concentration in manufacturing industries and business services, here in particular in financial services. This can be attributed to the fact that economies of scale play an important role in these sectors and that sufficient scale economies can only be achieved in large countries.

Table 4

Determinants of Concentration Ratios

	Manufacturing (M group)	Business services (S group)	Wholesale trade (HH group)	Retail trade (HR group)	Consumer services (H group)	Financial services (S02 sector)	Communication services (H08 sector)
HerfSALE$_{t-1}$	0.337	−0.128	0.533***	0.060	0.558***	0.124	0.414
	1.01	*−0.85*	*3.03*	*0.31*	*3.3*	*0.75*	*1.18*
PRMA$_{t-1}$	−0.007	0.091*	0.031	0.005	−0.062	−0.118	0.012
	−0.13	*1.68*	*0.91*	*0.11*	*−1.32*	*−1.52*	*0.4*
GDP per capita$_{t-1}$	0.832	−0.236	1.064	0.837	0.313	2.731**	−1.465**
	0.87	*−0.16*	*1.6*	*1.13*	*0.34*	*2.05*	*−2.18*
GDP growth$_{t-1}$	0.005	0.024	−0.021	0.013	0.022*	−0.134	0.001
	0.5	*1.18*	*−1.56*	*0.79*	*1.77*	*−1.18*	*0.12*
Export ratio$_{t-1}$	0.027***	0.034***	0.013***	0.030***	0.017	0.010	0.002
	4.53	*4.74*	*3.11*	*2.7*	*1.25*	*0.58*	*0.19*
Inward FDI ratio$_{t-1}$	−0.009	−0.003	−0.002	−0.009	0.005	0.009	−0.004
	−1.29	*−0.26*	*−0.28*	*−1.01*	*0.44*	*0.63*	*−0.37*
Country size$_{t-1}$ (population)	14.002***	21.993***	4.593	−1.798	3.060	24.738***	2.940
	2.67	*3.29*	*1.53*	*−0.29*	*0.56*	*2.59*	*0.5*
Industry size$_{t-1}$ (sales)	−0.449***	−0.048	−0.090*	−0.177	−0.435*	0.144	−0.091
	−2.88	*−0.47*	*−1.67*	*−1.37*	*−1.8*	*1.31*	*−1.24*
EBRD competition policy$_{t-1}$	−0.503	0.352	1.584	0.670	−0.694	6.320*	−3.105*
	−0.31	*0.12*	*0.85*	*0.35*	*−0.31*	*1.89*	*−1.75*
EBRD$_{t-1}$*GDP growth$_{t-1}$	−0.000	−0.028*	0.009	−0.016	−0.018**	0.037	0.002
	−0.02	*−1.93*	*1.34*	*−1.47*	*−2.11*	*0.72*	*0.23*
EBRD$_{t-1}$* GDP per capita$_{t-1}$	0.074	0.009	−0.190	−0.083	0.100	−0.807*	0.386*
	0.36	*0.02*	*−0.83*	*−0.35*	*0.34*	*−1.88*	*1.83*
Constant	−220***	−350***	−81.486*	19.270	−46.857	−4.10***	−34.206
	−2.7	*−3.24*	*−1.76*	*0.2*	*−0.52*	*−2.6*	*−0.36*
Number of observations	527	216	536	447	197	55	70
Number of groups	91	37	90	88	38	11	13
Chi^2	71.931	53.788	44.373	17.857	91.469	1.70E+7	5,500
AR(1) z-value	−2.198**	−2.093**	−3.289***	−2.509***	−2.049**	−1.320	−1.933*
AR(2) z-value	−0.232	1.759	1.067	1.665	−1.303	1.057	−0.060

Source: Authors' calculations.

*Note: GMM estimation; t-values given below coefficients. ***, ** and * indicate significance at the 1%, 5% and 10% level, respectively; clustered standard errors used, allowing for correlation within individual sectors.*

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[25] *For this indicator the aggregation of individual industries to broader sector categories results in a considerable loss of the model's explanatory power. Sector-specific results are therefore more informative, while being qualitatively similar (results are available from the authors on request).*

Again, industry size as measured by the total sales volume relates inversely to concentration, in particular again in the manufacturing industry.

