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Distributional Effects of Foreign versus Domestic Investment: Evidence from Post-Communist EU Member States

Summary: The paper provides insight into the relationship between foreign and domestic investment, and its effect on income distribution in the post-communist EU member states. The analysis is conducted using the general method of moment (GMM) estimator on panel data of the 10 Central and Eastern European (CEE) new member states from 1993-2017. The results reveal that a greater level of foreign direct investments (FDI) contributed to eliminating the negative effects of domestic investment on income distribution, particularly mass layoffs and the transfer of wealth into the hands of a small economic and political elite. It leads to the conclusion that FDI has played a significant role in reducing income inequality and rebuilding the middle class in the post-communist EU member states.

Key words: Foreign direct investment, Domestic investment, Income distribution, Post-communist EU member states.

JEL: D30, D63, F21.

Foreign direct investment has played a significant role in the economic transformation of the post-communist EU member states. However, despite the numerous benefits of FDI to the host economies in terms of transfer of knowledge and technology, the distributive effects of FDI remain a complex and controversial issue. In addition to the direct impact on income distribution, expressed by the change in employment and wages in the foreign-owned sectors, FDI also has indirect distributional effects on a number of economic and non-economic variables which determine income distribution: economic growth, investments, labour market regulation or human capital formation. Seeking to shed additional light on this issue, we will investigate the complex crowding in/out relationship between FDI and domestic investment related to income distribution in selected post-communist countries.

Our paper is structured into five sections. Section 1 reviews the literature on distributional effects of FDI and the literature on the relationship between FDI and domestic investment. Section 2 presents an overview of the conceptual framework and stylized facts used to define the research hypothesis. Section 3 shows the data and describes the econometric model. Section 4 is devoted to a discussion of the obtained

results in comparison with previously published papers. Section 5 highlights the main conclusions.

1. A Brief Review of the Literature

The important roles that FDI has played in shaping income distribution are well discussed throughout the literature. However, despite a vast number of theoretical and empirical papers dedicated to the analysis of the FDI-income inequality relationship, there is no consensus on this issue (Pandey Chintrakarn, Dierk Herzer, and Peter Nunnenkamp 2012; Kaixing Huang, Nicholas Sim, and Hong Zhao 2020). As an illustration of this complexity, Huang, Sim, and Zhao (2020), using meta-regression analysis applied to 543 empirical studies, find that 41% reported positive and statistically significant effects of FDI on inequality, while the remaining 59% reported negative or insignificant effects.

Which effect of FDI on income distribution will prevail depends largely on the level of economic development (Parantap Basu and Alessandra Guariglia 2007; Paolo Figini and Holger Görg 2011; Muhammad Tariq Majeed 2017; Muhammad Shahbaz, Mita Bhattacharya, and Mantu Kumar Mahalik 2017; Huang, Sim, and Zhao 2020). Given that the effect of FDI on income distribution is conditioned by economic development, the FDI-income relationship changes as a country develops (Figini and Görg 2011; Jyun-Yi Wu and Chih-Chiang Hsu 2012).

That FDI is an important source of economic development in developing countries is well elaborated in the literature (e.g. Joseph E. Stiglitz 2000; Nagesh Kumar and Jaya Prakash Pradhan 2005; Berhanu Mengistu and Samuel Adams 2007; Figini and Görg 2011; Kevin Lehnert, Mamoun Benmamoun, and Hongxin Zhao 2013). The relevance of this issue for post-communist countries stems from the fact that transition countries, concerning their absorptive capacity to FDI, occupied a middle position between developing and developed countries (Chiara Franco and Elisa Gerussi 2013).

The first years of economic reforms in the transition countries were characterized by a significant increase in income inequality (for example, Francisco H. G. Ferreira 1999; Maria Ivanova 2007; Branko Milanovic and Lire Ersado 2012), and accompanied by rapid and large penetration of FDI (Hans-Werner Sinn and Alfons J. Weichenrieder 1997; Nauro F. Campos and Fabrizio Coricelli 2002; Florian Dorn, Clemens Fuest, and Niklas Potrafke 2018; Kosta Josifidis, Novica Supić, and Slađana Bodor 2020). Parallel dynamics of income inequality and FDI inflows suggest the potential link between these two variables and initiates research in this area.

The literature on distributive effects of FDI in post-communist countries is relatively scarce and ambiguous (Svilena Mihaylova 2015; Josifidis, Supić, and Nikolina Doroškov 2020). The majority of authors argue that inflows of FDI were associated with the rise of income inequality in post-communist CEE countries (Anna M. Falzoni, Giovanni S. F. Bruno, and Rosario Crinò 2004; Nina Bandelj and Matthew C. Mahutga 2010; Gianluca Grimalda, David Barlow, and Elena Meschi 2010; Kornél Halmos 2011; Dimitrios Asteriou, Sophia Dimelis, and Argiro Moudatsou 2014). A significantly smaller number of studies show the negative relationship between FDI and income inequality (Andreas G. Georgantopoulos and Anastasios Tsamis 2011; Josifidis, Supić, and Olgica Glavaški 2018; Noemí Peña-Miguel and Beatriz Cuadrado-

Ballesteros forthcoming), or that the FDI-income inequality relationship is not statistically significant (Bornali Bhandari 2007; Franco and Gerussi 2013; Misztal Piotr 2020).

These contrasting results suggest that the relationship between FDI and income inequality in post-communist countries may be nonlinear (Bhandari 2007; Imran Khan and Zuhaba Nawaz 2019; Josifidis, Supić, and Doroškov 2020), time-varying (Herzer and Nunnenkamp 2013) and conditioned by the impact of the other factors (Franco and Gerussi 2013; Asteriou, Dimelis, and Moudatsou 2014; Dominik Völlmecke, Björn Jindra, and Philipp Marek 2016).

