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HUMAN DEVELOPMENT EFFECTS OF FOOD MANUFACTURING FOREIGN DIRECT INVESTMENT

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Abstract

Whilst some studies explored the effect of food manufacturing foreign direct investment (FMFDI) on microeconomic and macroeconomic indicators, the human development effect, which is the ultimate for economic management, remains unexplored. This study does that with a focus on developing and developed countries. An unbalanced panel data of 44 (18 developing and 26 developed) countries from 1991 to 2018 with a fixed-effects and general method of moments estimators were employed. Developing countries' FMFDI positively influenced the human development of the total economy. Also, developed countries' FMFDI positively influenced the human development of the total economy. Developing country economic managers should improve the macroeconomic environment to promote foreign direct investment into the food manufacturing subsector. There is a need for a reallocation of FMFDI to developing countries. International bodies such as the United Nations Conference on Trade and Development would be useful in this direction.
Keywords: *Developed countries, developing countries, food processing, foreign investment, welfare.*
JEL Codes: *F21,23; L66; O15.*

1. Introduction

Food manufacturing involves transforming relatively bulky, perishable and typically inedible raw materials into more useful, shelf-stable, and appetising or drinkable beverages (FAO, 2010; Djokoto, 2021a; Stadler et al., 2020). A third of food produced globally is either lost or wasted. Therefore, confronting food loss and waste through post-harvest loss management including food manufacturing is critical to improving food and nutrition security, as well as helping to meet climate change goals and reduce stress on the environment (World Bank, 2021). Food manufacturing enhances food security by minimising waste and loss in the

food chain and by increasing food accessibility and marketability. Food manufacturing also increases food quality and safety (FAO, 2010; Djokoto, 2021a; Leonard et al., 2020; Phan et al., 2020; Stadler et al., 2020).

The food manufacturing sector appears to be comparatively more relevant to developing and economies in transition than for developed countries as it constitutes 3.03%, 3.11% and 2.10% of gross domestic product (GDP), respectively (FAOSTAT, 2021; Djokoto, 2021a). Nevertheless, the food manufacturing sector needs more investments for growth and development (Djokoto, 2021a; Hine, 2015; Primanthi, 2015). These have created an opportunity for many countries to implement policies to attract foreign direct investment into their respective food manufacturing sectors (Djokoto, 2021a). Foreign direct investment is a cross-border transaction establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor (OECD, 2009; Punthakey, 2020; UNCTAD, 2009). The benefits include investment accumulation, technology transfer and job creation (de Mello Jr, 1997; Farla et al., 2016; Kosova, 2010). Despite the varied goals of economic policy, the welfare (human development) of the citizens is the ultimate. We ask whether foreign direct investment into food manufacturing impacts human development?

As people are the ultimate target of economic policies, their wellbeing should be paramount. Hitherto, economic growth alone had been used to measure welfare at the macroeconomic level. The United Development Programme (UNDP) had developed the Human Development Index (HDI) as a summary measure of average achievement in key dimensions of human development. These are long and healthy life, being knowledgeable and having a decent standard of living. The index is the geometric mean of normalised indices for each of the three dimensions (UNDP, 2021). Welfare matters appear to be more important in developing countries owing to the development gap within the group of countries.

The determinants of foreign direct investment into food manufacturing have been studied by Wendt and Pederson (2006) and Nellis Jr. (1977) in the US food manufacturing industry, Phillips and Ahmadi-Esfahani (2010) in Australia and Vaughan (1995) in Canada. These were firm-level studies. Others investigated the effect of FMFDI on domestic investment (Djokoto, 2021a), productivity (Primanthi, 2015) and competition (Overend, 1995). Djokoto (2021a) found that in the long run for all developing, transition and developed countries, FMFDI crowd-in domestic investment. FMFDI contributed positively to technical efficiency and total factor productivity growth. On the contrary, horizontal spillovers and fiscal incentives were found to hurt technical efficiency and productivity growth (Primanthi, 2015). Overend (1995) found that multinational firms acted more aggressively toward increases in output by domestically owned firms than domestically owned firms acted in response to increases in output by multinational firms. Whilst these studies explored the effect of FMFDI on microeconomic indicators as well as macroeconomic indicators, the human development effect, which is the ultimate for economic management, remains unexplored. This study fills this gap.

