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Agricultural development in the presence of foreign divestment: Policy options

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ABSTRACT

Following the implications of the loss of employment, revenue, foreign exchange, and the negative impact on overall agricultural development resulting from foreign divestment, estimates of the extent of foreign divestment on agricultural development and policy options for ameliorating this effect were obtained. A cross-sectional data of 159 observations was fitted to a derived model and estimated by OLS. One US$ increase in foreign divestment reduces agricultural development by US$ 0.04. Policy mixes involving the combination of domestic investment, aid, and trade in response to foreign divestment in agriculture have been proposed. The best policy mix is the combination of domestic investment, aid, and trade to respond to foreign divestment in agriculture. Aid to agriculture independently was ineffective in promoting agricultural development, however, other variables produced a synergistic effect. Despite efforts to attract foreign direct investment in agriculture, foreign divestment does occur with the associated disbenefits to the sector which is detrimental to agricultural development. It is important to identify the policy options to address this in the study.

1. Introduction

Foreign divestment as a long-term decision of foreign affiliates of multinational enterprises in a host country, leads to changes in the business portfolio, culminating in a reduction in the level of assets [1–4]. The divestment could take any of these three forms: downsizing, relocation of operations or termination [1–5]. Downsizing is the fractional sale or discarding of material and organisational endowments and the diminution of the workers of the enterprise [4,6]. Relocation comprises the total closedown of operations and transferring business facilities and the enterprises' functions to a different nation [2,4,7]. The total selling or disposal of material and organisational resources, the shutdown of plants of the enterprises' functions in a nation without moving to a different nation is termination [4,8]. The affiliate's resources are usually transferred to the international head office after the termination [4]. These firm-level foreign capital returns show at the macro level as a negative of the net inward foreign direct investment. Within the context of this study, foreign divestment out of agriculture is the negative inward foreign direct investment recorded by countries [8,64]. This must not be confused with outward foreign direct investment which is the outcome of a strategic decision of parent companies to establish affiliates outside their home countries.

Agricultural development creates an enabling environment for the fulfilment of an economy's agricultural potential [85,86]. The accumulation of knowledge, access to technology and the appropriate allocation of inputs and output are necessary enablers [15,85,86]. Investments including inward foreign direct investment are relevant in providing the resources for agricultural development.

Within the agricultural sector, the incidence of foreign divestment would result in loss of resources to the host economy, irrespective of the form of the divestment. Specifically, this would result in a diminution in the stock of foreign direct investment and domestic investment in agriculture. The implications are loss of employment, tax revenue, foreign exchange and depriving the agricultural economy of the host economy of technology transfer creating a decline in overall agricultural development [9–14]. Considering these, what is the extent of the effect of foreign divestment on agricultural development? What policies and policy mixes exist and would most appropriately respond to the effect of foreign divestment on agricultural development?

Developing agriculture is one of the most effective avenues to ameliorate extreme poverty, enhance shared prosperity and nourish the expected 9.7 billion persons by 2050 [10,14,15]. This is because

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agriculture provides food and nutrition and is a source of raw materials for industry. Accounting for 4% of global gross domestic product, the segment interposes more than 25% of the gross domestic product in some developing countries [15]. Moreover, an increase in the agricultural segment of the economy is up to four times more effectual in boosting wealth amongst the most destitute relative to other economic segments and in 2016, 65% of destitute employed working-age persons earned livelihood out of the sector [15]. Thus, not only is studying agricultural development important but also, policies that would promote agricultural development are relevant.

The effect of aid on agricultural development has been examined [16–20] whilst [21,22] investigated the effects of domestic and public investment, and trade on agricultural development [23,24]. considered the effects of trade and aid on agricultural development [25,26]. studied the effect of trade on agricultural development. Whilst none of these studies addressed the effect of domestic investment, trade, and aid on agricultural development, none of them explored the role of foreign divestment on agricultural development. To fill these voids, this paper investigates the independent effects of foreign divestment, domestic investment, aid, and trade. The objectives are first to assess the extent of the effect of foreign divestment on agricultural development, secondly to identify other factors that affect agricultural development and thirdly, to select the most appropriate policy mix that enhances agricultural development. To the best of our knowledge, this paper is the first to investigate the effect of foreign divestment on agricultural development. The outcome would provide information on policy options for enhancing agricultural development.

