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Aleksandar B. Todorov

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Aleksandar B. Todorov[2]

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Abstract: *The purpose of the paper is to provide empirical evidence on regularities concerning the relationship between foreign direct investment and aggregate economic concentration. Based on company data two types of concentration indices are computed – concentration ratio and Gini coefficient. The results suggest that aggregate concentration among the examined countries varies considerably. Although correlated, both measures of concentration seem to measure different aspects of economic concentration. The concentration ratio appears to be higher in smaller economies with higher export and labor intensities. Higher levels of foreign investment appear to be related with higher values of the Gini coefficient, that is with skewer firm size distribution.*

Keywords: FDI, economic power, size distribution of firms, large companies, foreign investors

JEL: L11; F21; P23

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[2] Dr. Aleksandar B. Todorov is Assistant Professor at the University of Economics Varna, Bulgaria. Contact: atodorov@ue-varna.bg.

1. Introduction

Multinational enterprises (MNEs) are important players on worldwide markets, while their foreign subsidiaries and other investments have a profound impact on economic development. From a host country perspective foreign direct investment (FDI) is expected to have a positive impact on growth in several ways: for instance, by providing additional funds available for investments, by transferring technology and know-how, by increasing employment, and by promoting international trade (Liang, 2004). In the case of Eastern Europe FDI is supposed to have a positive effect on the volume of trade (Fetai & Morina, 2018) and to facilitate the transition of East European economies to a market economy (Estrin & Uvalic, 2014).

The positive impact of FDI on growth depends on various social, economic and policy conditions of the host country. Empirical research of this effect suggests that the contribution of FDI to growth is clear evident in the case of developed countries, but the results for the developing countries are rather mixed. It is suggested, for instance, that FDI is more likely to flow into and to significantly impact the growth of developing countries that are politically stable, less corrupt, endowed with human capital, have access to larger domestic and foreign markets, as well as provide favorable economic environment, such as tax regime, and natural resources (Okafor & Webster, 2016).

However, FDI flows do not necessarily increase the welfare of regions. For instance, foreign affiliates of MNEs possess an advantage over domestic firms due to size-induced higher productivity and better integration into international trade flows of the owing company. This could lead to crowding out of domestic companies and to an increase in economic concentration. According to Blomström (1986) FDI leads to higher industry concentration in smaller economies. This is due to larger size and technological superiority of foreign firms compared to domestic firms. More recent research suggest that foreign entry is more likely to increase host-country industry concentration in developing economies, while in developed economies the effect is reversed (Amess & Roberts, 2005).

The impact of FDI on economic concentration may be important for at least three reasons. First, concentration among large diversified companies in an economy increases the likelihood of collusive behavior in and across individual markets (Gal & Cheng, 2016). This is particularly true for small economies as well as economies where regulatory institutions fail to respond adequately to market challenges (Mitton, 2007). As economic concentration is seen to be correlated with

market power, high levels of concentration might be associated with various economic distortions that hinder growth (see, e.g. Aghion et al., 2001).

Second, higher concentration might be associated with higher levels of economic volatility. Such possibility is demonstrated by Shaffer (2007), who shows that aggregate concentration may exacerbate systemic risk. A related issue, which has been picked up in the theoretical literature by Gabaix (2011) and gained importance after the Great Recession, is that aggregate shocks are initiated as shocks to individual firms. If the economy is "granular", that is, if it is characterized by highly disproportioned firm size distribution, then shocks to the few relatively large firms could trigger aggregate business fluctuations. Furthermore, Di Giovanni & Levchenko (2012) show that smaller, more open economies tend to be more granular than large ones.

Third, high concentration may lead to political distortions. If economic power is translated into political power, then the latter could be used to favor the interests of individuals or companies in highly concentrated sectors (see e.g. Acemoglu & Robinson, 2001). For instance, it could be used to gain governmental protection from potential competition (Ayal, 2013). The effect is emphasized when markets are smaller and where it is easier for the business elite to establish additional formal or non-formal networks of influence between large companies. As Bischoff & Buchwald (2018) show, such linkages may be a mechanism to facilitate collusion, which further enhances economic power.

In this context the present study has two purposes. First, an attempt is made to estimate the extent of aggregate concentration in 10 Southeast European (SEE) economies. Second, given the estimates of aggregate concentration in SEE, and as proposed by previous research, a relation between aggregate concentration and FDI is tested empirically. The answers to these questions allow us to relate to the discussion of economic power and the role of FDI in the region. Thus, it is hoped, to expand the already existing literature, which focuses mainly on developed Western economies. The rest of the paper is structured as follows. The next Section 2 reviews some of the key points in the literature on aggregate concentration and its relation to FDI. This discussion allows the formulation of the main hypotheses. Section 3 outlines the methodology and the data. Section 4 presents the empirical findings of the study. The final section concludes and discusses the limitations of the study, as well as opportunities for future research.

2. Literature Review

Concentration in economic sense refers to an indicator of the number and size distribution of firms (Lipczynski, Wilson & Goddard, 2017). It attempts to "determine the degree of control exercised over a large portion of some economic activity by a small absolute or relative number of firms" (Hexter & Snow 1970, p. 239). Concentration can be measured at two different levels: (1) for all firms classified as members of some industry, or (2) for the largest firms in an economy. Concentration at the industry level is often referred to as industry, or market, concentration. This type of concentration is an important characteristic of market structure and is believed to be positively related to market power. On the other hand, concentration at the economy level, or aggregate concentration, reflects the importance of the largest firms and is therefore considered to be positively related to economic power.

