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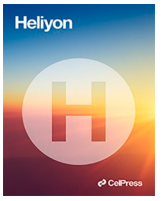

Research article

The theory of the investment development path and agriculture in Eastern Europe

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ABSTRACT

The outdated investment development path results in Eastern Europe and the lack of focus on the agricultural sector necessitated this study. The generalised least squares estimator employed countries from 1993 to 2021 for agricultural sector data on 17 Eastern Europe. Eastern European agriculture is in the early phase of stage IV of the investment development path, consistent with the theory of the investment development path. Human capital enhanced net foreign direct investment. Agricultural trade openness, exchange rate, and inflation did not influence net foreign direct investment. Developed and transition countries in Eastern Europe were not distinguished regarding net foreign direct investment. Eastern European countries must increase agricultural growth relative to population growth. This would increase agricultural development. The increased income can be saved and channelled into domestic investments to spur additional growth. This would make capital available for export. The growth in human capital must be sustained to enhance technical know-how in agriculture that would accompany agricultural capital export. Agricultural sector managers of Eastern European countries must focus on enhancing the sector's supervisory and regulatory functions. The goal should be to reduce the costs of doing agricultural business through effective facilitation towards efficient agricultural markets.

1. Introduction

The theory of the investment development path is often used to assess the investment activities of countries and regions [1–4]. The evaluation is based on the performance of foreign direct investment, economic development, and their interface [5–9]. Foreign direct investment outcome is based on the net foreign investment position, which is the difference between the stocks of outward foreign direct investment and inward foreign direct investment [5,6,8,10,11]. Economic development is based on the gross domestic product per capita [-15,4,12]. The theory of the investment development path identifies an economy based on its characteristics as a net inward direct investment economy or net outward direct investment economy [4,6,8,13]. Further, this theory also hypothesises that each economy goes through five stages of the investment development path, namely, stages I, II, II, IV and V (Fig. 1) [, 17, 18]. Knowing the investment development path stage shows the transnational appeal of the economy and the probabilities of firms going beyond the home border. Further, it contributes strategies for the right economic policy [2,6,8,14–16]. The total economy is constituted into

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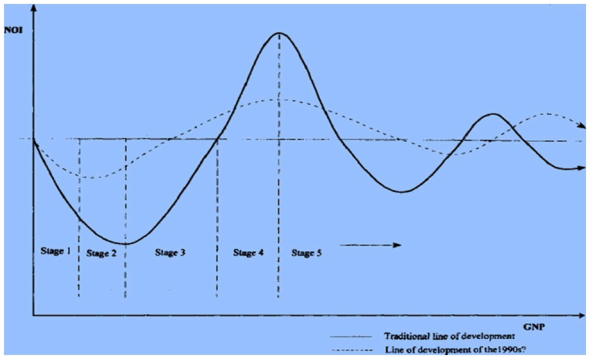

Fig. 1. Investment development path (Dunning and Narula
Note: Not drawn to scale – For illustrative purposes only
Notes: 1. NOI – Not outward foreign direct investment. 2. GNP – Gross National Product.

sectors including agriculture.

Agriculture provides food for humankind and raw materials for agro-based industries. Agriculture is also critical to economic growth: representing 4 % of global gross domestic product and in some least developing countries, this can exceed 25 % of the gross domestic product [17]. In Eastern Europe, agriculture's contribution to gross domestic product averaged 4.8 % from 1993 to 2021. Russia and Ukraine for example account for 12 % and 17 % respectively, of global wheat exports. It is not surprising that the conflict between the two nations caused shocks in global grain supplies [18–20]. It is estimated that the conflict could cause a 60 % drop in wheat trade, about 50 % rise in prices of wheat and austere food diffidence with reduced ability to buy wheat (above 30 %), particularly for countries that depend largely on imports of wheat from Ukraine [19]. The contribution of agriculture to the economies of Eastern Europe and the increase in agricultural output occurred in the presence of a transition from a planned economy to a market economy.