For the rest of the paper, the review of literature precedes the data and methods. The results and discussions are next. The final section is the concluding remarks.

2. Literature review

2.1. Theoretical review

This subsection focuses on agricultural development and foreign divestment theories. Some early theories of agricultural development relate to the two-sector model that focuses on structural transformation [27–29]. These stressed the need to modernise agriculture and create a pathway to industrialisation [30–32]. Higher productivity of small farms was considered a necessary ingredient for the rapid reduction of poverty and useful structural transformation [33]. [34] is well known for his thesis of an 'agrarian revolution'. That is, attaining higher productivity in agriculture through technical change. Schultz had stated that farmers in traditional agriculture are rational and that based on technical, economic, and institutional limitations, they apportion inputs efficiently. Farmers' successful adoption of new technology leads to a continued increase in output per unit input. Educating the rural worker, as part of human capital development and promoting productivity growth was essential. Attaining agricultural development requires investment and the appropriate policy environment [33,35–37].

The existing theories on foreign direct investment offer the starting point for the theories on foreign divestment [38]. put forward the internationalisation theory on investment stating that firms do choose foreign direct investment over a license as a way of accessing a non-home market because of certain capabilities that cannot be licenced. Once in the home country, other factors could create the need for divestment. Within the oligopolistic theory [39], proposed that enterprises follow market leaders in their internationalisation strategies. Similarly, followers will respond likewise if the leader engages in foreign divestment. Enterprises undertake foreign direct investment at phases of the life sequence of the products initiated [40]. These enterprises are set up in foreign markets when local demand in those countries grows large enough to support local production [10]. Where there is product maturity within the foreign market, foreign divestment may be undertaken. Within the industrial organisation perspective, foreign divestment is explained as a lowering of the barriers to exit [41–43].

[3,41–45] note that foreign divestment is a managerial decision that could be influenced by poor performance. The specific enterprise-level factors of foreign divestment are the focus of the theory [41]. formerly proposed a theory on foreign divestment based on Dunning's eclectic theory [46–49]. [8,41,50] note that a foreign enterprise divests its operations if the enterprise.

1. No more has net reasonable merits over the enterprise of other countries.
2. Ceases to find it beneficial to use them itself rather than sell or rent them to foreign enterprises - that is, the enterprise no longer considers it profitable to 'internalise' these advantages.
3. Finds it no more profitable to utilise its internalised net competitive advantage outside its home country – that is, it is now more advantageous to serve foreign markets by home production, or to foreign and/or abandon foreign markets altogether.

2.2. Empirical review

Some studies have investigated the role of domestic investment, trade, and aid on agricultural development [17–20,22–26,51]. Whilst the single-country studies on Nigeria [20,22] and China [25] used time-series data, multi-country studies used panel data. These include [21] on West Africa and [26]; on Southern Africa Development Community (SADC). Sub-Saharan Africa, Africa, developing countries and a mix of developing and developed countries was the respective foci of [17–19,23,51].

[21,22] found a positive but statistically insignificant effect of domestic investment and public investment in agriculture on agricultural output respectively, in the long run [22]. however, found a significant effect of public investment in the short run. No reasons were assigned for the findings. Whilst the data of the former spanned 1990 to 2015, the latter covered 1960–2014.

Trade openness positively influenced agricultural gross domestic product [21,24,25]. [23,26] split trade into exports and imports. Whilst the former found a positive and neutral effect for imports and exports respectively, the latter found a positive effect for both [51]. used only exports as a proxy for trade and found a positive effect on agricultural output. Only [22] found a negative effect of trade on agricultural output but did not assign reasons for the negative effect [26]. noted a disparity in the positive effects of exports to SADC and the Southern African Customs Union (SACU). Acknowledging different export possibilities to different destinations affect exporters' decisions [26], explained that farmers and exporters may take advantage of export possibilities close by due to cost considerations. Also, the elimination of trade barriers could facilitate trade. Further, reasons may be found in enterprise-level decision-making by farmers [21]. explained that West African countries are exporters of primary commodities (cotton, cocoa, coffee, cashew, rubber) for which revenues are important whilst they are net importers of most transformed agricultural goods.