As with the pooled results, we do not find that the EBRD competition policy indicator has a direct influence on any of the groups. However, a weakly significant coefficient is observed in individual sectors: a counterintuitive positive coefficient in financial services and the expected negative coefficient in communication services. This may point to genuine differences in market structure between those two industries, but it also indicates that the same set of policies has different effects on market structure from sector to sector. Hence, a careful and differentiated design of competition policies is certainly necessary. In both cases, however, the direct effect is dampened by indirect effects working through economic dynamics. Finally, the negative indirect effect of the regulatory environment on concentration for a given stage of economic development observed for the pooled sample (the first interaction term in table 4) stems from responses in consumer and business services. All in all, we find weaker effects for concentration ratios, which is also reflected in the lower chi-squared statistics reported in table 4.

5 Conclusions

Given the generally acknowledged difficulties in empirically measuring the intensity of competition, we analyze two widely-used competition indicators, namely profit margins and the concentration of sales. We use the Amadeus firm-level database covering 27 sectors in 13 CESEE countries over the period from 1999 to 2007.

Although these indicators of competition are commonly used in the literature, interpretations of their precise implications for the intensity of competition are not free from theoretical ambiguity. The interaction of different forces (rising efficiency of firms, rapid catching-up of the countries concerned, etc.) may, for instance, imply rising profit margins or rising market concentration without negatively affecting the degree of competition. Our results should be seen as a first comprehensive description of these commonly used competition indicators for the CESEE region rather than an exact description of the intensity of competition in these markets.

The descriptive analysis reveals high profit margins and above-average concentration ratios in a number of CESEE countries, in particular Bosnia and Herzegovina, Serbia, Romania and Estonia, and in a number of sectors, notably communications, finance, and miscellaneous goods and services. Manufacturing, by contrast, tends to display lower profit margins and concentration ratios than other sectors.

In the literature, concentration ratios are traditionally used as a measure of competition in empirical studies based on micro data. At the same time, macro-oriented, often theoretical studies tend to rely on profit margins as the only measure of competition. Recently, the empirical and policy-oriented literature, too, has adopted this view. We find that – at least for the CESEE region – the two indicators do not move in parallel. When we combine both indicators and analyze them in relation to their overall time trend over the 1999 to 2007 period, we find a relative drop in both profit margins and concentration ratios in only a handful of sectors, namely housing and utilities, passenger transport and information services. All these industries are services sectors and end-user oriented. However, there is another group of end-user-oriented sectors, such as many retail trade sectors and

financial services, where both competition indicators increased in relative terms over our sample period, suggesting a trend toward less competitive market structures. For all remaining sectors, we observe diverging trends for the two indicators. While manufacturing and wholesale trade show a relative decline in profit margins coupled with a relative increase in market concentration compared with the general trend, we observe the opposite for business and consumer services, such as communications, and restaurants and hotels. Evidence for the euro area suggests sometimes very diverse conditions in Western European markets. Especially the communications sector emerges here as being highly competitive (Alvarez and Hernando, 2006), which may be related to the differences in the stage of economic development.

Our findings are clear as regards the pronounced absolute dynamics of both indicators over the past decade, which is very likely related to the rapid transformation and catching-up process that has characterized the region over the past two decades. Over time, profit margins have increased. What we observe here, however, may rather be the result of increased efficiency at the firm level than that of less competition. By contrast, concentration ratios have declined over time, suggesting that the number of firm entries remains high following the severe post-transformational recession in the CESEE countries and that the region is still in a phase of rapid market expansion.

We also find that the distribution of the competition indicators shows considerably greater variation across sectors than across countries. There appears to be a certain lack of competitive pressure, particularly in specific service sector activities, such as communication and finance. A potential explanation might be that the still rapidly growing market gives producers in these countries greater scope to raise prices and thus allows even less efficient firms to enter the market.