Eastern Europe and the increase in agricultural output occurred in the presence of a transition from a planned economy to a market economy. Eastern Europe experienced huge capital imports in the 1990s and beyond. The inward foreign direct investments recorded US$645 m in 1990, rose to US$27,441 m in 1999 with a further rise to US$96,515 m in 2019. Outward foreign direct investment also recorded US$23 m in 1990 and rose to US$3,382 m in 1999. By 2019, it attained US$40,572 m [21]. Agricultural inward foreign direct investment rose from US$5.17 m in 1993 to US$148 m in 2000. The value of inward foreign direct investment was US$413 m in 2010 but declined to US$18 m in 2021.

Technology transfer and economic growth arising from inward foreign direct investment birthed capital exports from the agricultural sector in Eastern Europe. The first agricultural outward foreign direct investment of US$1.64 m was recorded in 2000. There was a net divestment of US$ 0.51 m in 2010 and a net outward foreign direct investment of US$13.75 m in 2020. Considering the importance of Eastern European agriculture, the interaction of outward and inward foreign direct investment and the size of agricultural output, what is the level of agricultural development within the investment development path framework?

Boudier-Bensebaa [22] found stages I or II of the investment development path for countries in Eastern Europe and stage II was identified for Estonia [1], Poland [23], Poland, Czech, Hungary, and Slovakia [24], Eastern European countries [25], Kazakhstan [26] and transition countries [27]. Albania, Romania, and Georgia were reported to be in late stage III [28]. Stages II and III were also noted for Latvia [29] and Eastern European countries [13]. Early stage III was observed in Poland [30] and Bulgaria [30]. The only instances of stage IV were reported for Czechia and Slovenia based on data in 2011 [25] and developed countries [10]. Czechia and Slovenia are included in our data.

The literature on the investment development path in Eastern Europe has focused on Poland [23], the Baltic states [29], Visegrad [30], selected countries in Eastern Europe [28,24] and countries in Eastern Europe[1] [31,13,22,32]. There are three limitations to the literature. First, is the limitation on the date and the span of the data employed. The most current study on Eastern European countries covered data from 2009 to 2014. Whilst the range of the data is limited, the end date is 2014. The date and the span of the data are important because the stage in the investment development path changes with time. For example [23], found Poland in stage II based on data from 1999 to 2006, but [30] found Poland in stage III using data from 1990 to 2013. Also, Fonseca, Mendonça and Passos [33] and Iacovoiu and Panait [25] found Estonia in stages III and IV in 2005 and 2011, respectively. However [1], found Estonia in stage II based on data from 1992 to 2019. Further, the span of the data influences the number of observations, so it has implications for the efficiency of econometric estimates. Specifically, the narrower the span, the lower the observations and the less efficient the estimates would likely be. Secondly, the data covered 11 countries. This is less than the countries in the region. In third place, is the level of aggregation. All the studies cover the total economy. The building block of an economy is the sectors such as the agricultural sector whose global and regional importance have been alluded to earlier. A United Nations agency, the Food and Agricultural Organisation is dedicated to disseminating data on the sector, including data on inward and outward foreign direct investment, agricultural gross

[1] Eastern Europe was described in the studies as Central and Eastern Europe (CEE). The former designation is used for consistency.

domestic product, and population. In public sector management, policies at lower levels of aggregation tend to be better managed than those at higher levels of aggregation [34–37].

In this study, we applied the theory of investment development path to the agricultural sector of 17 Eastern European countries. We used from 1993 to 2021, with most of the data drawn from the Food and Agriculture Organisation. Eastern European agriculture is in the early phase of stage IV of the investment development path, consistent with the theory of the investment development path. The recent and wider span of data demonstrates that Eastern European agriculture has progressed beyond stages I or II identified by Boudier-Bensebaa [22] and stage III observed by Gorynia et al. [32]and Trąpczyński et al. [31], all for the total economy.