The effectiveness of aid has been a debatable issue [52–55]. Whilst some support aid to developing countries, others argued that it was not effective in promoting development. The evidence on agricultural development seemed to fit the debate. Aid to agriculture has been found to significantly influence agricultural output [17,19,20,23,51]. [18,24] however, found a neutral effect of aid on agricultural output [23]. attributed the positive but low elasticity of aid to the instability of aid and poor policies adopted by some African countries.

From the review [25,26], examined the effect of trade on agricultural development whilst [16–20] studied the effect of aid on agricultural development [21,22]. examined the effects of domestic and public investment, and trade on agricultural development [23,24]. considered the effects of trade and aid on agricultural development. Whilst none of the studies investigated the effect of domestic investment, trade, and aid, further, none of them addressed the role of foreign divestment. This

paper investigates the independent effects of foreign divestment, domestic investment, aid, and trade as well as their combinatory effects on agricultural development to identify the best policy option.

3. Data and methods

3.1. Data

It must be noted that owing to the unavailability of data for some countries over time, the data could not pass for a panel but a cross-section. The time dimension for some countries was accounted for by including the variable, *YEAR*. Therefore, a cross-sectional data of 159 observations were used in the analysis. First, agricultural foreign domestic divestment was defined. Second, all data that satisfied the definition was collected. Third, these were then assembled into countries and the corresponding years. Countries included in the data was thus based on the available data at the source and the corresponding availability of data on the other variables. All data was sourced from FAOSTAT. The measurement of the variables of the data is outlined in Table 1. Data on recurrent expenditure on agriculture from FAOSTAT was limited., hence, agricultural recurrent expenditure was not used in the models. Development funds (AID) flow from developed countries to developing countries. Thus, there is no data on AID receipts for developed countries in the cross-section [56].

3.2. Model and modelling

According to [57] and for the total economy,

$$Y = f(LK) \tag{1}$$

where Y is output, L is labour, and K is capital. From national income accounting [58–60],

$$Y = f(C, I, G, X, M) \tag{2}$$

where consumption expenditure is C, I represents investment expenditure, G represents government expenditure, X and M are respectively exports and imports.

Combing equations (1) and (2),

$$Y = f(L,\ K,\ C, I, G, X, M) \tag{3}$$

K and I can both be considered as an investment of which three forms of investments are identifiable: domestic investment (DI), foreign direct investment (FDI) and development flows (AID) [56]. Thus,

$$Y = f(L,\ C, DI, FDI, AID, G, X, M) \tag{4}$$

Developing a parallel for the agricultural sector from equation (4), Y will be agricultural output (AGGDP), L will be agricultural labour (AGLA), *DI* will be a domestic investment in agriculture (AGDI), *FDI* will be agricultural FDI (AGFDI), and AID will be development flows into the agricultural sector (AGAID). X and M will be agricultural exports and imports, considered here as agricultural trade (AGTO). The G representing government expenditure on the agricultural sector (AGG) was dropped due to reasons stated in the data section. The parallel of C for the agricultural sector is not clear. Congruent to the objectives of the study, FDI can be substituted with agricultural foreign divestment (AGFD), the negative of FDI [3,41,61–63]. From the foregoing, equation (4) can be restated as

$$AGGDP = f(AGLA,\ AGDI, AGFD, AGAID, AGTO) \tag{5}$$

Equation (5) can be specified as

$$AGGDP_i = \alpha_0 + \alpha_1 AGLA_i + \alpha_2 AGDI_i + \alpha_3 AGFD_i + \alpha_4 AGAID_i + \alpha_5 AGTO_i + \omega_i \tag{6}$$

The data consisted of different countries; developing, transition and developed. These must be accounted for. Also, in the literature, agricultural output per capita has been used as a proxy for agricultural development [17–20,22–26,51]. Incorporating this into equation (6) and a natural logarithm transformation equation, 7 is specified:

$$LNAGGDPPC_i = \beta_0 + \beta_1 LNAGLA_i + \beta_2 LNAGDI_i + \beta_3 LNAGFD_i + \beta_4 LNAGAID_i + \beta_5 LNAGTO_i + \beta_6 DVP_i + \beta_7 TRS_i + \beta_8 YEAR_i + \omega_i \tag{7}$$

DVP and TRS represent developing and transition countries, respectively. *YEAR* was included in equation (7) to account for the time dimension of the data. Many countries changed status in the level of income, with switches between lower and higher-level statuses within the study period. In the case of level of development, however, only former eastern bloc countries migrated from transition economies to the developed economies category. Thus, the development classification is less unstable during the study period than the level of income categorisation. The level of development was thus preferred to using the level of income categorisation. It must be noted that the numbers of countries in each development group are not based on statistical representativeness, rather, it is based on the identification of these countries as belonging to each group.