The novelty of our paper is that we investigate the distributional effects of FDI in post-communist EU member states in the context of the interdependence between foreign and domestic investment. From a theoretical perspective (Magnus Blomström and Ari Kokko 1999; James R. Markusen and Anthony J. Venables 1999; Salvador Barrios, Görg, and Eric Strobl 2005; Kevin Sylwester 2005; Elitza Mileva 2008; Alessia A. Amighini, Margaret S. McMillan, and Marco Sanfilippo 2017) the effect of FDI on domestic investment can be both positive and negative. Consequently, the debate on this issue is a dominantly empirical one. The empirical studies often point to conflicting conclusions, depending upon the choice of country sample, time period, or econometric methods.

Most of the studies on the impact of FDI on domestic investment are based on continents other than Europe (Keith Pilbeam and Neringa Oboleveciute 2012) and suggest crowding-out effect in the case of less developing and middle-income countries. These studies include, for example, Brian J. Aitken and Ann E. Harrison (1999), David Deok-ki Kim and Jung-soo Seo (2003), Mengistu and Adams (2007), Miao Wang (2010), Perekunah Bright Eregha (2012), Oliver Morrissey and Manop Udomkerdmongkol (2012) and Charles Fahinde et al. (2015). Between these, it is worth mentioning the New-Developmentalist literature that provides a useful theoretical framework for analyzing interactions between foreign and domestic capital in the process of economic development in developing and middle-income countries, which is supported by robust empirical findings (José Luís Oreiro, Kalinka M. da Silva, and Marwil J. Dávila-Fernández 2020). The problem is recognized in FDI-driven exchange rate appreciation which dampens economic development (Luiz Carlos Bresser-Pereira, Oreiro, and Nelson Marconi 2015; Oreiro, Da Silva, and Dávila-Fernández 2020).

When focusing on the new EU member states from Central and Eastern Europe, the picture is mixed, but most empirical studies conclude in favour of a crowding-in effect. Thus, Pilbeam and Oboleveciute (2012) investigated whether FDI crowds in or crowds out domestic investment in 26 of the 27 EU countries (excluding Luxembourg). By applying the one-step system generalised method of moments (GMM) estimator on the theoretical model developed by Manuel R. Agosin and Roberto Machado (2005), they find a significant crowding-out effect of FDI on domestic investment in the old EU member states, but not in the case of the new EU member states.

In a similar vein, Cristina Jude (2019) run an analysis on a panel of 10 post-transition EU member states during the 1995-2015 period and find that FDI inflows were accompanied by a short-term crowding-out effect and long-term crowding-in effect on domestic investment. She also investigates the individual effects of greenfield

FDI and mergers and acquisitions (M&A) on domestic investment. The obtained results suggest a strong complementarity between greenfield FDI and domestic investment in the long-run, while in the short-run crowding-out effect is dominant. M&A does not show a significant effect on domestic investment. Following the same theoretical model, Jan Mišun and Vladimír Tomšk (2002) provide the evidence of crowding-in effect in Hungary and the Czech Republic and the crowding-out effect in Poland in the period 1990-2000.

Moreover, it is possible to find arguments that go beyond the conventional understanding according to which crowding-out relationship is detrimental to economic development. The explanation is that FDI may push less efficient domestic firms, but it may also enhance average productivity in the economy by improving allocative efficiency (Kristine Farla, Denis de Crombrughe, and Bart Verspagen 2016). This issue seems particularly relevant for post-communist countries, given the obsolete capital stock inherited from the socialist era and the industrial transformation that accompanied the transition period (Jude 2019).

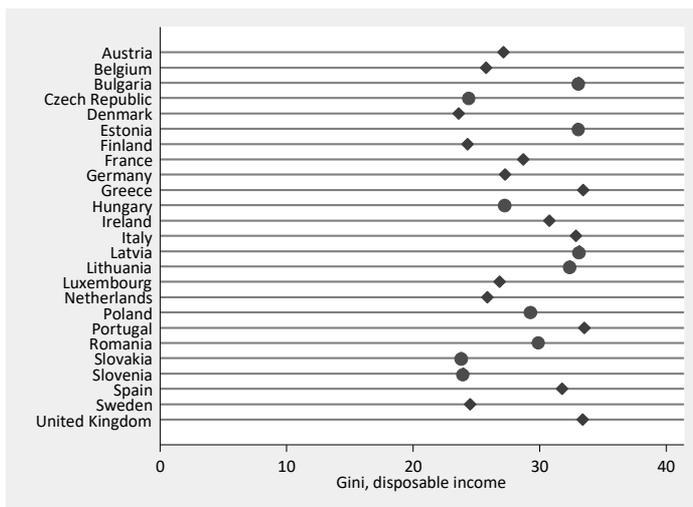
Overall, no clear consensus emerges from the existing literature on the distributive effects of FDI in post-transition countries. Additionally, FDI-domestic investment interaction seems to matter when considering whether this effect will be positive or negative. Finally, to our best knowledge, there are no empirical studies considering the income inequality dynamics in post-transition countries in the context of interaction between FDI and domestic investment. Therefore, the contribution of our paper is to address this issue through empirical analysis focused on the new EU member states for Central and Eastern Europe.

2. Conceptual Framework and Stylized Facts

The former communist countries of Central and Eastern Europe are perhaps the best example for testing the hypotheses on the impact of FDI on income distribution. The reasons are twofold.

First, in the period of socialism, income inequality in these countries was smaller than that in the other countries at a similar level of economic development. State's monopoly over the means of production leads to income distribution in which labour and capital income inequality did not reflect the differences in individual capabilities or market position, and was not the outcome of decisions freely made by households or firms. Instead, income distribution primarily reflected the political commitment toward establishing a classless society.

The transition from a planned economy to a market economy was accompanied by a significant increase in income inequality and social polarization. This negative trend was, to a large degree, overcome during the 2000s mainly as a result of economic and institutional reforms associated with the integration into the EU. Consequently, today the post-communist EU member states have a level of income inequality that is, on average, similar to those of the old (EU-15) member states (Figure 1).



Source: Authors' illustration using STATA 14 software.
Data retrieved from SWIID Version 9.0 dataset (Harvard Dataverse 2020)¹.