The subsequent sections are structured into three. The model is outlined based on the pertinent literature. This is followed in the same section with the data description, justification of the variables, and estimation strategy in section 2. After summarising the results, the stage of Eastern European agriculture in the investment development path is identified and discussed followed by some comments on the control variables in section 3. Section 4 answers the research questions and provides some recommendations for the agricultural sector.

2. Materials and methods

2.1. Graphical model

The investment development path was first demonstrated using charts [6,14,15]. Thus, the relevant literature used charts solely or partly [1,29,13,28,31,23–26,32]. The literature was followed in obtaining a scatter plot of net foreign direct investment per capita (*NFDIPC*) on the vertical axis and gross domestic product per capita (*GDPPC*) on the horizontal axis. A trend line was then fitted to the plots. This was juxtaposed with Fig. 1 to determine the stage of Eastern European agriculture in the investment development path.

2.2. Econometric model

Informed by the theory [6,14,15], we state equation (1):

$$NFDIPC = f(GDPPC) \tag{1}$$

However, Djokoto [1] has shown that other factors explain *NFDIPC*, hence equation (2):

$$NFDIPC = f(GDPPC, TO, EXRATE, HC, INFLA) \tag{2}$$

Consequently, the estimable equation is specified as equation (3):

$$NFDIPC_{it} = \alpha_0 + \alpha_1 GDPPC_{it} + \alpha_2 GDPPC_{it}^2 + \alpha_3 TO_{it} + \alpha_4 EXRATE_{it} + \alpha_5 HC_{it} + \alpha_6 INFLA_{it} + \alpha_7 DVD_{it} + \varepsilon_{it} \tag{3}$$

where the αk are parameters to be estimated and εit is the idiosyncratic error term. The dependent variable *NFDIPC* is the net foreign direct investment per capita, measured as agricultural 51 outward foreign direct investment (OFDI) minus inward foreign direct investment (IFDI) both in current US dollars and the difference is divided by the population of both sexes. Agricultural value added in current US dollars divided by population (both sexes) is *GDPPC*. The square of *GDPPC* is $GDPPC^2$. These two are the key explanatory variables.

TO is agricultural trade openness, the sum of exports and imports divided by the agricultural value added at current US dollars. Both IFDI and OFDI are related to trade. Whilst *TO* will influence *IFDI* and *OFDI* and consequently *NFDIPC*, the direction is uncertain. As foreign investments involve capital flow, the rate at which currency is changed (*EXRATE*) must affect *NFDIPC*. However, the direction could be positive or negative. *EXRATE* is measured as the number of units of the official currency exchanged for one US dollar. Human capital (*HC*) is relevant for the utilisation of capital. It is measured as gross secondary school enrolment as a percentage of total enrolment. Djokoto [1] found a positive effect of *HC* on *NFDIPC* for Small states. This could be confirmed or otherwise. Thus, the direction of the effect of *HC* on *NFDIPC* could be positive or negative. Changes in the general price level, and inflation, could change the level of the purchasing power of consumers. This will not only influence consumption but also, the cost of doing business in the host economy. Inflation (*INFLA*) is the rate of change of the consumer price index (CPI). Eastern Europe is made up of both developed 11 and transition economies. This was controlled using *DVD*. *DVD* = 1 (developed country), and 0 otherwise (transitioning country).

NFDIPC, *GDPPC*, $GDPPC^2$ and *TO* are based on the agricultural sector, whilst *EXRATE*, *HC* and *INFLA* are for the total economy. These are employed as they are incidental to the agricultural sector as well.

2.3. Data and estimation strategy

The ingredients for computing *NFDIPC*, *GDPPC*, $GDPPC^2$ and *TO* were obtained from FAOSTAT [38]. Data on *EXRATE*, *HC* and *INFLA* were extracted from the World Bank [39]. The data ranged from 1993 to 2021 covering 17 countries for which data was available, in Eastern Europe is defined according to the United Nations [40]. This definition covers Central and Eastern Europe described [31,13,22,32]. These are constituted as developed countries (10) and transition countries (7), based on the United Nations [41] in the Appendix. The panel is unbalanced. The gaps were filled by linear interpolation. Regression analysis was employed in line with the pertinent literature [1,10,11,28,22,27,32]. Since the time dimension exceeded 30 the cross-section, the generalised least squares estimator was applied following Baltagi and Wu [42] and Bhargava, Franzini and Narendranathan [43].