From equation (7), the β_k would be interpreted as elasticities. The monetary change on *AGGDP* due to a unit change in the explanatory variable is the product of the coefficient and the exponent of the dependent variable's mean, β_k*exp(dependent variable's mean). AGGDP is defined as agricultural development [21–23,25].

AGFD is captured in FAOSTAT as a negative of foreign direct investment [8,64]. For equation (7) to be amenable to the natural logarithm transformation, the AGFD series was multiplied by −1. This will be restored by dividing the estimate(s) by −1 later.

3.3. Estimation procedure

As explained earlier, due to data limitations, the data used in the study is recognised as cross-sectional data. As this is not strictly the case and there as few time dimensions, the year of data was accounted for. Hence, the ordinary least squares (OLS) estimator was applied. Agricultural output has been measured variously; in current US dollars, in 2010 constant pieces and 2015 constant prices. These versions were explored, and a choice was made amongst them using statistical tools. Two violations of the OLS were tested: multicollinearity (VIF) and heteroscedasticity [65,66]. Following the omission of AGG, it was necessary to test for omitted variables bias, hence Ramsey's test [67], a third test of the assumptions of the OLS. Since the dependent variable was measured in three variants, each of these was estimated, and one model was selected based on the AIC [68] and BIC [69].

As the objective of the paper was to assess policy options for promoting agricultural development in the presence of foreign divestment, the use of combinations of coefficients comes in handy [70–73]. have applied this method in both linear and logistic cases. This process involves constructing a combination of coefficients with their estimated standard errors and testing the result under a chi-square test. Thus, beyond the individual effects of the key variables estimated, the combined effects from the explanatory variables other than LNAGFD are

Table 1
Variables, definition, and measurement.

Variable	Label	Measurement
LNAGGDPC	Agricultural development	Natural logarithm of value-added of agriculture, forestry, and fishery in current US dollar
LNAGGDP2010	Agricultural development	Natural logarithm of value-added of agriculture, forestry, and fishery in 2010 constant US dollar
LNAGGDP2015	Agricultural development	Natural logarithm of value-added of agriculture, forestry, and fishery in 2015 constant US dollars
LNAGLA	Agricultural labour	Natural logarithm of agricultural labour
LNAGDI	Agricultural domestic investment	Natural logarithm of gross fixed capital formation for agriculture, forestry, and fishery
LNAGFD	Agricultural foreign divestment	Natural logarithm of foreign divestment from agriculture
LNAGAID	Aid to agriculture	Natural logarithm of receipts of development flows (total disbursements) for agriculture forestry and fishery
LNAGTO	Agricultural trade	Natural logarithm of the sum of imports and exports
DVP	Developing country	Developing country = 1, 0 otherwise
TRS	Transition country	Transition countries = 1, 0 otherwise
DVD	Developed country	Developed countries = 0, the reference[a]
YEAR	Year	Year for which data is available

[a] This excludes receipts for developed countries.

computed based on Table 2 and subjected to a chi-square test.

4. Results and discussion

4.1. Background of data and results

The mean of the dependent variables is similar (Table 3). However, that of the key explanatory variables, *LNAGDI*, *LNAGFD*, *LNAGAID* and *LNAGTO* are varied. *LNAGAID* show the least value of 4.0446. Developed countries contributed more than 60% of the observations to the data from 27 countries (Appendix). Transition countries on the other hand contribute the least of 4 countries (Appendix) and 4% to the number of observations (Table 3).

Models 1, 2 and 3 were estimated with *LAGGDP2015*, *LAGGDP2010* and *LAGDPC* as dependent variables, respectively (Table 4). The similarity of the coefficients in sign and magnitude portends consistency and somewhat robustness to the dependent variable used. The adjusted R squared is just above 90% suggesting a substantial portion of the variability in the dependent variables are explained by the estimated models. The F statistics are all statistically significant implying the variability in each of the dependent variables is explained jointly by the explanatory variables. The Breusch-Pagan/Cook-Weisberg test statistics are statistically significant suggesting heteroscedastic errors in the models. The VIFs are below 10 [74–77]. Model 1–3 are misspecified

Table 2
Independent and joint effects of explanatory variables on agricultural development.