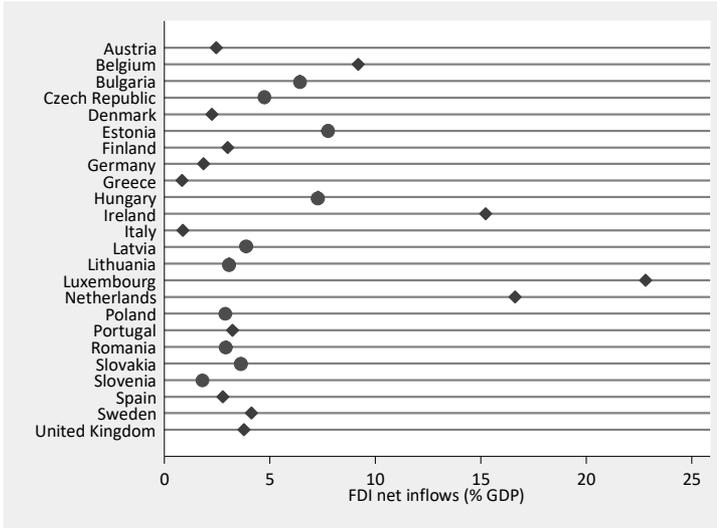
Figure 1 Gini, Disposable Income, the CEE New EU vs EU-15 Member States, 1990-2018 Average

The second reason is that private FDI in the post-communist CEE countries was restricted and virtually did not exist prior to the fall of communism. Starting from a very low level at the beginning of the transition process, FDI inflows increased steadily, especially in years in which most of the CEE countries entered the EU as member states. Moreover, in some CEE countries (for example Hungary, Poland, and the Czech Republic), FDI increased sharply immediately after the EU announced its eastern enlargement. This suggests that economic integration plays a significant role in accelerating FDI flows in these countries (more about integration-FDI nexus in transition countries see in Uros Delevic and Irina Heim 2017; Mihaela Simionescu 2018).

From the perspective of foreign investors, the membership of the host country to the European Union means a huge internal market of the 27 states with a population above 440 million people. The EU is also seen as a low-risk region for investment given its political and economic stability and the currency union between 19 of 27 member states. As a result, the CEE new member states are now significant recipients of FDI with net FDI inflows that are comparable to those recorded in the old (EU-15) member states (Figure 2).

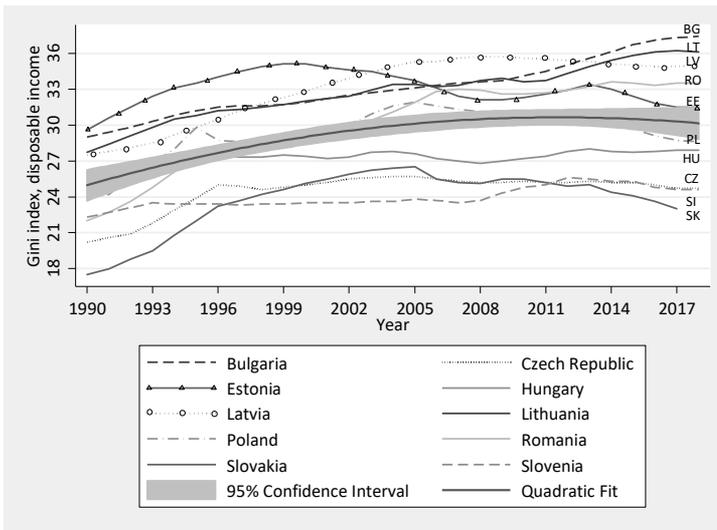
The similar trajectories of income inequality and FDI inflows in the post-communist EU member states suggest a potential relationship between these two processes which is worth examining further. Data on income inequality in the CEE new EU member states show a tendency towards stabilization (Figure 3). Income distribution first deteriorates and then improves as the economic and institutional reforms progress.

¹ **Harvard Dataverse.** 2020. The Standardized World Income Inequality Database (SWIID), Version 9.0. <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/LM4OWF> (accessed July 01, 2020).



Source: Authors' illustration using STATA 14 software. Data retrieved from World Development Indicators dataset (World Bank 2020)².

Figure 2 FDI Net Inflows (% GDP), the CEE New EU vs EU-15 Member States, 1990-2019 Average



Source: Authors' illustration using STATA 14 software. Data retrieved from SWIID Version 9.0 dataset (Harvard Dataverse 2020).

Figure 3 Gini Index, the CEE New EU Member States, 1990-2019

² World Bank. 2020. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators> (accessed July 01, 2020).

FDI certainly plays a significant role in this shift in income distribution. The main driver of economic development are investments, particularly investments that bring new technologies, know-how, and management practices into the economy. At the beginning of the transition process, the CEE countries were faced with a shortage of such investments. The main reason was system-specific disadvantages of socialism, such as price control and the business concept based on the “seller” instead of “buyer” market (János Kornai 2000), which limited the market valorization of innovation. The result was low efficiency in the use of resources and uncompetitive production. In such circumstances, it is not surprising that the FDI became a major channel for accessing advanced technologies, know-how, and management practices for transition countries during the first years of transition.

The effects of foreign capital penetration on economic development are determined by the nature of the relationship between foreign and domestic investment. Generally, FDI may crowd in or crowd out domestic investors. The crowding-in effect occurs when FDI inflows lead to more domestic investment and capital accumulation. This is the case when foreign investors are in a complementary relationship with domestic investors. For example, FDI inflows may increase demand for products and services from local suppliers. However, foreign investment may also crowd out domestic investment, when foreign and domestic investors are in a substitution relationship. For example, if a foreign investor has more advanced technology than its local competitors or domestic firms have limited absorptive capacity, then FDI crowds out domestic investment (Eliana A. Cardoso and Rudiger Dornbusch 1989). The net effect on total investments, and thus on economic development, depends on the size and time synchronization of these two effects.