Finally, to shed more light on the underlying reasons for these diverse developments, we assess the main determinants of our competition indicators, using a dynamic panel model over the period from 1999 to 2007. We find the two measures of market structure to be highly persistent, which justifies using the dynamic approach. Market size as measured by the industry's sales volume has the expected negative effect on our two measures. Moreover, the penetration by foreign firms in the form of inward FDI shows a pro-competitive effect. Other variables reflecting the general macroeconomic environment show a counterintuitive effect on both profit margins and sales concentration. Both the stage of economic development and greater export orientation are positively related to profit margins and concentration ratios. This may be attributable to a composition effect, with only the most efficient firms surviving in such highly developed and highly integrated markets, thus raising average firm size, firm profits and concentration. Economies of scale may also play a role here. According to these arguments, higher profit margins would not necessarily imply a lower degree of competition. Nevertheless policymakers would be well advised to keep a vigilant eye on developments within individual sectors, given their potential to influence economic outcome, as also suggested by our results: The EBRD competition policy indicator does not generally show a significant correlation with any of our measures; when interacted with economic growth, however, it shows a negative correlation. This suggests that an improvement in competition policy as measured by the EBRD policy indicator fosters competition only after a country has reached a

certain stage of development or economic progress. Looking at individual sectors, we find that competition policy has a "stage-dependent" effect on profit margins only in business services, in particular financial services and wholesale trade. Concentration ratios show no strong response to the policy environment in general. Clearly, more research is needed here to assess the impact of competition policy, both in methodological and economic terms (given large sector-specific differences, a more detailed analysis of individual sectors and applicable regulations is needed).

Clearly, more research is necessary, in particular to resolve ambiguities in interpreting some of our explanatory variables. Recent approaches (Boone, van Ours and van der Wiel, 2007; Creusen, Minne and van der Wiel, 2006) suggest that cost structures should also be taken into account, which allows for assessing the response of different indicators to a reallocation of output from inefficient to efficient firms. As mentioned in the paper, the Amadeus database does not allow firm cost structure to be incorporated into the analysis for the country set at hand since the data were unfortunately too patchy. Together with further analyses geared to determining why certain countries and sectors appear to be clear outliers as far as our chosen indicators of competition are concerned, such new approaches open up a wide field of research into the state of competition in CESEE.

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Annex 1: Employment Coverage in the Amadeus Database

The coverage of industries in the Amadeus database varies considerably across time, countries and sectors. To obtain an indication of the representativeness of the Amadeus database, we compare the employment coverage with official employment figures obtained from Eurostat. Employment appears to be the only variable for which we can find an official alternative data source to serve as a benchmark.

When we look at the weighted average, 2005 turns out to be the year in which the Amadeus database has the greatest employment coverage for the CESEE countries. In that year, about half of all employed persons in the CESEE countries (based on Eurostat figures) are captured by the data contained in the Amadeus database. There are, however, large country-specific differences, presumably as a result of differences in accounting and disclosure rules from one country to another. The total weighted average employment coverage for the CESEE countries during the period from 2002 to 2007 is around 42%. Hungary, Lithuania and Slovakia are the laggards in the sample. In these countries, the employment coverage of Amadeus for the period from 2002 to 2007 is less than 30%. Bulgaria and Estonia, by contrast, are the top performers.

The employment coverage for the manufacturing sector is generally higher in Amadeus, with a weighted average of over 65% in 2005 and around 57% for the 2002 to 2007 period. These figures have to be treated with caution, however, because for these years the underlying NACE classifications employed by Amadeus differ from those used in Eurostat employment figures.[26]

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[26] *Large discrepancies arise in particular with respect to trade and repair activities, implying some misallocations in sections D, G and K of NACE Revision 1. The bias goes toward an overrepresentation of business services (K) and, to a lesser extent, trade and repair (G) at the expense of manufacturing (D). Furthermore, sections A to B show inconsistencies. These problems were reduced by a time-consuming careful allocation of individual four-digit codes, but could not be eliminated totally due to a non-uniqueness in the correspondence.*

Annex 2: Annex Tables

Coverage of Employment in the Amadeus Database by Country

	2005		Average 2002–2007	
	Total	Manufacturing	Total	Manufacturing
Bulgaria	87.9	80.7	71.9	73.2
Croatia	56.7	82.9	54.2	76.6
Czech Republic	56.6	81.1	47.4	64.5
Estonia	74.5	87.9	67.9	81.5
Hungary	15.7	29.2	15.2	25.4
Latvia	39.1	64.0	34.8	55.6
Lithuania	30.4	54.1	29.2	51.6
Poland	36.7	54.4	32.0	47.3
Romania	57.9	63.6	52.2	59.2
Slovak Republic	36.1	54.2	24.3	36.8
Slovenia	42.8	67.9	31.9	52.7
Mean	48.6	65.5	41.9	56.8

Source: Authors' calculations.