	Wald
Domestic investment	β_2
Foreign divestment	$-\beta_3$
Aid	β_4
Trade	β_5
Foreign divestment and domestic investment	$-\beta_3 + \beta_2$
Foreign divestment and aid	$-\beta_3 + \beta_4$
Foreign divestment and trade	$-\beta_3 + \beta_5$
Foreign divestment, domestic investment, and aid	$-\beta_3 + \beta_2 + \beta_4$
Foreign divestment, trade, and aid	$-\beta_3 + \beta_5 + \beta_4$
Foreign divestment, domestic investment, and trade	$-\beta_3 + \beta_2 + \beta_5$
Foreign divestment, domestic investment, aid, and trade	$-\beta_3 + \beta_2 + \beta_4 + \beta_5$

Note: The negative sign is introduced for the effect of foreign divestment.

Table 3
Descriptive statistics.

VARIABLE	Observations	Mean	Standard deviation	Minimum	Maximum
LNGDPC	159	22.5607	1.7134	18.6120	25.9212
LNGDP2010	159	22.7230	1.6511	18.5424	25.8978
LNGDP2015	159	22.6566	1.6536	18.4817	25.9668
LNAGL	159	12.8497	1.6842	7.73749	17.5608
LNAGDI	159	20.9411	2.1544	14.7257	24.6979
LNAGFD	159	15.8968	2.0975	11.5129	20.6954
LNAGAID	159	4.0446	7.0491	0	19.4135
LNAGTO	159	23.6177	2.1184	17.6006	26.9824
DVP	159	0.2704	0.4456	0	1
TRS	159	0.0440	0.2058	0	1
DVD	159	0.6855	0.4658	0	1
YEAR	159	2005.698	5.6778	1995	2017

based on the Ramsey test. This can be partly attributed to the omission of *AGG*. Before correcting for the properties with unacceptable indicators, one model was selected from among the three using AIC [68] and BIC [69]. Model 3 is selected because it has the lowest AIC and BIC.

Model 3 was then corrected for misspecification by adding another explanatory variable, the square of the prediction of the dependent variable and the model estimated with robust standard errors. These were to correct for misspecification and heteroscedasticity. Although the resulting model 4 is homoscedastic, the VIF increased to 777.39, far above the liberal threshold of 20 [76,78,79]. Multicollinearity biases estimates, increase standard errors that could invalidate hypothesis tests and switch signs of coefficients in extreme cases [74–78]. The statistically significant Ramsey test statistic of 17.63 for model 3 was evidence of misspecification. In line with econometric practice, an additional explanatory variable, *PLNGDPC* was created as the square of the prediction of the dependent variable in model 3. *PLNGDPC* happened to be the variable with the highest VIF in model 4. A common solution to multicollinearity is to remove the variable responsible for the multicollinearity [79–81]. In this case, the variable responsible is the correction factor for misspecification. Removing it would lead to failure to correct for the misspecification. A second option is to interact the multicollinearity-causing variable with another variable in the model [79–81]. *PLNGDPC* was interacted with *LNAGLA* to yield *PAGL* and used in place of *LNAGLA* and *PLNGDPC*. The outcome of the subsequent estimation is model 5. The VIF has now been reduced to 11.14, under the generous cut-off of 20 [76,78,79]. Interestingly, the AIC and BIC of model 5 are lower than those of models 1–3, confirming model 5 is an appropriate correction for misspecification of model 3. It is worth noting that no serial correlation test was implemented because the data used was cross-sectional and neither time series data nor panel data.

The magnitude and sign of the coefficients of model 5 are like those of models 1–3, especially closer to those of model 3. As these models did not violate the multicollinearity assumption, the change in sign of the coefficients of model 4 and the difference in the magnitude of the coefficients of model 5 compared to those of models 1–3 and 5. These confirm that multicollinearity indeed, biases estimates and lead to switches of sign in severe cases [70,74].