The effects of FDI on domestic investment may be considered as a two-stage process. The negative effect in the first stage does not necessarily generate a detrimental effect in the long-run. It is possible that the negative effects in the first phase are followed by the positive effects in the second phase. To put this in other words, the crowding-out effect in one stage may lead to the crowding-in effect in the second stage. Consequently, penetration of foreign capital, and its effect on host economy welfare, can be treated in the context of creative destruction.

In the first phase of the transition process, which refers to the period up through the beginning of negotiations for membership in the European Union, domestic and foreign private investment worsened rather than improved income distribution. This is expressed by a sharp increase in the Gini index (Figure 3). The key channel for investment was a privatization process, which was accompanied by mass layoffs and the transfer of wealth into the hands of a small economic and political elite in the case of domestic investment, and foreigners in the case of foreign investment.

The exception to this, in terms of the impact on employment, were greenfield foreign direct investments. However, this does not mean that the effect greenfield FDI had on income distribution was positive across the board. The penetration of greenfield capital contributed to the growth of between-group (difference in wage premium between foreign and domestic-owned firms) and within-group wage inequality (difference in the wage premium for skilled and unskilled workers in foreign-owned firms). This was a result of a more compressed wage structure in domestic sectors than in

foreign sectors and the skill-biased nature of FDI in general (for more, see Josifidis, Supić, and Doroškov 2020).

In the second period of transition, the upward trend in income inequality first slowed down and then stagnates in most CEE countries (Figure 3). This is the result of the interaction of a number of factors. With regard to FDI, higher FDI inflows and stronger business ties between foreign and domestic firms contributed to the growth of employment in the domestic sector and reduced the wage gap between the foreign and domestic sectors, and thus reduce overall income inequality.

More precisely, there are two key changes that improve income distribution. First, both the volume and quality of FDI increased compared with the first period of transition. Institutional and economic reforms related to EU accession improved the ease of doing business and attracted more investments by multinational corporations (Marie M. Stack, Geetha Ravishankar, and Eric Pentecost 2017; Tomasz Dorożyński, Bogusława Dobrowolska, and Anetta Kuna-Marszałek 2020). The EU single market is based on the assumption of free movement of goods, capital, services, and people among the member states. Practically, that means that the EU citizens are free to live, work, study and do business in any other EU member state without any restriction or discrimination. Concerning capital mobility, a common legal and regulatory framework combined with the incentive schemes offered to foreign investors and comparatively lower labour costs relative to core Eurozone countries made the CEE new member states particularly attractive to foreign investors, especially FDI from the old EU member states. Hence, it is not surprising that the post-communist EU member states have a greater positive impact of capital mobility on economic growth than the old member states (Agnieszka Gehringer 2013) with strong distributive effects taking into account the growth-inequality nexus. Additionally, before and after joining the EU, reforms improved the absorptive capacities of new member states. The quality, rather than the cost of labour, became more important in attracting FDI. This, in turn, allowed these countries to benefit from possessing an educated labour force and from the technological transfers associated with FDI (Andreas Ammermüller, Hans Heijke, and Ludger Wößmann 2005; Vasile Alecsandru Strat 2015; Stack, Ravishankar, and Pentecost 2017).

Second, since the mid-1990s, the composition of FDI has changed in favour of greenfield investment. The impact of FDI on economic development and consequently on income distribution differ depending on the type of FDI inflows. In general, the contribution of greenfield investment to economic development is greater than the contribution of brownfield investment. In contrast to greenfield investment, brownfield investment implies an ownership transfer of existing facilities and thus does not directly contribute to capital accumulation. The positive impact of brownfield investment implies a developed financial sector that is largely manifested through technology and knowledge transfer (Mesut Eren and Hong Zhuang 2015; Yilmaz Bayar 2017; Jude 2019).

Changes in the level and quality of the FDI inflows during the second period of transition have an impact on the distributive effects associated with domestic private investment. Generally, the interactions between foreign and domestic investment lead to lower income inequality thanks to employment growth in both sectors and upward

convergence of wages in the domestic sector toward wages in the foreign sector. The accumulation of FDI contributed to the elimination of many institutional distortions in the economy, such as non-optimally tax and tariff system or labour market imperfections (Markusen and Venables 1999; Lars P. Feld and Jost H. Heckemeyer 2011) which positively affected the level of domestic investment and employment. Deeper integration of foreign investors in the local market, and the expansion of trade linkages with domestic firms, also had a positive impact on domestic investment, employment, and wages. In contrast to the first period of transition, when FDI tended to crowd out domestic investment, in the second period of transition FDI has tended towards crowding in domestic investment (Jude 2019).

Specifically, domestic private investment in the second period of transition has more anti-inequality than the pro-inequality effect on income distribution. The adverse effects of domestic investments on income distribution associated with the enrichment of the old communist nomenclature through the privatization process have disappeared, while stronger business ties with foreign firms and increased competition on the domestic market have led to a reduction in the wage gap between foreign and domestic firms and generated more better-paid jobs in the domestic sector. This view is consistent not only with the theory, which suggests that the ties with foreign firms reduce the constraints that domestic firms face (Markusen and Venables 1999; Alex Eapen 2012), but also with the empirical findings (Simeon Djankov and Peter Murrell 2002; J. David Brown, John S. Earle, and Álmos Telegdy 2006; Saul Estrin et al. 2009; Marcella Nicolini and Laura Resmini 2010).

3. Data and Model Specification

In order to provide empirical support for the arguments in the presented conceptual framework, we define the conditional hypothesis that the effect of domestic investment on income inequality in the post-communist EU member states depends on FDI. We expect to show that FDI inflows in the CEE new member states contributed to a change in the direction of the impact of domestic investment on income distribution, from an initial increase to a subsequent decrease in income inequality.