Typically, aggregate concentration is measured as the share of the top hundred, two hundred or five hundred largest firms in total sales, assets or employment for the economy. The assumption, underlying this approach, is that firms included in the sample are independent economic actors. This assumption appears to be reasonable if the sample consists of individual firms or plants that are not a part of larger economic groups. In cases, where companies are highly diversified or interconnected, such a measure might not be appropriate (Choi & Patterson, 2007). Although this approach provides only a rough estimate of economic power, it is by far the most commonly applied and is suitable for international comparisons.

The systematic study of aggregate concentration goes back to the seminal work of Berle & Means (1932), who show that at the end of 1930 the largest 200 non-financial companies account for nearly half of all non-financial corporate assets in the US economy. Since then numerous scholars have continued this line of research by refining and applying various methods for the measurement of aggregate concentration. Most studies are consent that a "one shot" measurement of aggregate concentration is informative, but it is hard to interpret the data if there is not sufficient evidence from other economies to compare with. Therefore, in most cases research focus is set on a single economy, for which aggregate concentration is measured over a fixed period. Such approach allows the identification of trends, but makes the comparison between economies burdensome, when using different methodologies.

Trends in aggregate concentration have been studied extensively for the advanced industrial nations. There is a consensus in the literature that aggregate concentration in both the UK and USA has risen from the beginning of the 20th century up to the 1980s (see Curry & George, 1983 for an overview). For the UK Clarke (1993) investigates the trend in aggregate concentration for the period 1980-1989. He reports that the previous long-term trend has been reversed and aggregate concentration began to decrease. For the US Deutsch & Silber (1995) show that from 1976 up to 1990 there has been a clear increase in aggregate concentration. Their dynamic analysis, however, considers the variations in the ranking of the companies within the sample and indicates that there is no significant increase in concentration. Later White (2002) shows that aggregate concentration changed little after the 1980s up to the beginning of the 21st century.

Concentration studies suggest a link between market concentration and aggregate concentration. For example, an illustrative empirical analysis by Utton (1974) attempts to estimate the extent to which the largest firms in the UK manufacturing sector are also among the largest firms in individual markets. He shows that a relatively small group of firms dominates in about half of the product groups. Later Clarke & Davis (1983) demonstrate that, theoretically, aggregate concentration could be decomposed into the product of two components, one associated with firm's diversification degree, and the other with industry's concentration level. They show that the level of aggregate concentration is proportional to a weighted sum of concentration in individual markets, measured by the Herfindahl index, where the weights are represented by the shares of the individual industries in the sample.

Thus, the overall level of aggregate concentration depends on (1) the shares of individual industries; (2) the industry concentration; (3) the aggregate diversification. These conclusions have also a dynamic interpretation, as noted by Silver (1985). Accordingly, a rise in aggregate concentration can be attributed to three main components – an increase in concentration within individual industries, an increase in the share of industries in which concentration is above average, and an increase in the level of diversification. These conclusions suggest that factors influencing the relative size of major industries, as well as determinants of market concentration and diversification may also have an impact on aggregate concentration.

More recently Dietrich (2003) follows Clarke and Davis' approach to analyze trends in aggregate concentration on global level. There are, however, two major differences between the two

approaches. First, in Dietrich's' decomposition aggregate concentration is measured by the concentration ratio instead of the Herfindahl index. Second, firms' size is measured by their total size instead of their size in an economy. The 100-firm concentration ratio is thus determined by four factors: (1) the degree of market power in the home market; (2) the degree of global presence; (3) the degree of diversification; and (4) the economic structure of the home economy.

Only few studies on aggregate or market concentration exist for the post-communist countries and Eastern Europe in particular. An early study by Newbery and Kattuman (1992) estimates the level of concentration and the intensity of competition in selected countries in Eastern Europe including East Germany, Czechoslovakia and Poland. Their main findings are that these former centrally planned economies are dominated by large companies, whereas medium-sized or small companies are almost absent. These results provide support for what is called "conventional wisdom" about industrial structure in the soviet bloc, which suggests that the economy under central planning is dominated by very large firms in highly concentrated industries.

There are two early studies on industrial concentration in Soviet Russia, which put this conventional wisdom in dispute. First, Brown, Ickes and Ryterman (1994) use the 1989 Soviet census of Industry to show that aggregate concentration is much lower than industrialized market economies, whereby the size distribution of firms is characterized by the presence of large portion of medium-sized companies. Second, Joskow, Schmalensee and Tsukanova (1994) show also that Soviet Russian industry is not as concentrated as conventionally believed. The logic behind this fact seem to be that in centrally planned economies planners did not economize by establishing very large enterprises, but by not allowing very small enterprises. As innovation has been centralized, small enterprises did not play the same role as in market economies.

Later Kattuman & Domanski (1997) found that economic reforms in Poland while aiming at enhancing competition have led to increased concentration in several markets. This is due to premature exits of large state firms before the establishment of large enough private enterprises. These results are complemented by Roberts (1997), who shows that an increase in concentration is more likely in consumer goods industries characterized by low initial levels of concentration, high capital intensity and decreasing demand. For Croatia Tipurić & Bach (2009) study the changes in industrial concentration in the period 1995-2006. They find that concentration declines in about two fifths of the Croatian economy, which can be contributed to adjustments of leading

firms during the transition period as well as to deregulation policies. Concentration has increased in about one fifth of the economy, which is mainly due to the entry of multinational companies as well as the lack of entry after unsuccessful privatization.