3. Results and discussions

3.1. Results

The *NFDIPC* ranged from −46.7364 (Croatia in 2011) to 26.8382 (Albania in 2008) (see Table 1). The latter has a high level of NOFDIPC, a higher outward FDI than inward FDI, whilst the former has a low level of NOFDIPC, a lower outward FDI than inward FDI. The former means that the country exported capital more than it imported whilst the latter suggests that the countries imported capital more than they exported. The mean of −3.1607 coincides with the *NFDIPC* of Croatia in 2005. As the standard deviation is larger than the average, the variance will be even larger than the mean. This suggests much dispersion of the *NFDIPC*. This is observable in Fig. 2. Unlike *NFDIPC*, the standard deviations of *GDPPC* and $GDPPC^2$ are lower than the corresponding means however, the variances are larger than the means. Thus, there is also a significant spread of *GDPPC* (Fig. 2). Russia in 1999 (84.8702) and Albania in 2020 (1027.2110) represent the extreme values of *GDPPC*.

Notwithstanding the shape of the curve in Fig. 2, a test was performed to identify the appropriate models for it. In Table 2, both the Akaike information criterion (AIC) and Bayesian information criterion (BIC) are lower for the quadratic form than the others. Thus, the quadratic form, that is the model with both the linear and quadratic term, is more appropriate. Macroeconomic variables are often endogenous. The endogeneity of *GDPPC* and $GDPPC^2$ were examined by performing an F test of the coefficients of the errors from the reduced form regressions, models 1 and 2 (Table 3). The F statistics in the bottom pane of the table are low, 0.10. These are statistically indistinguishable from zero, hence, *GDPPC* and $GDPPC^2$ are not endogenous.

The results in Table 4 show that the estimates of *GDPPC* are either −0.02 or −0.03. In the case of $GDPPC^2$, the estimates range from 2.00e-05 to 2.50e-05. Further, the estimates are statistically indistinguishable from zero across models 4–10. These suggest the estimates of *GDPPC* and $GDPPC^2$ are robust to the insertion of the non-key variables. The coefficients of *TO* are statistically insignificant in models 5 and 10. These are also similar in magnitude and signs. The coefficients of *EXRATE* are different in magnitude, however, they are statistically insignificant owing to similar standard errors. The coefficients of *HC* are positive, statistically significant at a 5 % level of probability, and similar in magnitude. Regarding *INFLA*, whilst the standard errors are similar in magnitude, the coefficient in model 10 is six times the value of model 8. Nevertheless, both coefficients are statistically indistinguishable from zero.

In the case of *DVD*, whilst model 9's coefficient is positive, that in model 10 has a negative sign. However, the standard errors are relatively large hence, coefficients are statistically insignificantly different from zero. Relying on the statistical significance, the coefficients of the non-key variables are in harmony with those in model 10. Thus, by visual inspection, the estimates in Table 5 are robust.

Although the endogeneity of the key explanatory variables was explored in Tables 4 and it is important to confirm this. This was accomplished by computing the difference between the coefficients of *GDPPC* and $GDPPC^2$ of model 4 and the other models and calculating the square root of the sum of the corresponding standard errors. The ratio of the difference and the computed standard error becomes the *t*-test (Table 5). The intuition behind the test is that if the same estimator is applied, the differences between the coefficients of model 4 and the others should not be statistically distinguishable from zero. It is apparent from Table 5 that the standard errors (in parenthesis) are higher than the difference (values above, not in parenthesis). Therefore, the *t* statistics are less than 1, way below the 10 % value of 1.645. The indifference of the estimates of *GDPPC* and $GDPPC^2$ in model 4 and models 5–10 (Table 5) confirm the absence of endogeneity of *GDPPC* and $GDPPC^2$.