The literature review is presented next. The data and modelling constitute the third section. In the fourth section, the results are presented and discussed. Conclusions and recommendations are presented in the last section.

2. Literature Review

2.1 Theoretical Review

The welfare and economic growth literature have contributed to the effect of macroeconomic including foreign direct investment (FDI) on welfare. Early studies had, however, focused on incomes and commodities to judge a person's advantage, misery, and

deprivation (Sen 1987, 1992). Many socio-economic indicators or variables are known to contribute to changes and the general enhancement of the quality of life of a person (Sen 1992, 1987, 1997, 1998). The importance of redirecting attention to parameters and indicators that people have reason to value intrinsically has come to the fore (Afoakwa, 2016; Gökmenoğlu et al., 2018; Sen, 1987, 1992; Sharma and Gani, 2004; Kaukab and Surwandono, 2012).

Technological progress has been noted to have an influential effect on societal progress. Technological progress is the ultimate driving force behind sustained economic growth (Sharma and Gani, 2004; Solow, 1956). As FDI encourages technological integration with local input, it promotes cooperation with local enterprises and helps human resources development. FDI flows are crucial in creating the environment for a country with low technology, limited human, and organisational resources to catch up as it moves towards convergence with more developed countries (Menon, 2013; Kaukab and Surwandono, 2012). Considering the neoclassical growth model, FDI effects on humans, physical and employment will lead to human development (Mustafa et al., 2017; Kaukab and Surwandono, 2012). As FDI contributes to employment creation, skill development, income generation and technological improvements, this would enhance the well-being of recipient countries. The owners of the FDI firms would also benefit through returns on their investment.

2.2 Empirical Review

There is the absence of empirical evidence on the macroeconomic perspectives of FDI and human development, either for food manufacturing or manufacturing in general. Thus, literature on the effect of FDI on human development for the total economy was reviewed.

The literature covered the world (Djokoto, 2021b; Orbes Cervantes 2019; Srivastava and Talwar, 2020), Africa (Nakouwo, 2019; Tamer, 2013), developing and developed countries (De Groot, 2014; Djokoto, 2021c; Sharma and Gani, 2004), the Middle East and North Africa (MENA) and Association of South-East Asian Nations (ASEAN) (Hamdi and Hakimi, 2021; Kaukab and Surwandono, 2021), sub-Saharan Africa (Afoakwa, 2016; Ganiyu, 2016), North Africa (Kolster, 2015), and some individual countries; Nigeria – Fagbemi and Osinubi (2020); Morocco – Mansouri (2019) and Pakistan – Minkaj et al. (2007).

Afoakwa (2016) reported a negative effect of FDI on human development whilst Fegbemi and Osinubi (2020), Hamdi and Hakimi (2021) and Mansouri (2019) found a positive effect. In the long run, positive effects of FDI on human development have been found (Ganiyu, 2016; Kaukab and Surwandono, 2021; Kolster, 2015; Mansouri, 2019; Minhaj et al., 2007; Orbes Cervantes, 2019; Tamer, 2013). Orbes Cervantes (2019) explained that FDI offers benefits that enhance human development, such as the host country's economic growth and higher income which in turn are likely to encourage governments and individuals to spend more on education and health. Ganiyu (2016) noted that foreign investment creates more jobs, develops local skills, and stimulates technological progress, so human development will improve. FDI is more effective in countries with comparatively better economies, infrastructure, and business environments (Tamer, 2013).

On the contrary, Afoakwa (2016), De Groot (2014) and Nakouwo (2019) found a negative effect in the long run. De Groot (2014) noted that policymakers generally face a budget constraint that allows them to make certain spending choices. Increasing expenditures on attracting FDI may thus result in lower expenditures on health and education, which could imply a negative relationship between attracting FDI and lower levels of human development.