Note: In % of Eurostat employment data.

List of Sectors Used in this Paper

Economic activity	Group	Industrial sector	Description	Including NACE, Revision 2 codes
Consumer services	H	H04	Housing, water, electricity, gas, other fuels	D, E
	H	H08	Communication	4742; 53; 61
	H	H11	Restaurants and hotels	I
Wholesale trade	HH	HH01	Wholesale: Food and non-alcoholic beverages	Items of 46
	HH	HH03	Wholesale: Clothing and footwear	Items of 46
	HH	HH05	Wholesale: Furnishing, household equipment, routine maintenance of house	Items of 46
	HH	HH06	Wholesale: Health	4646
	HH	HH07	Freight transport	Items of 45, 49–51
	HH	HH09	Wholesale: Recreation and culture	Items of 46
	HH	HH12	Wholesale: Miscellaneous goods and services	Items of 46
Retail trade	HR	HR01	Retail: Food and non-alcoholic beverages	Items of 47
	HR	HR03	Retail: Clothing and footwear	Items of 47; 9523; 9601
	HR	HR05	Retail: Furnishing, household equipment, routine maintenance of house	Items of 47; 9524; 9529
	HR	HR06	Retail: Health	4773–4774; 86
	HR	HR07	Passenger transport	Items of 45, 49–51
	HR	HR09	Retail: Recreation and culture	Items of 47; 75; 79; R; 951; 9521
	HR	HR12	Retail: Miscellaneous goods and services	Items of 47; 649; 651; 653; 9525; 96 without 9601
Manufacturing	M	M01	Production: Food and non-alcoholic beverages	10; 1107
	M	M03	Production: Textiles, clothing, leather	13–15
	M	M04	Wood, coke, paper, printing, minerals, metals and products	16-19; 23–25
	M	M06	Chemicals, pharmaceuticals, rubber and plastics	20–22
	M	M07	Computer, electronical equipment, machinery, motor vehicles, transport equipment	26–30
	M	M08	Furniture, other manufacturing, repair	31–33
	M	M09	Construction	F
Business services	S	S01	Information	J without 61
	S	S02	Finance	K without 649, 651, 653
	S	S03	Real estate; business services	L, M without 75; N without 79

Source: OeNB.