On the other hand, this also implies that the control variables are not endogenous. This point is noteworthy as the test in Table 4 focused on only the key explanatory variables. The results of Table 5 also represent a formal test of the robustness of *GDPPC* and $GDPPC^2$. The statistically insignificant *t* statistics suggest the robustness of the estimates of both the key and the control explanatory variables. From the foregoing, not only are the key and control variables not endogenous, but their estimates are also robust.

3.2. Discussion of the investment development path

An increase in gross domestic product per capita (*GDPPC*) of US$ 1/person would decrease net foreign direct investment per capita (*NFDIPC*) by 2 cents (Table 4). The statistically significant negative coefficient of the *GDPPC* variable suggests the curve modelled initially slopes downwards. On the other hand, an increase in $GDPPC^2$ of US$1/person would increase *NFDIPC* by an infinitesimal US$ 2.19e-05. The small value is due to the large square of *GDPPC* ($GDPPC^2$), with a mean of 191,302 (Table 2). The sum of the square of $GDPPC^2$ is an ingredient in the denominator in the estimation of the coefficient. Thus, as the denominator increases, the quotient

Table 1
Summary statistics.

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
NOFDIPC	329	−3.1607	6.3074	−46.7364	26.8382
GDPPC	329	405.0233	165.3518	84.8702	1027.2110
$GDPPC^2$	329	191,302	159,015	7202.9450	1,055,162
AGTO	329	839.8479	799.8203	0	3827.4870
EXRATE	329	57.4228	107.2039	0.0672	573.3533
HC	329	73.9634	29.1487	18.5191	121.6647
INFLA	329	10.0404	82.9660	−1.5448	1500
DVD	329	0.4529	0.4985	0	1

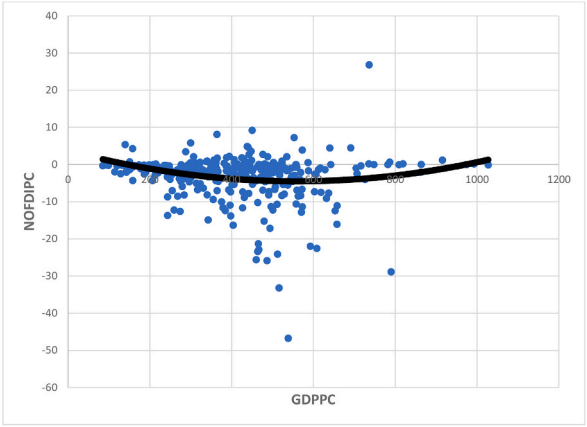

Fig. 2. IDP for Eastern Europe. Notes: 1. NOFDIPC – Net outward foreign direct investment. 2. GDPPC – Gross domestic product per capital.

Table 2
Model selection.

Information criterion	Linear (*GDPPC* only)	Quadratic (*GDPPC* and $GDPPC^2$)
AIC	2134.6060	2129.1080
BIC	2161.1780	2159.4760

Table 3
Endogeneity test for *GDPPC* and $GDPPC^2$.

	(1)	(2)	(3)
VARIABLES	*GDPPC*	$GDPPC^2$	*NOFDIPC*
GDPPC			−0.0811 (0.1919)
GDPPC_ue_2			0.0593 (0.1922)
GDPPC2			−0.0001 (0.0003)
GDPPC2_ue_2			0.0001 (0.0003)
AGTO	0.1308*** (0.0123)	114.8756*** (11.9765)	0.0196 (0.0641)
EXRATE	−0.2298 (0.1828)	−241.2440 (184.8468)	−0.0388 (0.1259)
HC	2.0887*** (0.5949)	1980.2878*** (591.3881)	0.3773 (1.0733)
INFLA	−0.0264 (0.0609)	3.2393 (58.9082)	
DVD	22.3901 (17.6359)	−13,128.9713 (17,086.6316)	
CONSTANT	151.5094*** (48.6854)	−24,150.3310 (49,916.2608)	6.8334 (20.9802)
Model diagnostics			
Observations	329	329	329
Countries	17	17	17
F tests			
GDPPC_ue_2			0.10
$GDPPC^2$*_ue_2*			0.10