The hypothesis is tested on a sample of 10 post-communist EU member states³ (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia). These countries form a relatively homogeneous group. They have similar economic and political backgrounds during the socialist era and passed similar reforms in the process of European integration. The baseline model is written as follows:

$$Gini_{it} = \beta_0 + \beta_1 Gini_{it-1} + \beta_2 DomesticInvest_{it} + \beta_3 FDI_{it} + \beta_4 DomesticInvest_{it} * FDI_{it} + \beta_5 Transfers_{it} + \beta_6 Unemployment_{it} + \beta_7 GDPpc_{it} + \beta_8 InvestFreedom_{it} + e_{it} \quad (1)$$

³ Of the CEE new EU member states, Croatia was left out of the analysis. The reasons are the specific model of socialism applied in the former Yugoslavia; the problem of data reliability during the war period in Croatia in the 1990s; the fact that Croatia became a member of the EU relatively late: 9 years after EU-8 and 6 years after Romania and Bulgaria.

In the model, the dependent variable is income inequality in disposable income, expressed by Gini coefficient after taxes and social transfers ($Gini_{it}$). The explanatory variables are $Gini_{it-1}$ – the lagged value of the dependent variable; $DomestInvest_{it}$ – domestic investments as a percentage of GDP; FDI_{it} – foreign direct investment inward flows as a percentage of GDP⁴; $DomestInvest_{it} * FDI_{it}$ – the interaction term between domestic investment and FDI; $Transfers_{it}$ – the social security transfers as a percentage of GDP; $Unemployment_{it}$ – unemployment rate; $GDPpc$ – GDP *per capita* in PPP terms; $InvestFreedom_{it}$ – investment freedom; e_{it} – the error term. The subscript i stands for the country, t is the time subscript. Complete definitions, data sources, and descriptive statistics of these variables are provided in the Appendix (Table 1).

The data spans the period from 1993 to 2017. The choice of the time interval is motivated by the intention to avoid erratic dynamics of macroeconomic data during the first years of transition (see Jude 2019 for more arguments that justify the omission of these years) in the case of the starting year, and by the data availability in the case of the final year. The regression is run on three-year average data (a similar approach could be found in Macarena Suanes 2016; Josifidis, Supić, and Glavaški 2018). There are three reasons for using three-year averages instead of annual data. First, the Gini index, as a measure of income inequality, is relatively stable over time so that the response of the dependent variable to annual changes of the explanatory variables will be small in absolute terms. Second, considering three-year averages rather than annual data, we reduce the effects of economic cycles on income inequality. Third, an average dataset based on three-year averages is more balanced compared with annual data given that the full annual data are not available for all series. The result is an unbalanced panel with 10 countries and 8 three-year average time intervals.

The logic of the model is that the impact of domestic investments on income inequality in the post-communist EU member states has been influenced by FDI, reflecting the model's hypothesis. This assumption is tested by including in the model the interaction term between domestic and foreign investment. In addition to the standard control variables used in the literature: GDP *per capita*, unemployment, and social transfers (since we use income inequality after redistribution as a dependent variable), the model contains the investment freedom variable. The investment freedom index value ranges from 0 to 100, where 0 represents the minimum and 100 maximum of investment freedom. This variable is used as a proxy for changes in institutions and policies in favour of a more investment-friendly environment in the CEE new EU member state.

We employ the dynamic rather than static estimation to account for the effect that previous inequality may have had on its current level. That income inequality is highly persistent over time is well justified in the literature (Steven N. Durlauf 1996; Muhammed N. Islam 2016; Diogo Signor, Jongsung Kim, and Edinaldo Tebaldi 2019; Josifidis and Supić 2020; Fatma Zeren and Mustafa Ercan Kılıç 2020) and in our case confirmed by a positive and significant autoregressive coefficient for income inequality of 0.91.

⁴ According to OECD definition, inward FDI flows represent transactions that increase the investment that foreign investors have in enterprises in the host country less transactions that decrease the investment of foreign investors in such enterprises.

Table 2 Income Inequality and FDI: The System-GMM Estimates

Variables	(1) Baseline model	(2) Model 2	(3) Model 3
Gini-1 (disposable income)	0.909*** (0.126)		0.950*** (0.077)
DomestInvest	0.183* (0.105)	0.007** (0.003)	0.123*** (0.047)
FDI (% GDP)	0.739*** (0.240)		
DomestInvest* FDI (inflow)	-0.042*** (0.013)		
Transfers	-0.252 (0.182)	-0.019*** (0.00721)	-0.249** (0.111)
Unemployment	0.102* (0.062)	0.0108*** (0.003)	0.0975** (0.044)
InvestFreedom	-0.0290*** (0.0109)	-0.002*** (0.0005)	-0.026*** (0.008)
GDPpc	0.001 (0.002)	0.0018 (0.0012)	-0.0064 (0.003)
FDI (% GFCF)		0.004* (0.002)	
DomestInvest * FDI (% GFCF)		-0.001** (0.0001)	-0.001** (0.0001)
Logistic Gini-1 (disposable income)		0.834*** (0.115)	
FDI (inward stock)			0.045** (0.021)
DomestInvest * FDI (stock)			-0.0027** (0.001)
Constant	3.820 (5.717)	0.0364 (0.176)	3.822 (3.179)
AR(1) (p -value)	0.1	0.040	0.073
AR(2) (p -value)	0.817	0.510	0.177
Hansen test (p -value)	0.541	0.442	0.210
Observations	68	69	70
Countries	10	10	10

Notes: Robust one-step standard errors are in parentheses. Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. AR(1): the Arellano-Bond test for the serial correlation. The null hypothesis is that there is no first-order autocorrelation in the first differences equation. AR(2): the Arellano-Bond test for the autocorrelation. The null hypothesis is that there is no second-order autocorrelation in the first differences equation. Hansen test is used to test the null hypothesis of instrument validity. The null hypothesis is that all the restrictions of overidentification are valid. To avoid the problem of instrument proliferation, the matrix of instruments is collapsed and the number of lags is limited at 2.

Source: Authors' calculation using STATA 14 software.