Profit Margins by Sector and Country, 2005–2007

Sesctor	Description	BA	BG	CZ	EE	HR	HU	LT	LV	PL	RO	RS	SI	SK
H04	Housing, water, gas, other fuels	6.2	4.0	9.0	13.9	3.2	3.0	4.7	4.4	5.5	7.2	23.7	3.2	14.2
H08	Communication	22.9	18.6	13.7	22.0	28.4	9.8	12.7	25.9	12.9	4.6	55.1	13.2	4.7
H11	Restaurants and hotels	5.4	7.2	3.4	8.7	4.2	2.1	6.2	8.0	6.4	3.6	42.0	5.0	−0.4
HH01	Wholesale: Food and non-alcoholic beverages	3.3	3.7	2.8	2.3	3.8	1.9	3.2	1.9	3.0	1.9	61.0	2.0	2.4
HH03	Wholesale: Clothing and footwear	9.1	5.6	6.5	7.1	5.6	5.2	5.2	6.3	6.8	6.9	57.2	3.5	4.9
HH05	Wholesale: Furnishing, household equipment, routine maintenance of house	7.3	4.2	2.5	6.4	3.0	1.5	5.6	4.4	4.1	5.2	49.6	4.0	3.0
HH06	Wholesale: Health	5.1	3.9	1.9	5.0	4.2	5.4	6.1	3.7	1.9	4.4	47.1	5.4	3.2
HH07	Freight transport	6.3	3.9	6.7	6.8	5.5	1.3	5.0	4.7	4.7	3.9	37.9	5.9	7.1
HH09	Wholesale: Recreation and culture	15.9	5.8	2.4	5.6	0.0	4.0	2.1	3.9	2.6	4.8	41.9	2.2	4.2
HH12	Wholesale: Miscellaneous goods and services	6.0	4.2	6.5	8.9	10.5	3.0	8.9	3.4	8.2	13.5	60.0	7.0	5.9
HR01	Retail: Food and non-alcoholic beverages	4.1	0.6	0.5	2.4	1.5	0.6	8.7	1.8	1.3	4.3	62.9	1.5	0.3
HR03	Retail: Clothing and footwear	6.7	7.4	7.1	11.0	5.5	3.2	6.1	6.0	9.8	4.5	57.4	8.0	2.1
HR05	Retail: Furnishing, household equipment, routine maintenance of house	7.5	6.2	6.3	6.1	4.2	2.3	3.0	3.7	7.0	5.5	56.8	4.7	4.9
HR06	Retail: Health	11.9	1.8	4.3	5.4	2.3	5.2	1.1	4.6	−0.9	7.4	22.0	5.4	4.4
HR07	Passenger transport	5.0	4.6	1.4	2.7	3.8	−1.7	3.7	2.6	1.3	7.8	45.6	1.7	1.0
HR09	Retail: Recreation and culture	8.4	8.2	3.4	9.4	4.8	4.2	3.3	12.6	3.3	4.7	61.6	2.9	9.7
HR12	Retail: Miscellaneous goods and services	18.5	7.0	2.7	27.6	6.8	2.0	5.8	14.7	13.6	12.5	59.5	15.6	2.8
M01	Production: Food and non-alcoholic beverages	4.5	5.0	2.7	3.1	5.1	1.6	2.5	2.4	4.1	21.1	31.8	1.2	0.2
M03	Production: Textiles, clothing, leather	9.3	5.8	2.8	4.8	2.4	2.9	2.8	7.6	4.3	6.1	39.8	1.0	−0.1
M04	Wood, coke, paper, printing, minerals, metals and products	6.0	4.8	8.0	8.1	5.3	8.1	4.5	5.0	8.0	2.6	26.2	4.0	6.9
M06	Chemicals, pharmaceuticals, rubber and plastics	6.7	3.8	6.9	7.9	3.1	7.6	7.1	8.2	7.0	2.6	36.4	8.8	4.1
M07	Computer, electronical equipment, machinery, motor vehicles, transport equipment	11.6	6.8	5.3	6.6	2.7	6.5	4.7	5.7	4.9	7.7	32.8	3.6	2.6
M08	Furniture, other manufacturing, repair	8.6	8.2	7.8	4.8	1.7	6.5	4.8	3.3	6.2	6.1	36.0	3.5	6.0
M09	Construction	10.4	7.9	4.4	9.8	4.4	4.3	8.5	6.9	6.1	5.5	47.3	2.5	4.5
S01	Information	14.9	11.0	7.5	12.6	4.1	3.7	14.8	9.7	9.2	5.6	51.4	5.7	13.2
S02	Finance	22.8	14.6	12.7	23.5	22.9	12.5	9.3	10.7	5.5	9.6	49.2	11.1	18.4
S03	Real estate, business services	14.0	11.5	6.1	21.6	7.6	7.1	15.2	11.8	7.6	12.4	57.0	5.4	5.9
Median		7.5	5.8	5.3	7.1	4.2	3.7	5.2	5.0	5.5	5.5	47.3	4.0	4.4

Source: Authors' calculations.