Notes: 1. Standard errors in parenthesis. 2. ***p < 0.01.3. *INFLA* and *DVD* dropped in model 3 because of multicollinearity.

reduces. This explains the small value. However, the statistically significant positive sign implies that the negative slope turns into a positive slope. This confirms the quadratic nature of the curve as selected in Table 3 and shown in Fig. 2. In Fig. 2, the curve first falls, attains a minimum and rises afterwards. Consequently, Fig. 2 opens upwards. Juxtaposed with Figs. 1 and 2 crosses stages I and II (downward slope) and stages III and IV (upward slope). As the rise of the curve above the line *NFDIPC* = 0 is brief, this can be described more specifically as a very early phase of stage IV. In this stage, outward foreign direct investment (OFDI) exceeds inward foreign direct investment (IFDI). The *GDPPC* also exceeds US$ 1000/person, an indication of high economic development. Had this been the gross national income per capita for the total economy, the group would have been within the lower middle-income bracket [44]. Further, an increase in OFDI relative to IFDI coupled with increased growth of the agricultural economy would see progression within stage IV. As transition countries are theorised for stage III whilst developed economies are expected in stages IV and V, by typology, the agricultural sector of Eastern Europe should be located anywhere within stages III, IV and V. The early phase of stage IV is consistent with the theory of the investment development path. It must be noted from Fig. 2 that the assessed stage IV is the highest stage for the collective of Eastern European countries. Over time, Eastern European countries have moved from stages I, through III and IV and are now in the early part of stage IV. This finding is consistent with the total economy results for Czechia and Slovenia, both of which are in the data of this study [25] as well as developed countries' results [10,11]. The findings depart from other findings covering Eastern

Table 4
Random effects generalised least squares estimations of IDP for Eastern Europe.

	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	*NOFDIPC*	*NOFDIPC*	*NOFDIPC*	*NOFDIPC*	*NOFDIPC*	*NOFDIPC*	*NOFDIPC*
GDPPC	−0.0265***	−0.0232**	−0.0266***	−0.0313***	−0.0265***	−0.0273***	−0.0271***
	(0.0091)	(0.0098)	(0.0091)	(0.0090)	(0.0092)	(0.0098)	(0.0099)
$GDPPC^2$	2.11e-05**	1.91e-05*	2.08e-05**	2.49e-05***	2.11e-05**	2.18e-05**	2.19e-05**
	(9.64e-06)	(9.92e-06)	(9.66e-06)	(9.36e-06)	(9.67e-06)	(1.02e-06)	(9.93e-06)
AGTO		−0.0007					−0.0007
		(0.0007)					(0.0007)
EXRATE			0.0033 (0.0049)				0.0007 (0.0045)
HC				0.0401**			0.0413**
				(0.0167)			(0.0179)
INFLA					0.0001 (0.0040)		0.0006 (0.0040)
DVD						0.2005 (0.9922)	−0.1074
							(1.1627)
CONSTANT	3.5570*	3.1474	3.4490*	1.8266 (2.1554)	3.5515*	3.6377*	1.2133 (2.2776)
	(2.0626)	(2.0988)	(2.0717)		(2.0803)	(2.1042)	
	Model diagnostics						
Observations	329	329	329	329	329	329	329
Wald	12.86***	13.95***	13.28***	19.20***	12.82***	12.86***	21.63***
Countries	17	17	17	17	17	17	17
Av. Period	19.4	19.4	19.4	19.4	19.4	19.4	19.4

Notes: 1. Standard errors in parenthesis. 2. *p < 0.10, **p < 0.05, ***p < 0.01.3. Av. – Average. 4. Av. Period is in years.

Table 5
Test of endogeneity of control variables and further robustness tests of *GDPPC* and $GDPPC^2$.