In the presence of the lagged dependent variable, the OLS estimator of the coefficients is inconsistent and biased. Also, there is a potential problem of endogeneity caused by an inverse causality between the dependent and the explanatory variables in the model, which cannot be controlled by the standard OLS estimator. It is reasonable to assume that causality between income inequality on one hand, and social spending and unemployment, on the other hand, may run in both directions. Thus, high social spending reduces income inequality, however, a society with a high income inequality population tends to prefer a greater income redistribution. Additionally, high income inequality is a consequence of a high unemployment rate, but high income inequality also reduces employment opportunities for the poor. Therefore, as a more appropriate approach, we estimate the model by the general method of moment (GMM) estimator developed by Manuel Arellano and Olympia Bover (1995) and Richard Blundell and Stephen Bond (1998).

The GMM technique provides a way of taking into account the dynamic structure of the model, while also controlling for the possible problem of endogeneity. In line with Blundell and Bond (2000), we adopt the one-step system GMM over the difference GMM method to carry out the estimations, as it provides better results in case of unbalanced panels, highly persistence of the lagged depended variable, and small sample size. The choice of GMM technique in our case is justified not only by data characteristics, but also by the literature on similar research (Horácio C. Faustino and Carim Vali 2013; Franco and Gerussi 2013; Herzer and Nunnenkamp 2013; Khan and Nawaz 2019; Peña-Miguel and Cuadrado-Ballesteros forthcoming).

The assumptions of homoscedasticity and cross-sectional independence are tested by using the modified Wald test for groupwise heteroscedasticity and the CD test developed by M. Hashem Pesaran (2021). The test results show that the baseline model is heteroskedastic ($p = 0.000$) but indicates no presence of cross-sectional dependence ($p = 0.243$). To control the problem of heteroscedasticity, we apply the one-step system GMM with robust error estimation.

4. Results and Discussion

In general, the obtained results are supportive of our hypotheses and consistent with the theoretical expectations (Table 2), although some estimates are not statistically significant. In the following, we will discuss the results one by one.

Among the explanatory variables, we are focused on the effects of investment on income inequality. As mentioned in the hypothesis, we argue that the effect of domestic investment on income inequality depends on FDI in the sense that FDI has contributed to a change in the direction of the impact of domestic investment on income distribution, from an initial increase to a subsequent decrease in income inequality. From an econometric point of view, if this hypothesis is correct, the domestic investments will be statistically significant and positively signed, whereas the interaction term between domestic investment and FDI will be statistically significant and negatively signed. The results from the baseline model conform to this expectation as the coefficient estimates for domestic investment and FDI inflows are positive and statistically significant, while the coefficient estimates for the interaction term are negative and statistically significant.

The economic interpretation is that competition, managerial knowledge, and technological spillovers of FDI on domestic firms have changed otherwise negative effects of domestic investment on income distribution associated with the process of privatization. More specifically, income generated by domestic investment during the first period of transition disproportionately benefits small elites and results in higher income inequality. This negative effect diminishes and eventually disappears as FDI inflows increase and change the quality of investment in the host countries.

It is important to note that the positive and statistically significant parameter estimate of domestic investment (β_2) and FDI (β_3) cannot be interpreted as unconditional or average effects as it can in a linear-additive regression model. The positive sign does not imply that domestic or foreign investment increases inequality. Instead, this impact could be positive in the specific instance when FDI or domestic investment is zero. This is substantively meaningless since it is impossible to imagine an open

market economy only with domestic investment or foreign investment. As a confirmation of this argument, in our sample, there are no observations for which domestic investment or FDI are zero so that β_2 and β_3 are substantively uninformative about the effect of domestic investment and FDI on income inequality.

The negative and statistically significant parameter estimate of the interaction term implies that an increase in FDI reduces the pro-inequality effect of domestic investment on income distribution. Since the impact of domestic investment on income inequality changes over some ranges of FDI values, the conditional marginal effect is calculated as follows:

$$\frac{\partial Gini}{\partial DomesticInvest} = \beta_2 - \beta_4 FDI. \quad (2)$$

This marginal effect shows changes in income inequality due to changes in domestic investment when the modifying variable is FDI.

The positive and statistically significant parameter estimate for domestic investment and the negative and statistically significant parameter estimate for the interaction term implies that as FDI increases, the positive effect of domestic investment on income inequality declines, and after reaching an inflection point, in terms of a certain minimum level of FDI, the effect of domestic investment of income inequality becomes negative. This occurs when FDI is 4.3% of GDP. For levels of FDI beyond this point, domestic investment begins to reduce rather than increases income inequality.

The marginal effects should be estimated for each set of modifying variable (FDI) values, ranging from the sample minimum to sample maximum. In addition to conditional marginal effects, it is necessary to calculate new standard errors for marginal effects, as follows:

$$\hat{\sigma} \frac{\partial Gini}{\partial DomesticInvest} = \sqrt{var(\hat{\beta}_2) + FDI^2 var(\hat{\beta}_4) + 2FDI cov(\hat{\beta}_2, \hat{\beta}_4)}. \quad (3)$$

To illustrate the significance of the marginal effects, we use the graphical presentation (Figure 4) since it is a more effective way than to report standards errors in the table. The confidence interval is calculated by using the following formula:

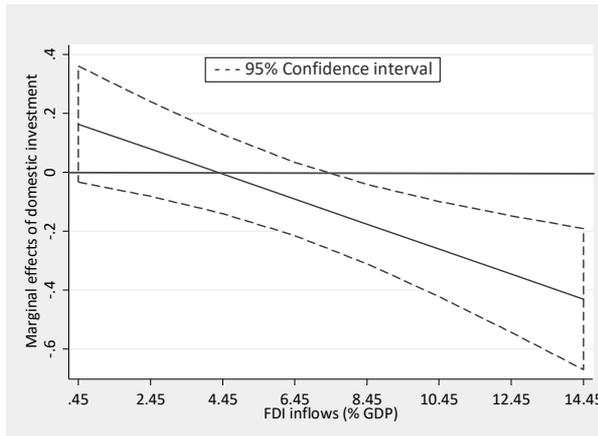
$$\frac{\partial Gini}{\partial DomesticInvest} \pm t_{df,p} \sqrt{\widehat{var} \frac{\partial Gini}{\partial DomesticInvest}}, \quad (4)$$

where: $t_{df,p}$ is the critical value in a t -distribution with df degree of freedom for a two-sided hypothesis-test at one minus the desired confidence-interval size.