In theory, the influence of foreign direct investment on concentration is ambiguous since there are two alternative effects, suggested by the literature, which act in opposite directions (Forte & Sarmento, 2014). Deconcentration, or competitive, effects are realized due to the ability of foreign, multinational, companies to overcome high entry barriers and enter in monopolized industries, which could not be challenged otherwise by domestic firms. Concentration, or anti-competitive, effects occur when foreign companies realize, for example, economies of scale due to their international operations or economies of scope due to their diversified portfolio and thus crowd out domestic firms. Although, these undesirable outcomes could be mitigated through adequate competition policy, in practice, in transition economies foreign companies could be treated with priority due to the lack of domestic investment, which could boost economic growth.

During transition FDI is expected to have a considerable impact on domestic firms in Eastern Europe (Rutkowski, 2006). This is mainly due to the technological and organizational advantage of foreign companies over the less competitive domestic firms. Moreover, in many cases foreign companies investing in Eastern Europe have been already operating in multiple international markets. Their larger financial resources allow them to entry by acquiring already established and efficient companies and leaving aside less efficient locally owned firms. As economies transition more and more to advanced market economies, their domestic firms could gradually lose their edge based on local knowledge but could also benefit from positive spillovers from foreign companies. Many of the East European economies have attracted FDI with high growth rates. Overtime these growth rates have gradually cooled down, especially after the Great Recession. These events have led to restructuring of FDI in the region with many foreign companies, especially those with short-term profit strategy, exiting the market.

These ambiguous effects have been studied empirically in the case of some East European economies. Two early studies by Ghemawat & Kennedy (1999) and Rutkowski (2006) show that during the transition period in the 1990s FDI has led to a significant decrease in industrial concentration. The starting concentration levels in these countries were considerably high, so a decrease in concentration has been expected as institutional factors have improved. Both studies

control for such factors and suggest that the positive spillover effects from FDI outweigh the anti-competitive effects. A study by Amess & Roberts (2005) shows, however, that the presence of multinational firms has both positive and negative effects on domestic firms. They show that there is a U-form relationship between foreign ownership and industrial concentration in Poland during 1989-1993. This suggests that there is an optimal foreign presence, which minimizes concentration. Initially FDI reduces concentration, but after a certain threshold the concentration effect arises.

3. Methodology

When estimating aggregate concentration, there are at least two methodological issues to consider. These include researcher's choice of (1) firm size measure, and (2) concentration measure. In the case of market concentration, economic theory suggests sales revenue as the proper size measure. When assessing aggregate concentration, White (2002) considers value-added to be the most suitable candidate for the measurement of firm size. Value-added figures are, however, difficult to obtain, especially in an international context. At the same time, Gabaix (2011) argues that firm's sales revenue is to be preferred over value-added because it captures the additional social value from productivity shocks.

To estimate the levels of aggregate concentration in SEE countries this study employs company data from SEE TOP 100 – an annual ranking of the 100 largest companies in Southeast Europe (SeeNews, 2017). Companies are ranked by total revenue for the previous fiscal year. Thus, the data for this study is limited to revenue figures only. The ranking covers non-financial companies in 10 countries: Albania (ALB), Bosnia and Herzegovina (BIH), Bulgaria (BGR), Croatia (HRV), Macedonia (MKD), Moldova (MDA), Montenegro (MNE), Romania (ROU), Serbia (SRB) and Slovenia (SVN). The primary data is compiled from various public sources (incl. national commercial registers, stock exchanges, as well as company reports) and covers a period of 10 years – from 2007 to 2016.

There is also a plethora of concentration indices to choose from. The various measures of economic concentration that have been used in past studies may be divided in two types: first, those which depend on the share of total economic activity controlled by a certain number of the largest firms in the economy, such as concentration ratio; and, secondly, those which depend on the size distribution of firms, such as the Gini coefficient. The former measure provides information

regarding what is known as absolute concentration, while the latter measure provides information regarding relative concentration.

According to Hart & Prais (1956) the absolute concentration ratio has an advantage over relative concentration ratio, because the former provides information that is more suitable for assessing the likelihood of collusive or monopolistic behavior. In the case of a broader issue, however, such as the analysis of concentration within the whole economy, a summary measure of concentration based on the size distribution of firms, such as the Gini coefficient, might be preferable. In Hart & Prais' interpretation, the Gini coefficient is a measure of average dominance in the group of firms under consideration. Moreover, disparity among the largest companies could proxy the "granularity" of the economy in the sense of Gabaix (2011).

Nevertheless, much of the discussion regarding aggregate concentration is based on the calculation of concentration ratios. As Feinberg (1981) argues this seems as logical extension of the tradition in the industry concentration literature. Concentration ratios have their appeal as they are relatively easy to calculate, but also their interpretation is straightforward. Furthermore, both measures carry different types of information – while disparity measures are related to the concepts of inequality and granularity, concentration ratios are more closely related to the political and social consequences of large companies. It is the relative position of these companies, as White (1981a) notes, that allows them to make political claims.

For the above reasons this study provides estimates for both types of concentration indices. Aggregate levels of absolute concentration are approximated using a ratio between total revenue of the top 5 companies in each economy and its respective GDP in a given year. This is a rough approximation, because GDP figures do not correspond directly to revenue figures – a more precise measure would relate company revenue to economy wide revenues. Nevertheless, it provides a benchmark for comparison between the economies under consideration. Relative concentration is estimated by the Gini coefficient for the top 5 companies in each country.