Departing from the significant effects of FDI on human development, Fagbemi and Osinubi (2020), Sharma and Gani (2004) and Srivastava and Talwar (2020) reported no significant effect of FDI on human development. Fagbemi and Osinubi (2020) attributed the insignificant effect to some reasons. The authors acknowledged the technology transfer and local skill improvement role of FDI. And noted that a less developed investment climate is

characterised by a poorly developed financial system, insufficiently strong legal framework, and ineffective government policy. Further, the seeming insufficient rates of foreign capital attributed to festering socioeconomic policies and governance, and a precarious and unstable business environment could hamper the performance of FDI inflows.

Trade has a positive influence on human development (Djokoto, 2021b; Orbes Cervantes, 2019; Tamer, 2013). Whilst Afoakwa (2016) reported a negative effect on human development, De Groot (2014), Hamdi and Hakimi (2021), Kolster (2015) and Nakouwo (2019) reported a neutral effect of FDI on human development.

Djokoto (2021b) a positive found a long run effect whilst Hamdi and Hakimi (2021) found a positive effect of inflation on human development in the short run, although Djokoto (2021c), Ganiyu (2016) and Nakouwu (2019) reported a negative effect. There is also evidence of a neutral effect of FDI on human development in the long run (Afoakwa, 2016; De Groot, 2014; Hamdi and Hakimi, 2021; Tamer, 2013).

Regarding the effect of population on human development, Afoakwa (2016) found a neutral effect whilst De Groot (2014) reported a negative effect. It is worth noting that the former measured population as the natural logarithm of the population whilst the latter used the annual growth rate of population. Djokoto (2021b) found a positive effect using the former's approach.

Ganiyu (2016) reported on the role of human capital in human development. Human capital was measured as total enrolment in secondary education, regardless of age. Ganiyu (2016) noted that "the higher a country's quality of human capital, the more likely the country would attract resource seeking (human resource) investors, and the more the spillover effect for better welfare" (page 75). Djokoto (2021b,c) also acknowledged the positive effect of human capital on human development.

The literature search on the effect of FDI on human development resulted in three studies concluding on the effect of infrastructure on human development. Djokoto (2021c), Kolster (2015) and Tamer (2013) found a positive effect for north Africa for data covering 1990 to 2011, and Africa for 1980 to 2011, and developing countries, respectively.

The empirical literature on the effect of government final expenditure on goods and services is mixed. Djokoto (2021b), Kolster (2015) and Sharma and Gani (2004) reported a positive effect on human development whilst Afoakwa (2016) reported a negative effect. The neutral effect is based on the conclusions of Orbes Cervantes (2019), Ganiyu (2016), De Groot (2016), and Tamer (2013).

Whilst the literature on the effect of FDI on human development focused on the total economy, these neither provided a sectoral nor a sub-sectoral perspective. Indeed, the concern about manufacturing in general or the food manufacturing sub-sector has not been addressed. To fill this gap, the current study provides evidence on the effect of FMFDI on human development for developing and developed countries.

3. Methods and Data

3.1 Data

An unbalanced panel of 44 countries: 18 developing and 26 developed (Appendix) was employed. The categorisation of countries into developing and developed countries was informed by United Nations (2020). The time dimension spans 1991 to 2018 yielding 561 observations. The number of countries, periods and observations were not based on the representativeness of the sample, rather these were based on the availability of the data on the variables from the sources. The developed countries in the sample exceeded that of developing countries because the latter had better statistical systems and hence better at reporting data on many variables to the United Nations data systems. Also, manufacturing is more developed in

developed than in developing countries. The data on FMFDI were extracted from FAOSTAT as 'FDI inflows to Food, Beverage and Tobacco' (http://www.fao.org/faostat/en/#data/FDI). Other data were obtained from the UNDP website, and World Development Indicators (WDI) of the World Bank. Further details are contained in Table 1.

Table 1. Variables, Definition, and Measurement

Variable	Definition	Proxying…….
HDI	Human development index	Human development
FMFDI	Natural logarithm of FDI inflow into food, beverage, and tobacco (FBT) in current USD	foreign direct investment (FDI)
FMFDI_DVP	Interaction of natural logarithm of FDI inflow into FBT for developing countries, DVP=1 and 0, otherwise.	FDI
INFLA	Annual growth rate of consumer price index	Inflation
POPG	Growth rate of population, both sexes	Growth in population
HC	Secondary school enrolment as a per cent of gross enrolment	Human capital
TO	Sum of exports and imports to GDP ratio	Trade Openness
FIXMOBILET	Sum of fixed and mobile telephone subscriptions per 100 persons	Infrastructure
GE	Final government consumption expenditure on goods and services	Government expenditure

Note: The data covers developed and developing countries only except otherwise stated.