The constant of model 5 is statistically insignificant, only like that of model 3. The statistical insignificance suggests that adding more explanatory variables to model 5 will not yield statistically significant coefficients. The statistical significance of PAGL also implies that the misspecification in model 3 has indeed been corrected for in model 5. Although PAGL accounts for the omission of *AGG*, it must be acknowledged that this statistical solution is the second-best solution. The 'first-best' is the inclusion of *AGG*, if available. Four additional variables are statistically significant. This is shared by the key variables in models 1–3. The coefficient of *LNAGAID* is the only statistically insignificant key variable estimated. Thus, the significance of the combined or joint coefficient of any coefficient and *AID* would depend largely on the magnitude and standard error of the counterpart coefficient(s).

Table 4
Results of estimation.

	1	2	3	4	5
VARIABLES	*LNAGGDP2015*	*LNAGGDP2010*	*LNAGGDPC*	*LNAGGDPC*	*LNAGGDPC*
LNAGL	0.2686*** (0.0382)	0.2459*** (0.0376)	0.2441*** (0.0369)	−0.6965*** (0.2180)	
LNAGDI	0.5435*** (0.0535)	0.5224*** (0.0527)	0.5481*** (0.0517)	−1.4350*** (0.5224)	0.4231*** (0.0845)
LNAGFD	−0.0441* (0.0241)	−0.0323 (0.0237)	−0.0432* (0.0233)	0.1176*** (0.0364)	−0.0397* (0.0220)
LNAGAID	0.0096 (0.0123)	0.0201 (0.0121)	0.0030 (0.0119)	−0.0081 (0.0096)	0.0009 (0.0095)
LNAGTO	0.0500 (0.0500)	0.1013** (0.0492)	0.0995** (0.0483)	−0.2619*** (0.0967)	0.0786** (0.0315)
DVP	0.4151** (0.1753)	0.3050* (0.1726)	0.4256** (0.1695)	−1.0338*** (0.3818)	0.3447*** (0.1133)
TRS	−0.1869 (0.2871)	−0.3563 (0.2827)	0.0703 (0.2777)	0.0592 (0.2081)	0.1259 (0.2464)
YEAR	−0.0180** (0.0077)	−0.0206*** (0.0076)	0.0002 (0.0074)	−0.0006 (0.0073)	0.0007 (0.0078)
PLNGDPC				0.0827*** (0.0205)	
PAGL					0.0004*** (0.0001)
CONSTANT	41.8614*** (15.3118)	46.8594*** (15.0759)	4.4426 (14.8095)	28.8626** (13.6631)	7.1026 (14.8799)
Model diagnostics					
Observations	159	159	159	159	159
F test	181.57***	187.28***	211.17***	345.25***	288.48***
R squared adj.	0.9014	0.9041	0.9141	0.9344	0.9206
VIF	7.78	7.78	7.78	777.39	11.14
Breusch-Pagan test	28.47***	23.84***	43.68***	–	–
Ramsey test	11.26***	10.43***	17.63***	–	–
AIC	251.5252	246.5883	240.9186	208.2373	236.7414
BIC	279.1453	274.2085	268.5387	238.9263	264.3615

Notes: 1. ***p < 0.01, **p < 0.05, *p < 0.1. 2. Standard errors in parentheses. 3. Standard errors in parentheses for model 4 and 5 are robust.

The positive but statistically insignificant coefficient for *YEAR* means that although the countries and for the period of their data show rising *LNAGGPPC* over time, this increase is by chance. The limitations of the data especially regarding the years might have accounted for this result. Whilst the coefficient of *TRS* is positive but not statistically significant, that of *DVP* is positive and statistically significant implying developing countries show higher *LNAGGDPC* than the reference, transition, and developed countries. This could be due to the substantial contribution of agriculture relative to other sectors of the economy in developing countries. Each of the coefficients of AGFD has been divided by −1 to restore the negative sign changed before the natural logarithm transformation.

4.2. Discussion

The statistically significant coefficient of *LNAGDI* implies one per cent increase in domestic investment would induce a 0.4231% change in the *LNAGDDPC* (Table 4). The less than 1 magnitude of the coefficient suggests an inelastic effect of *LNAGDI* on *LNAGGDPC*. Whilst all other key coefficients possess positive signs, that of *LNAGDI* is the highest. The largest, positive, and statistically significant sign underscores the importance of domestic investment in agricultural development. The investments in land improvement, pasture development, machinery, housing, and technology among others, are crucial to the progress of agricultural development. The largest estimate also means that domestic investment can be considered as the primary investment option for agricultural development. Although the findings of [22,23] agree with the positive sign of the current study, they differ in that they are statistically insignificant whilst the coefficient of *LNAGDI* is statistically significant.