Table 1 provides an overview of all variables used in the study. Dependent variables include, as discussed, concentration ratio by the top 5 firms (CR5), as well as Gini coefficient of the revenue for the top 5 firms (GINI5). The explanatory variable of primary interest is foreign direct investment (FDI). It is proxied by net inflow of FDI as percentage of GDP, for which data is obtained from World Bank's World Development Indicators (WDI) database.

Independent variables include also measures of market size, which is operationalized as domestic market size and foreign market size (see also Todorov, 2018). Domestic market size is approximated by country's population (POP), while foreign market size is approximated by exports in percentage of GDP (EXP). The data for both variables stems also from the WDI database.

Table 1. List of variables

Variable	Code	Description
Dependent variables		
Absolute concentration	CR5	Revenue to GDP ratio for the top 5 companies in %
Relative concentration	GINI5	Gini coefficient for the top 5 companies
Independent variables		
Foreign direct investment	FDI	Foreign direct investment, net inflows (% of GDP)
Domestic market size	POP	Population of the economy in millions
Foreign market size	EXP	Exports of goods and services (% of GDP)
Labor intensity	LBI	Employment in agriculture (% of total employment)
Growth	GROWTH	Real GDP growth (annual %)

To account for further factors that might be related to aggregate concentration, two additional country characteristics are considered as control variables. First, a proxy for the intensity of labor use (LBI) is incorporated in the model. This seems reasonable because, as White (1981b) argues, large firms tend to be more capital intensive. Labor intensity is proxied as employment in agriculture as share of total employment, for which data come from the WDI database. A negative relationship between labor intensity and concentration is expected.

Many studies on market concentration report a relationship between concentration and industry growth (see Curry & George, 1983 for an overview). It is believed, for instance, that entry barriers are lower for fast growing industries than for slow growing ones. Therefore, it seems reasonable to assume that concentration at economy level may also be related with growth. Because faster growing economies may attract more new companies or motivate the creation of new ones, a negative relationship between real GDP growth and aggregate concentration is expected. In the regression analysis growth is proxied by real GDP growth for which data is provided by the World Bank's WDI database.

4. Results

Descriptive statistics for the data are reported in Table 2. The table contains mean, median, standard deviation, minimum, maximum, as well as measures of skewness and kurtosis for all variables. There are total 98 observations in the sample, since there is no available data for Albania for 2007 and 2008.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Median	Std. dev.	Min.	Max.	Skew.	Kurt.
CR5	98	18,8	19,0	5,7	7,5	29,3	0,0	-1,0
GINI5	98	21,1	20,7	7,1	4,8	49,0	0,9	2,0
FDI	98	6,2	4,2	6,3	-0,7	37,3	2,5	7,5
POP	98	5,5	3,9	5,4	0,6	21,1	1,9	2,8
EXP	98	43,1	41,3	13,0	25,0	77,7	1,0	0,3
LBI	98	18,9	18,0	10,8	4,6	46,5	0,7	-0,2
GROWTH	98	2,0	2,4	3,5	-7,8	10,7	-0,4	0,6

Note: The Gini coefficient is calculated using R's package "ineq" (Zeileis, 2014).

The mean values of the dependent variables, CR5 and GINI5, for the whole sample are 18,8 and 21,1 respectively. The Gini coefficient, represented by the variable GINI5, has been standardized to range from 0 to a maximum of 100 – higher value implies more inequal distribution of revenue among top 5 firms. The CR5 variable ranges from 7,5 to 29,3, while the GINI5 variable ranges from 4,8 to 49,0. These figures suggest that there is some variation of aggregate concentration in the sample at hand. Noteworthy, the measures of skewness and kurtosis for these variables differ significantly supporting the notion in the methodology section that they measure different aspects of aggregate concentration. This issue is further explored in Table 3, which provides the values for both variables on a country level.

In Table 3 Macedonia has the highest CR5-value (Panel A) with the revenue of the largest 5 companies in the country equating to about 26% of its GDP averaged over the period 2007-2016. At the same time the country ranks 6th, if the GINI5 (Panel B) variable is used. Large discrepancies are also present in the cases of Croatia, Moldova, and Serbia. That these two measures are quite different is also obvious from the correlation matrix for the data presented in Table 4. Although significant at the 10% level the Pearson correlation coefficient between CR5 and GINI5 has rather moderate value of 0,34.