Differences	(4)–(5)	(4)–(6)	(4)–(7)	(4)–(8)	(4)–(9)	(4)–(10)
GDPPC	−0.0033 (0.0134)	0.0001 (0.0129)	0.0048 (0.0128)	0.0000 (0.0129)	0.0008 (0.0134)	0.0006 (0.0134)
$GDPPC^2$	2.00e-06 (1.38e-05)	3.00e-07 (1.36e-05)	−3.80e-06 (1.34e-05)	0.00e+00 (1.37e-05)	−7.00e-07 (9.69e-06)	−8.00e-07 (1.38e-05)
Tests of ….	*AGTO*	*EXRATE*	*HC*	*INFLA*	*DVD*	All controls jointly

Notes: 1. Test computed as the difference between the estimates of *GDPPC* and $GDPPC^2$ of model 4 and models 5–10.2. Differences of coefficients not in parenthesis. 3. Standard errors in parenthesis. 4. Standard errors are computed as the square root of the sum of the squares of the pairs of standard errors.

European countries [13,28,31,23,24,30,32].

3.3. Discussion of control variables

Although the key explanatory variables are *GDPPC* and $GDPPC^2$, we present a brief discussion of the control variables. An increase in human capital by 1 % raises *NFDIPC* by 4 cents. Human capital contributes labour and management personnel to firms. Thus, a significant positive effect is expected. This finding is consistent with [1]. This finding is, however, inconsistent with the finding of [45]. Trade openness, exchange rate, and inflation have no discernible effect on net foreign direct investment. These findings are contrary to that 26 of [1]. [45] found a significant positive relationship between NOFDIPC and trade openness for developing countries' agriculture. The agricultural sectors of developed and transitioning countries in Eastern Europe are similar. This is evidenced by the statistically insignificant coefficient of developed countries (*DVD*. Although the developed and transition countries could be distinguished regarding inward and outward FDI, the net effect (net of foreign direct investment) eliminates the possible differences.

4. Conclusions and recommendations

The outdated results on Eastern Europe the theory of the investment development path and the lack of focus on the agricultural sector necessitated this study. Agricultural sector data from 17.

Eastern European countries from 1993 to 2021 were used. Eastern European agriculture is in the early phase of stage IV of the investment development path, consistent with the theory of the investment development path. Human capital enhanced net foreign direct investment. Agricultural trade openness, exchange rate, and inflation did not influence agricultural net foreign direct investment. Developed and transition countries in Eastern Europe were not distinguished regarding net foreign direct investment. Eastern European countries must increase agricultural growth relative to population growth. This would increase agricultural development. The increased income can be saved and channelled into domestic investment to spur additional growth. This would make capital available for export. The growth in human capital must be sustained to enhance technical know-how in agriculture that would accompany agricultural capital export. Managers of the agricultural sectors of Eastern European countries must focus on enhancing their supervisory and regulatory functions. The goal should be to reduce the costs of doing business in agriculture through effective facilitation towards efficient agricultural markets. Eastern Europe was studied as a bloc. Further study can segregate these into

developed and transition as well as European Union and non-European Union member states.

Data availability statement

The data used in this study were obtained from public sources.

CRediT authorship contribution statement

Akua Agyeiwaa-Afrane: Writing – review & editing, Writing – original draft, Methodology. **Kofi Aaron A-O Agyei-Henaku:** Writing – review & editing, Writing – original draft, Methodology. **Charlotte Badu-Prah:** Writing – review & editing, Writing – original draft, Methodology. **Francis Yaw Srofenyoh:** Writing – review & editing, Writing – original draft, Methodology. **Ferguson Korbla Gidiglo:** Writing – review & editing, Writing – original draft, Methodology. **Justice Gameli Djokoto:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix. List of Eastern European countries in the data

Albania	Estonia	North Macedonia	Slovenia
Armenia	Georgia	Poland	Ukraine
Bulgaria	Hungary	Romania	
Croatia	Latvia	Russian Federation	
Czechia	Lithuania	Serbia	

Note: The categorisation is informed by United Nations [46].

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