Sales Concentration by Sector and Country, 2005–2007

Sector	Description	BA	BG	CZ	EE	HR	HU	LT	LV	PL	RO	RS	SI	SK
H04	Housing, water, gas, other fuels	13.8	13.0	7.9	10.2	20.3	3.6	9.7	27.9	3.7	0.4	9.9	11.0	11.7
H08	Communication	70.3	22.0	21.5	14.3	25.2	33.8	26.2	20.9	22.2	0.2	45.8	20.3	21.5
H11	Restaurants and hotels	4.2	2.8	2.2	0.7	1.5	0.8	7.1	6.9	8.3	0.9	2.9	5.4	3.1
HH01	Wholesale: Food and non-alcoholic beverages	3.8	1.0	6.0	2.6	5.0	1.5	3.2	2.0	0.6	1.4	3.5	2.4	2.0
HH03	Wholesale: Clothing and footwear	5.4	4.1	8.9	8.0	7.2	1.1	7.1	7.7	4.3	0.4	2.7	3.3	7.1
HH05	Wholesale: Furnishing, household equipment, routine maintenance of house	3.7	16.0	3.9	1.9	6.4	3.0	15.3	2.7	3.5	2.3	2.8	3.1	11.8
HH06	Wholesale: Health	12.8	7.3	11.6	8.7	16.0	9.6	9.4	12.5	5.0	0.6	6.1	18.8	16.1
HH07	Freight transport	4.2	2.0	12.8	2.8	1.9	1.1	5.6	3.0	0.8	3.1	9.4	3.0	10.3
HH09	Wholesale: Recreation and culture	33.2	4.7	8.8	5.5	0.0	5.5	14.1	30.9	33.6	3.7	12.7	11.1	11.0
HH12	Wholesale: Miscellaneous goods and services	20.7	6.3	12.5	5.6	21.6	16.6	9.8	17.5	11.4	38.5	17.5	15.9	18.1
HR01	Retail: Food and non-alcoholic beverages	2.6	9.9	10.7	8.0	10.5	9.7	35.4	18.8	5.1	14.5	13.1	33.7	5.9
HR03	Retail: Clothing and footwear	6.4	5.1	14.7	2.5	22.0	27.9	11.3	8.8	5.2	3.0	6.8	6.8	11.8
HR05	Retail: Furnishing, household equipment, routine maintenance of house	4.7	2.8	13.2	2.8	2.3	2.1	3.5	3.2	21.0	2.1	8.7	5.4	18.9
HR06	Retail: Health	4.3	2.9	2.1	2.1	5.8	0.2	13.0	8.5	0.4	10.1	14.1	25.7	10.0
HR07	Passenger transport	3.5	4.4	3.8	2.9	2.3	2.0	4.5	4.3	2.1	2.7	4.6	16.4	5.4
HR09	Retail: Recreation and culture	12.0	6.0	2.3	1.9	8.3	1.9	14.3	3.6	3.6	2.7	5.9	7.2	7.0
HR12	Retail: Miscellaneous goods and services	41.3	5.2	10.6	10.1	7.1	16.6	12.2	14.1	5.3	0.7	18.2	14.5	20.4
M01	Production: Food and non-alcoholic beverages	3.7	2.3	1.2	2.5	3.5	1.5	3.9	1.8	0.6	15.1	1.2	4.0	2.7
M03	Production: Textiles, clothing, leather	3.0	2.8	2.3	3.5	5.6	2.5	2.2	3.7	0.9	0.4	1.3	8.0	4.6
M04	Wood, coke, paper, printing, minerals, metals and products	2.4	5.5	1.3	0.8	20.3	21.4	10.5	3.1	7.7	2.0	6.1	1.8	5.2
M06	Chemicals, pharmaceuticals, rubber and plastics	12.5	41.7	5.7	3.3	10.9	5.3	9.1	8.1	1.1	24.6	3.2	6.7	8.0
M07	Computer, electronical equipment, machinery, motor vehicles, transport equipment	2.9	2.1	5.2	2.5	2.2	7.7	3.7	3.9	1.4	0.3	1.0	5.2	6.0
M08	Furniture, other manufacturing, repair	14.0	2.7	10.6	1.0	3.9	2.2	2.6	4.0	2.3	1.0	7.0	2.1	8.4
M09	Construction	1.7	0.5	1.5	0.6	0.9	2.4	2.0	0.8	0.7	3.9	0.8	2.2	5.5
S01	Information	5.0	2.1	4.4	1.3	3.6	2.0	23.1	3.8	2.3	1.0	3.1	4.8	5.4
S02	Finance	41.6	3.8	10.3	5.4	7.7	8.8	66.1	25.0	19.2	0.2	21.6	14.1	16.8
S03	Real estate, business services	14.2	0.3	1.3	0.4	1.5	2.7	5.4	1.4	3.6	18.1	2.1	1.3	4.5
Median		5.0	4.1	6.0	2.8	5.8	2.7	9.4	4.3	3.6	2.1	6.1	6.7	8.0

Source: Authors' calculations.