Table 3. Aggregate concentration by country

Panel A: Concentration ratio (CR5)										
Year	ALB	BIH	BGR	HRV	MKD	MDA	MNE	ROU	SRB	SVN
2007		11,8	19,4	19,8	24,4	26,9	17,6	7,5	29,3	19,1
2008		14,5	26,4	17,8	26,8	26,0	18,5	9,2	25,9	20,0
2009	12,5	12,4	19,0	17,0	21,2	15,6	22,0	8,2	16,2	19,0
2010	10,2	13,0	23,3	19,2	24,9	18,7	29,3	9,0	18,7	20,3
2011	12,7	14,2	26,0	20,3	27,9	20,0	26,7	11,1	17,7	21,6
2012	15,1	15,9	27,0	20,9	28,7	17,9	26,1	12,0	17,6	25,6
2013	16,5	17,3	24,9	19,5	25,7	14,3	20,9	11,4	20,0	24,4
2014	16,3	16,3	22,6	19,3	26,5	12,2	24,4	11,2	17,1	23,1
2015	12,8	14,9	19,4	16,4	27,6	10,3	22,2	9,6	20,6	22,7
2016	10,5	14,0	16,5	11,8	25,7	12,9	22,0	8,9	18,8	21,4
Average	13,3	14,4	22,4	18,2	25,9	17,5	23,0	9,8	20,2	21,7
Trend regression										
Slope	0,1	0,3	-0,3	-0,4	0,3	-1,6	0,3	0,2	-0,7	0,5
Std. Error	0,4	0,2	0,4	0,3	0,2	0,3	0,4	0,2	0,4	0,2
t value	0,3	2,1	-0,7	-1,5	1,3	-5,2	0,7	1,5	-1,8	2,3
p value	0,8	0,1	0,5	0,2	0,2	0,0	0,5	0,2	0,1	0,0
R^2	0,0	0,4	0,1	0,2	0,2	0,8	0,1	0,2	0,3	0,4
Adj. R^2	-0,1	0,3	-0,1	0,1	0,1	0,7	-0,1	0,1	0,2	0,3
Obs.	8	10	10	10	10	10	10	10	10	10
Trend	+	+	-	-	+	-	+	+	-	+
Panel B: Gini coefficient (GINI5)										
Year	ALB	BIH	BGR	HRV	MKD	MDA	MNE	ROU	SRB	SVN
2007		14,8	21,1	27,7	19,5	38,2	48,9	20,4	22,3	16,8
2008		9,9	28,1	32,1	23,8	34,1	42,0	21,4	26,7	24,2
2009	15,1	15,5	19,2	26,0	13,7	21,3	33,3	20,5	14,7	19,5
2010	15,3	10,7	19,3	25,9	13,6	17,2	24,9	19,1	15,6	20,9
2011	16,4	9,6	23,2	26,7	15,4	21,7	21,5	13,7	18,0	21,2
2012	12,5	16,2	26,9	26,7	14,1	23,6	22,9	15,6	25,0	21,3
2013	21,6	14,9	26,3	27,2	16,1	22,0	35,1	13,9	22,8	21,2
2014	23,2	10,3	24,4	28,2	25,6	25,2	18,6	12,9	26,1	20,1
2015	20,4	4,7	20,0	22,8	31,8	17,8	19,0	15,3	11,6	20,0
2016	25,5	9,6	16,2	23,8	31,8	19,5	18,1	16,8	20,7	20,7
Average	18,8	11,6	22,5	26,7	20,5	24,1	28,4	17,0	20,3	20,6
Trend regression										
Slope	1,5	-0,5	-0,3	-0,5	1,4	-1,5	-2,9	-0,8	-0,2	0,1
Std. Error	0,4	0,4	0,4	0,2	0,7	0,6	0,7	0,3	0,6	0,2
t value	3,5	-1,4	-0,7	-2,3	2,1	-2,5	-4,0	-3,1	-0,4	0,3
p value	0,0	0,2	0,5	0,1	0,1	0,0	0,0	0,0	0,7	0,8
R^2	0,7	0,2	0,1	0,4	0,3	0,4	0,7	0,5	0,0	0,0
Adj. R^2	0,6	0,1	-0,1	0,3	0,3	0,4	0,6	0,5	-0,1	-0,1
Obs.	8	10	10	10	10	10	10	10	10	10
Trend	+	-	-	-	+	-	-	-	-	+

Notes: Author's calculations based on company data from SeeNews (2017). For definitions of both variables see Table 1 and the description in text. The Gini coefficient is calculated using R's package "ineq" (Zeileis, 2014) and is standardized to range from a minimum value of 0, the case of equal-sized firms, to a maximum value of 100, the case of one dominant firm with relative share approaching one, and N-1 very small firms with a negligible relative share.

Table 3 also presents the results from a trend regression for each variable, CR5 and GINI5, and for each country. Aggregate concentration in six out of ten countries is rising, if the CR5-variable is used (Panel A). This positive trend is significant at the 10%-level only in two countries – Bosnia and Herzegovina (R^2 = 0,4) and Slovenia (R^2 = 0,4). In four out of ten countries CR5 is declining during the period under investigation. This negative trend is significant at the 10%-level only in two countries – Moldova (R^2 = 0,8) and Serbia (R^2 = 0,3). Panel B in Table 3 presents trend regression results for the GINI5-variable. Aggregate concentration rises in three out of ten countries. This positive trend is significant, again at the 10%-level, only in two countries – Albania (R^2 = 0,7) and Macedonia (R^2 = 0,3). In seven out of ten countries GINI5 is declining during the period under investigation. This negative trend is significant at the 10%-level in four countries – Croatia (R^2 = 0,4), Moldova (R^2 = 0,4), Montenegro (R^2 = 0,7), and Romania (R^2 = 0,5).

Table 4 presents the Pearson correlation matrix for the variables used in the study. The results indicate that aggregate concentration, measured both by CR5 and GINI5, is positively correlated with foreign direct investment (FDI), with a correlation coefficient of 0,34 ($p < 0,1$) for CR5 and a coefficient of 0,45 ($p < 0,1$) for GINI5 respectively. This is also illustrated graphically in Figure 1, which relates CR5 (Panel A) and GINI5 (Panel B) to FDI. It is evident that on average, that is across all countries and all years, there seem to be a positive relationship between foreign direct investment and aggregate concentration. This relationship appears, however, to be stronger in Panel B, that is between FDI and GINI5, implying a positive association between foreign investment and firm size distribution. However, correlation between two variables might reveal little, or even misleading, information when other factors have not been controlled for.