In Figure 4, the solid line indicates the marginal effects, while the dashed lines around the solid line show the 95-percent confidence interval under which the marginal effects are statistically significant. If both upper and lower bounds of the confidence interval are above or below the zero line, the marginal effects are significant. In contrast, if both or one of the bounds cross the zero line the marginal effects are not statistically significant (Thomas Brambor, William Roberts Clark, and Matt Golder 2006).

As we can see from Figure 4, the line that represents the marginal effects (the solid line) is sloped downward, from left to right side. To put this in context, the effect of domestic investments on income inequality is positive (increases income inequality)

for a lower level of FDI inflows (below 4.3% of GDP) and negative (reduces income inequality) for a higher level of FDI inflows (above 4.3% of GDP). Taking into account the 95percent confidence intervals, we can get a more accurate picture. Domestic investment has a negative and statistically significant marginal effect on income inequality for the levels of FDI above 7% of GDP, but below that level of FDI, the marginal effect is not statistically significant. This is an important finding since it implies that the negative impact of domestic investment on income distribution is not statically significant.



Notes: The calculation is made with the full set of explanatory variables.

Source: Authors' calculation using STATA 14 software.

Figure 4 Marginal Effects of Domestic Investment on Income Inequality in Post-Communist EU Member States, as Conditioned by FDI Inflows

Turning briefly to control variables, the positive and statistically significant coefficient of lagged dependent variable suggests that past income inequality has a strong impact on current income distribution. That past inequality is an important predictor of current inequality is well elaborated in the theoretical and empirical literature on income inequality (Alberto Chong 2004; David Aristei and Cristiano Perugini 2015; Josifidis and Supić 2018; Josifidis, Supić, and Glavaški 2018). This finding confirms that income inequality in post-communist EU member states, just as in other market economies, is not a temporary but a permanent phenomenon.

That income inequality is a permanent phenomenon does not mean that it is also a spontaneous phenomenon. Income distribution is market-generated but controlled by the government through income redistribution in favour of lower-income families. Hence, it is not surprising that social spending has a strong anti-inequality effect, which is indicated by a negative and statistically significant coefficient of the social transfer⁵.

The effect of unemployment on income inequality is clear and corresponds with our expectations. The positive and statistically significant coefficient on

⁵ In the baseline model, the parameter estimate for the variable social transfer is of the expected – negative sign, but not statistically significant. However, in the two alternative specification (Table 2, Model 2 and Model 3), this coefficient is highly statistically significant.

unemployment indicates that unemployment has a negative impact on income distribution. While holding all other predictors constant, one unit increase in the unemployment rate leads to an increase in the Gini index by 0.10. Compared to the impact of other regressors on income inequality, the effect of unemployment seems relatively small. This result may be partly explained by the fact that in the process of transition and European integration all CEE countries experienced growth of median income, which in turn weakened the impact of unemployment on income inequality. Unemployment is a strong generator of income inequality, but this effect depends largely on households' income level. Generally, households with high income are less sensitive to unemployment than households with low income, especially in the short-term (Jonathan A. Parker and Annette Vissing-Jorgensen 2010).

For investment freedom, as expected, the coefficient is negative and statistically significant. Over the last decades, the CEE new EU member states have substantially reformed their policies and institutions in favour of more investment freedom. The strong FDI-growth relationship in post-communist countries (Campos and Yuko Kinoshita 2002; Mišun and Tomšk 2002; Alan A. Bevan and Estrin 2004; Asteriou, Xeni Dassiou, and Dionysius Glycopantis 2005) suggests that greater economic freedom boosts economic growth and thus contribute to more equal income distribution. Additionally, reforms remove the barriers that protect politically favored groups and open economic opportunities to less privileged and lower-income groups (Salvador Pérez-Moreno and María J. Angulo-Guerrero 2016). In line with theoretical expectation, the influence of GDP *per capita* on income inequality is negative but falls short of being statistically significant.

To demonstrate the robustness of our empirical findings, we perform sets of robustness checks. First, we re-estimate the baseline specification with the alternative measures for the dependent variable (Gini index) and the key explanatory variable – FDI. As an alternative measure for the Gini index after taxes and transfers in the baseline specification, we use a logistic transformation of the Gini index (Table 2, Model 2). The result of the logistic transformation of the Gini index is a measure of income inequality that is completely unbounded (Kenneth F. Wallis 1987; Yousef Makhoulouf 2018). The inward FDI inflows as a percentage of GDP from the baseline specification are replaced with FDI inflows as a percentage of gross fixed capital formation (Table 3, Model 2); and FDI inflows stock (Table 2, Model 3). Second, we re-estimate the model by excluding one country/year after another from the regression. This is done to make sure that outlier country or deviant time period do not drive the results⁶. Third, the validity of the system-GMM estimates is checked by comparing the coefficient of the lagged dependent variable obtained by using system-GMM, OLS (Ordinary Least

Table 3 Income Inequality and FDI: Lagged Dependent Variable (GMM, OLS, and FE)

Variables	(1) GMM	(2) OLS	(3) FE
Gini-1 (disposable income)	0.909*** (0.141)	0.965*** (0.029)	0.869*** (0.087)
Observations	70	68	68
Countries	10	10	10

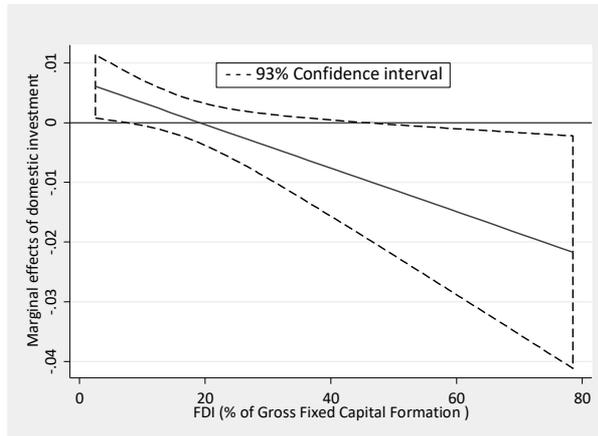
Notes: Level of significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: Authors' calculation using STATA 14 software.