The statistically significant coefficient of *LNAGFD* implies that as *LNAGFD* increase by one per cent, *LNAGGDPC* would decrease by 0.0397%. Recalling that the foreign divestment is the negative foreign direct investment [3,41,50,61–63], this is detrimental to agricultural development. Indeed, for one dollar that leaves the host economy as foreign divestment, agricultural gross domestic product declined by 0.0397%. Although this is the lowest coefficient among the investment options and trade, it is the only variable with a detrimental effect on agricultural development [8]. reported a statistically significant and opposite movement of exchange rate and agricultural foreign divestment. Depreciation of the country local currency by 1% would induce a 0.19% decrease in foreign divestment [8]. note that multinational enterprises tend to import materials including raw materials owing to concessions for imports. Depreciation of the currency would make the imports of production inputs more expensive. Together with a rise in the cost of other goods, this would engender a rise in the cost of living and drive up wages. Generally, the increased cost of production could diminish profits and encourage foreign divestment out of agriculture. Central Banks should, therefore, manage exchange rates with due consideration to agricultural foreign divestment.

Although the positive sign of *LNAGAID* is indicative that a one per cent rise in aid would cause a 0.0009% rise in agricultural development, the statistical insignificance implies that agricultural aid does not significantly influence agricultural development. From the data of the study, not only are the developing countries fewer than the developed countries that provide aid, the observations on the number of years for developing countries are also fewer. Thus, the data inherently portends minimal statistical influence from developing countries. The provision of agricultural development support, agricultural policy and administrative management, food crop production, industrial crops or exports crops, agricultural inputs, agricultural co-operatives, agricultural education or training and rural development as aid [50], is secondary. Although the result of this study is like that of [18,24] others reported a co-movement of aid on agricultural development [17,19,20,23,51]. It must be noted, however, that some of the studies reported small magnitudes. The finding for agriculture feeds into the global aid effectiveness debate for which some make a case for aid whilst others oppose aid [[52–55,78,84]].

The coefficient of *LNAGTO* is statistically significant with a size of 0.0786 implying the capacity of a one per cent rise in trade to induce a 0.0786% increase in agricultural development. Although the lowest among the statistically significant coefficients of the key variables, it covers the coefficient of foreign divestment about two times. Whilst non-divested foreign enterprises would continue to trade, the divested enterprises could source some raw materials from the former host country and service the former host economy with products from other locations. The statistical significance of the positive coefficient of trade is in line with the findings of [21,24,25]. Whilst [26] reported a significant effect for imports and exports independently [51], found a positive effect for exports but [23] found a neutral effect for exports [22]. was the only study that reported a negative effect on trade measured as trade openness.

Table 5
Computed effects and monetised changes in agricultural gross domestic product.

	Wald [chi square]	Increase in AGGDP (US$)	Scenarios
Domestic investment	0.4231 [25.07]***	2.657b	–
Foreign divestment	−0.0397 [3.26]*	−0.249b	–
Aid	0.0009 [0.01]	5.652 m	–
Trade	0.0786 [6.22]**	0.493b	–
Foreign divestment and domestic investment	0.3834 [15.07]***	2.407b	I
Foreign divestment and aid	−0.0388 [1.85]	−243.311 m	II
Foreign divestment and trade	0.0389 [0.80]	0.244b	III
Foreign divestment, domestic investment, and aid	0.3843 [13.88]***	2.413b	IV
Foreign divestment, trade, and aid	0.0398 [0.64]	0.249b	V
Foreign divestment, domestic investment, and trade	0.4620 [17.92]***	2.901b	VI
Foreign divestment, domestic investment, aid, and trade	0.4628 [16.42]***	2.906b	VII

Notes: 1. ***p < 0.01, **p < 0.05, *p < 0.1. 2. Values in the square brackets are chi-square statistics. 3. The low value of aid is due to many zeros for developed countries.