Table 4. Pearson correlation matrix

	CR5	GINI5	FDI	POP	EXP	LBI	GROWTH
CR5	1						
GINI5	0,34*	1					
FDI	0,19*	0,45*	1				
POP	-0,53*	-0,22*	-0,29*	1			
EXP	0,46*	0,19*	0,02	-0,20*	1		
LBI	-0,54*	-0,28*	-0,10	0,16*	-0,31*	1	
GROWTH	0,01	0,13	0,21*	0,01	0,01	0,10	1

Note: *Correlation is significant at the 0,1 level (2-tailed).

The results in Table 4 show also that aggregate concentration is negatively related to domestic market size (POP), implying that the larger the economy the lower aggregate concentration level – correlation coefficient of -0,53 ($p < 0,1$) for CR5 and a coefficient of -0,22 ($p < 0,1$) for GINI5. At the same time a larger foreign market size (EXP) appears to be associated with higher levels of aggregate concentration – correlation coefficient of 0,46 ($p < 0,1$) for CR5 and 0,19 ($p < 0,1$) for GINI5. Labor intensity appears to be negatively related to aggregate concentration – coefficient of -0,54 ($p < 0,1$) for CR5 and -0,28 ($p < 0,1$) for GINI5. Growth of the economy appears not be related to aggregate concentration.

The correlation results from Table 4 suggest also that there is a negative and significant relationship between foreign direct investment (FDI) and domestic market size (POP) with a correlation coefficient of -0,29, which implies that more FDI flows into smaller economies. On the other hand, FDI is positively and significantly related to GROWTH with a coefficient of 0,21, which supports the notion that growing economies attract larger amounts of foreign investments.

Among the other control variables domestic market size (POP) appears to be significantly negatively correlated with EXP with a coefficient of -0,20, implying that larger economies have lower export intensity than smaller ones. At the same time POP is positively related to LBI with a coefficient of 0,16, implying that larger economies are more labor intensive. Finally, EXP appears to be negatively related to LBI with a correlation coefficient of -0,31, implying that economies that are more labor intensive are less export intensive.

For the purpose of investigating the relationship between foreign investment and aggregate concentration two econometric models are specified and estimated. In the first model – Panel A of Table 5 – CR5 is used as dependent variable, while the dependent variable in the second model is GINI5 – Panel B of Table 5. The standard procedure to panel estimation is to use fixed effects estimator. By applying this procedure, however, the time-invariant variation between countries, i.e. the long-run variation, is wiped out (Kennedy, 2008). In the case of the study at hand one is interested in long-run relationships too. To question, for instance, how much would aggregate concentration rise, if population increases by 1 percentage, seems to provide little economic insight.

Two alternative approaches to the fixed effect estimator are the pooled OLS estimator and the random effects estimator. While the pooled OLS estimator does not take the panel structure of the

data into account, the random estimator gives a more comprehensive model since it uses a weighted average of the between-country and the within-country (over time) estimations. For instance, Bell & Jones (2015) consider the fixed effects model as a constrained form of the random effects model. Moreover, they show that in situations, when the variation between countries is of essence, the fixed effects model may provide misleading results.