⁶ Estimation results of these robustness checks are available upon request.

Squares), and FE (Fixed Effects) estimators. According to Bond (2002), a consistent GMM estimate should lie between FE estimate as lower bound and OLS estimate as upper bound (Table 3).

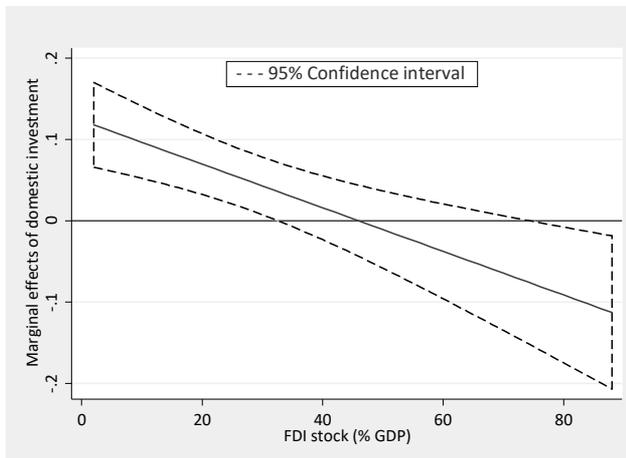
Finally, we estimate the marginal effect of the alternative model specification (Figures 5 and 6). Although the results are less robust, the marginal effect depicts the same substantive relationship between FDI and domestic investment, on the one hand, and income inequality, on the other hand, as does the baseline model.



Notes: The calculation is made with the full set of explanatory variables from Model 2.

Source: Authors' calculation using STATA 14 software.

Figure 5 Marginal Effects of Domestic Investment on Income Inequality in Post-Communist EU Member States, as Conditioned by FDI (% of Gross Fixed Capital Formation)



Notes: The calculation is made with the full set of explanatory variables from Model 3.

Source: Authors' calculation using STATA 14 software.

Figure 6 Marginal Effects of Domestic Investment on Income Inequality in Post-Communist EU Member States, as Conditioned by FDI (% of Gross Fixed Capital Formation)

Overall, the different sensitivity analyses suggest that our findings are relatively robust to different measures of the dependent and main explanatory variable, they are not driven by a particular country or time period, and that the system-GMM estimates are consistent.

5. Conclusion

Inspired by the data on parallel dynamics of income inequality and FDI inflows in the post-communist countries, in this paper we attempt to shed more light on the FDI-income inequality nexus in the CEE new member states. Given that there is a lack of consensus in the literature on whether, and to what extent, FDI affects income inequality, we assume that this relationship in our sample is nonlinear, time-varying, and conditioned. More specifically, we test the hypothesis that FDI has contributed to the positive effect of domestic investment on income distribution in the CEE new member states. The analysis covered 10 post-communist EU member states in the period from 1993 to 2017.

As predicted, our research results show that the increase in income inequality associated with domestic investment declines as the FDI inflow increases. It seems that FDI has contributed to a change in the direction of the impact of domestic investment on income distribution, from an initial increase to a subsequent decrease in income inequality. This shift is explained by a higher level and quality of FDI inflows in the second period of transition, which in turn resulted in more positive than negative spillovers of FDI on domestic firms. To put this finding in the time and institutional context, we paid special attention to the impact of European integration on income inequality in the post-communist EU member states. The economic and political reforms associated with the European integration were anti-inequality, partly thanks to the positive impact that the establishment of the single market has had on FDI inflows from the old EU member states.

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Appendix

Table 1 Variable Description (Three-Year Average Data)

Name	Description	Source	Obs.	Mean	Std. dev.	Min	Max
Gini (disposable income)	Income inequality after taxes and social transfers.	Harvard Dataverse (2020)	80	29.59	4.02	22.03	36.76
FDI (inflow)	Foreign direct investment, inward inflows (% of GDP).	United Nations Conference on Trade and Development (UNCTAD 2020) ⁷	78	4.10	2.81	0.46	15.79
FDI (stock)	Foreign direct investment, inward stock (% of GDP).	UNCTAD (2020)	80	39.35	23.12	2.13	87.86
FDI (% GFCF)	Foreign direct investment, inward inflows (% of gross fixed capital formation).	UNCTAD (2020)	79	18.04	12.93	2.56	78.69
DomestInvest	Domestic investment (gross fixed capital formation minus FDI).	UNCTAD (2020)	80	19.56	4.71	6.69	31.61
Transfers	Social security transfers, % of GDP.	Organisation for Economic Co-operation and Development (OECD 2020) ⁸	80	12.29	2.41	7.24	16.91
Unemployment	Unemployment rate, % of civilian labour force.	World Bank (2020)	80	9.80	3.72	3.96	19.06
GDPpc	Gross domestic product converted to international dollars using purchasing power parity rates.	World Bank (2020)	80	19519.20	6274.07	8390.28	31490.49
InvestFreedom	Investment freedom index. The index is ranged from 0 to 100, where 100 represents the maximum investment freedom.	Heritage Foundation ⁹ (2021)	80	69.18	11.91	30.00	90.00

Source: Authors' compilation.

⁷ **United Nations Conference on Trade and Development (UNCTAD).** 2020. <https://unctad.org/statistics> (accessed July 01, 2020).

⁸ **Organisation for Economic Co-operation and Development.** 2020. Data. <https://data.oecd.org/searchresults/?q=data> (accessed July 01, 2020).

⁹ **Heritage Foundation.** 2020. 2021 Index of Economic Freedom. <https://www.heritage.org/index/> (accessed July 01, 2020).

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