4.3. Policy scenarios

Having discussed the independent effects of domestic investment, foreign divestment, aid, and trade, Table 5 presents the options of employing the role of domestic investment, aid, and trade in the presence of foreign divestment. The coefficients of scenarios II, III and V are statistically insignificant. These are obviously due to the size of the constituent coefficients in computing the coefficients of the scenarios as well as the standard errors. The chi-square test of scenarios I, IV, VI and VII are statistically significant owing partly to the size of the constituent coefficients and standard errors. The scenario with two variable combinations is I whilst that with three are IV and VI. Scenario VII is the only scenario with four variable combinations. Policymakers may not have the pleasure of using many variables jointly. In that case, the policy scenario I would be preferred. This is because the magnitude of this scenario is higher than all the independent effects except that of domestic investment. One per cent increase in foreign divestment and domestic investment would induce a 0.3834 increase in agricultural development. This is equivalent to US$2.407b. Both foreign divestment and domestic investment falls within the investment domain and could constitute low hanging fruit. Whilst foreign divestment is taking place, domestic investment is also occurring. Indeed, it is not impossible that because of downsizing from foreign divestment, labour and other resources could be channelled into other businesses within the economy. Also, foreign enterprises folding up as part of foreign divestment would have been purchased or acquired by domestic enterprises. In cases where foreign enterprises control large tracts of land within the framework of land grab [82–87], divestment could free the land for use, hence contributing to domestic investment leading to increases in agricultural development.

Where there is further latitude for the combination of three policy variables, scenario VI would be preferred to IV because the former has a Wald of 0.4620 equivalent to US$2.901b whilst the latter posted 0.3843 realising US$2.413b if implemented. In scenario VI, whilst foreign divested enterprises now operating in other countries could sell to the previous host country, these enterprises could also import inputs from the former host country. In case there is an opportunity to combine four policy variables with foreign divestment, scenario VII is recommended. This is because of the marginal difference of US0.005b attributable to aid. Statistically, the difference between 0.4620 and 0.4628 may appear insignificant, however, in monetary terms, the US$500 m is material. The difference between one per cent of the sum of the average of the variables in scenarios VI and VII is US$0.57. Considering this as an additional cost (marginal cost) of implementing scenario VII, it is negligible. Thus, incurring less than a dollar in policy cost would generate (marginal revenue) of US$500 m in agricultural development, which is desirable. Although independently, aid is not significant, together with other policies, aid makes a marginal contribution to agricultural development. Scenario VII is a complete investment policy gamut in addition to trade.

5. Concluding remarks

This paper's contribution is in the assessment of the independent effects of foreign divestment, domestic investment, aid, and trade as well as their combinatory effects on agricultural developnent to establish the best policy option for agricultural development. This paper departs from the existing literature as it may well be the first to investigate the effect of foreign divestment on agricultural development. A cross-sectional data for 159 observations were fitted to OLS. Foreign divestment discouraged agricultural development whilst domestic investment and trade enhanced agricultural development. Aid was not effective based on the data. Four policy combinations with associated monetary gains in agricultural development were significant. The scenario of domestic investment, aid and trade with foreign divestment turned out to be the most beneficial option. The difference between the best option and the second best is 0.0008 equivalent to US$160 m attributable to aid. This is higher than the independent monetary contribution of aid, US$0.05. Provision of aid for agricultural development should continue. In the presence of foreign divestment in agriculture, other policies combined more than compensate for the loss incurred by foreign divestment.

Where costs and policy environment permit, domestic investment, aid, and trade should be combined to respond to foreign divestment in agriculture. The data in the study was limited by the availability of observations on the foreign divestment series. Specifically, for all countries with data for two or more years, none of the series had contiguous years. Further research could consider existing (positive) foreign direct investment in place of foreign divestment.

Declaration of competing interest

"No potential competing interest was reported by the authors."

Appendix. List of countries constituting the data

Developing	Transition		Developed		
Bolivia	Madagascar	Albania	Australia	France	Netherlands
Cambodia	Malaysia	Kazakhstan	Austria	Germany	Poland
Chile	Morocco	Kyrgyzstan	Belgium	Greece	Romania
Colombia	Mozambique	North Macedonia	Bulgaria	Iceland	Slovakia

(*continued on next page*)

(*continued*)

Developing	Transition	Developed		
Costa Rica	Panama	Croatia	Italy	Slovenia
El Salvador	Paraguay	Cyprus	Japan	Spain
Honduras	Rep. Of Korea	Czechia	Latvia	Sweden
Indonesia	Thailand	Denmark	Lithuania	UK
Israel	Uruguay	Estonia	Malta	USA

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