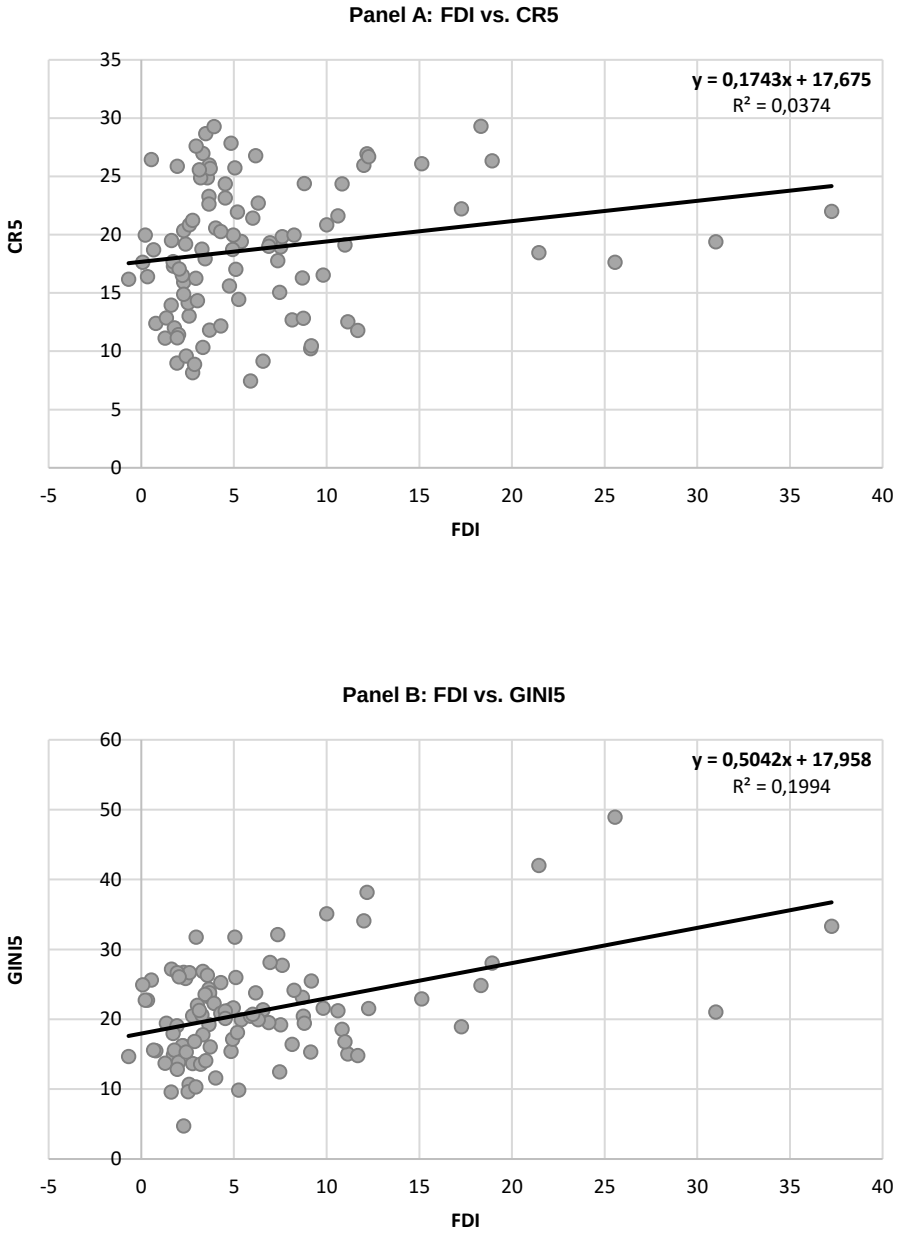

Figure 1. Foreign direct investment and aggregate concentration in SEE, 2007-2016

To account for the above problems and to distinguish between short-run and long-run effects each of the two models is estimated using three different estimation techniques – pooled OLS, fixed effects and random effects estimator. For the fixed and the random effect Table 5 reports the results from regressions with individual, time and two-way effect. Individual effects resemble least square dummy variable estimation with dummies for each country. Therefore, this procedure uses variation over the years and implies short-run effects only. In contrast, when including time effects only between country variation is used, so this procedure captures the influence of aggregate time trends and the results imply rather long-run effects. The two-way estimation considers both variation between countries and between years. All estimation procedures are performed in R (R Core Team, 2017). Reported standard errors are heteroskedasticity robust standard errors. Author's calculations using R's "plm" package (Croissant & Millo, 2008 and Millo, 2017).

Panel A of Table 5 reports the regression results with CR5 as dependent variable. In all estimated models FDI has no either statistical or economic significant effect on aggregate concentration. This result should not come as a surprise considering Panel A of Figure 1, which shows a weak and noisy relationship between FDI and CR5 in the pooled model. From all estimators only the pooled OLS and the time models appear to perform well with R-squared above 0,5 and large and highly significant F-statistic. The results suggest that POP and LBI have a negative significant effect on CR5, while EXP has a positive significant effect on CR5. GROWTH appear not to have any significant relationship with CR5. These results imply that the countries in the sample with larger domestic markets and higher labor intensity have lower levels of absolute aggregate concentration. At the same time countries with higher export intensity are characterized by higher levels of aggregate concentration ratios.

Results from the regressions with GINI5 as dependent variable are reported in Panel B of Table 5. In this case FDI has a significant positive effect using all estimators except the fixed two-way effect estimator. This suggests that higher levels of foreign direct investment in SEE are associated with more skewed firm-size distribution (long-run effect), but also in countries where foreign investment is increasing, relative aggregate concentration seems to increase too (short-run effect). As for the other variables only LBI appears to be statistically significant, when using the pooled OLS and time effects estimators.

Table 5. Regression results

Estimator	Pooled OLS	FE	RE	FE	RE	FE	RE
Effect	None	Individual	Individual	Time	Time	Two-way	Two-way
Panel A: Concentration ratio (CR5)							
FDI	0,02	0,01	0,04	-0,02	0,02	-0,04	0,00
Std. error	0,09	0,10	0,09	0,09	0,09	0,06	0,09
t value	0,19	0,08	0,45	-0,19	0,19	-0,71	0,41
p value	0,85	0,94	0,65	0,85	0,85	0,48	0,68
POP	-0,42	2,70	-0,42	-0,43	-0,42	-0,03	-0,42
Std. error	0,09	3,05	0,08	0,10	0,09	2,92	0,10
t value	-4,50	0,89	-5,46	-4,56	-4,50	-0,01	-4,19
p value	0,00	0,38	0,00	0,00	0,00	0,99	0,00
EXP	0,11	0,11	0,08	0,12	0,11	0,13	0,07
Std. error	0,04	0,12	0,06	0,04	0,04	0,18	0,04
t value	2,91	0,94	1,28	2,90	2,91	0,72	1,88
p value	0,00	0,35	0,20	0,00	0,00	0,48	0,06
LBI	-0,21	0,04	-0,20	-0,21	-0,21	-0,40	-0,19
Std. error	0,03	0,22	0,04	0,03	0,03	0,21	0,03
t value	-7,29	0,20	-4,66	-7,02	-7,29	-1,93	-6,33
p value	0,00	0,84	0,00	0,00	0,00	0,06	0,00
GROWTH	0,08	-0,02	0,01	0,07	0,08	-0,34	0,01
Std. error	0,14	0,15	0,13	0,21	0,14	0,08	0,13
t value	0,62	-0,13	0,05	0,35	0,62	-4,10	0,04
p value	0,47	0,90	0,96	0,73	0,54	0,00	0,97
R^2	0,55	0,02	0,19	0,60	0,55	0,08	0,54
Adj. R^2	0,52	-0,14	0,15	0,53	0,52	-0,20	0,52
F-statistic	22,31	0,39	4,34	24,54	22,31	1,34	21,31
p for *F*	0,00	0,86	0,00	0,00	0,00	0,26	0,00
Panel B: Gini coefficient (GINI5)							
FDI	0,44	0,40	0,43	0,40	0,44	0,17	0,43
Std. error	0,14	0,19	0,18	0,15	0,14	0,16	0,15
t value	3,07	2,08	2,44	2,73	3,07	1,11	2,82
p value	0,00	0,04	0,02	0,01	0,00	0,27	0,01
POP	-0,07	3,18	-0,07	-0,10	-0,07	1,86	-0,06
Std. error	0,12	2,16	0,09	0,14	0,12	2,32	0,11
t value	-0,63	1,47	-0,74	-0,76	-0,63	0,80	-0,55
p value	0,53	0,15	0,46	0,45	0,53	0,43	0,58
EXP	0,06	0,18	0,08	0,05	0,06	0,42	0,09
Std. error	0,08	0,12	0,09	0,10	0,08	0,26	0,09
t value	0,73	1,51	0,95	0,56	0,73	1,65	0,99
p value	0,47	0,13	0,34	0,58	0,47	0,10	0,33
LBI	-0,13	0,20	-0,09	-0,11	-0,13	-0,43	-0,08
Std. error	0,06	0,35	0,08	0,06	0,06	0,36	0,07
t value	-2,05	0,58	-1,12	-1,73	-2,05	-1,21	-1,21
p value	0,04	0,56	0,27	0,09	0,04	0,23	0,23
GROWTH	0,13	0,11	0,14	-0,26	0,13	-0,44	0,14
Std. error	0,23	0,21	0,20	0,40	0,23	0,30	0,22
t value	0,58	0,53	0,71	-0,66	0,58	-1,43	0,64
p value	0,56	0,60	0,48	0,51	0,56	0,16	0,52
R^2	0,27	0,16	0,16	0,24	0,27	0,13	0,27
Adj. R^2	0,23	0,01	0,12	0,11	0,23	-0,14	0,23
F-statistic	6,89	3,05	3,57	5,31	6,89	2,18	6,67
p for *F*	0,00	0,01	0,01	0,00	0,00	0,07	0,00

5. Conclusion

Foreign direct investment is expected to bring positive effects into the economies of Eastern Europe. The believe is that FDI could facilitate the transition to market economy and boost growth. The impact of FDI on domestic firms, and on economic concentration, is ambiguous since there are two alternative effect, which operate in opposite directions. First, FDI might lower domestic concentration due to the ability of foreign companies to overcome high entry barriers. On the other hand, FDI might increase concentration due to the realization of large economies of scale leading to the crowding out of domestic firms. Which effect would dominate in practice is an empirical question.

To shed more light on that question the paper at hand has provided estimates of aggregate concentration in ten economies in Southeast Europe. First, on a basis of a concentration ratio between sales revenue and GDP in each of the 10 countries under consideration the study finds that there is some variation between these economies. For instance, in Macedonia sales revenue of the top 5 largest companies account on average for about one fourth (about 26%) of country's current GDP. At the same time the corresponding figure for Serbia is one fifth (about 20%), and for Romania – one tenth (about 10%).

Another way to look at aggregate concentration is to estimate a measure of inequality between the largest companies. The Gini coefficient provides such a measure. It is also related to the concept of "granularity" since a higher Gini value implies more skewed firm size distribution, that is a more "granular" economy. Although correlated with the concentration ratio, this measure seems to reflect a different aspect of economic power. For instance, the distribution of revenue among top five companies in SEE economies is relatively highly skewed in Montenegro, with Gini of about 28, moderately skewed in Slovenia, with Gini of about 21, and relatively low skewed in Bosnia, with a Gini of 12. On average, that is for all countries under consideration and over all years, the Gini coefficient for the top 5 firms appears to be moderate with a value of 21.

The differences in aggregate concentration could be attributed to differences in domestic market size, foreign market size, labor intensity, as well as inward foreign direct investment. Higher levels of aggregate concentration ratio appear to be associated primarily with smaller domestic markets, larger export intensity and lower labor intensity. More skewed firm size distribution, on the other hand, appears to be associated primarily with higher levels of foreign direct investment and labor

intensity. While the relationship between labor intensity and aggregate concentration appears to be of long-term nature, that between foreign investment and aggregate concentration appears to have both long-run and short-run dimensions. That implies that countries with higher FDI have higher levels of aggregate concentration, but also as FDI rises so does concentration and vice versa.

Although estimates of aggregate concentration provided by this study are relatively rough, they shed new light on concentration issues in Southeast Europe. Future research could try to focus on better estimates for the levels of absolute and relative concentration, and to test whether the moderate correlation between them still holds. Assessing relative concentration seem to be a promising venture, since recent research has shown that macroeconomic shocks have a more profound effect in more granular economies, that is in economies with highly skewed distribution of firm sizes. Of course, a possible extension of this study is to include a richer set of explanatory variables with a stronger focus on institutional differences between SEE countries.

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