3.2 Model and Modelling

The base equation for the study is

$$Human\ developent = f(Foreign\ direct\ investment) \quad (1)$$

Restating equation 1 and accounting for the country categories, and the food manufacturing sub-sector (FM), yields equation 2.

$$Human\ development = f(FMFDI, FMFDI\_DVP) \quad (2)$$

Some other factors explain human development namely, inflation, population growth rate, human capital, trade, infrastructure, and government expenditure (Afoakwa, 2016; Ganiyu, 2016; De Groot, 2014; Hamdi and Hakimi, 2021; Kolster, 2015; Orbes Cervantes, 2019; Srivstatava and Talwar, 2020; Tamer, 2013). Thus, equation 2 can be augmented to take account of these as well as the proxy for human development and specified as

$$HDI = \beta_0 + \beta_1 LNFMFDI_{i,t} + \beta_2 LNFMFDI\_DVP_{i,t} + \beta_3 INFLA_{it} + \beta_4 POPG_{i,t} + \beta_5 HC_{i,t} + \beta_6 TO_{i,t} + \beta_7 INFRA_{i,t} + \beta_8 GE_{i,t} + \epsilon_{i,t} \quad (3)$$

Where β_k are parameters to be estimated, i is the number of countries and t is the time in years. The variables, definitions, measurements, and sources are presented in Table 1.

It must be noted that FDI is expressed as a natural logarithm. This was necessary to reduce the size of the values to be within the region of the size of other data in the model because of the absence of data in FAOSTAT on food manufacturing value added (or GDP).

3.3 Estimation Procedure

The existing literature employed diverse estimators in investigating the effect of FDI on human development; fixed effects (Afoakwa, 2016; Ganiyu, 2016; Orbes Cervantes, 2019;

Sharma and Gani, 2004), vector error correction modelling (Fagbemi and Osinubi, 2020; Hamdi and Hakimi, 2021; Minhaj et al., 2007), and the general method of moment (GMM) (De Groot, 2014; Kaukab and Surwandono, 2021; Kolster, 2015). Whilst Mansouri (2019) and Srivastava and Talwar (2013) used FMOLS and DOLS, only Nakouwo (2019) and Djokoto (2021c) applied seeming unrelated regression and general estimation equations regression, respectively. The use of these estimators was informed partly by the structure of the data; time series (Fagbemi and Osinubi, 2020; Hamdi and Hakimi, 2021; Minhaj et al., 2007) and panel data (De Groot, 2014; Kaukab and Surwandono, 2021; Kolster, 2015; Mansouri, 2019; Nakouwo, 2019; Srivastava and Talwar, 2013) and the unit interval of HDI (Djokoto, 2012c).

The cross-section dimension of the data; 44 countries (N) exceeded the time dimension of the data; years, 28 (T). As the *N* is greater than *T*, the plausible estimators applied were the fixed effects and random effects estimators. A choice had to be made between the two using the Hausman specification test (Hausman, 1978). Additionally, two tests were performed; Breusch and Pagan Lagrangian multiplier test for random effects (Breusch and Pagan 1980) and the modified Wald test for groupwise heteroskedasticity in fixed-effect regression models (Baum, 2000; Greene, 2000). Regarding serial correlation, the Wooldridge test for autocorrelation in panel data was performed (Wooldridge, 2002; Drukker, 2003). Ramsey RESET test was used to test for misspecification (Asteriou and Hall, 2015; Ramsey, 1969). Finally, a test for non-correlated covariates was implemented using the variance inflation factor (VIF) (Baltagi, 2021; Hsiao, 2014). The result of the tests determined the estimator used, the appropriate adjustments made to the modelling and the estimation results reported. Following De Groot (2014), Kaukab and Surwandono (2021) and Kolster (2015), the general method of moments was estimated as well.

The data used comprised developing and developed countries. From the literature, the effects of FDI on human development could differ based on the level of development (Tamer 2013). Thus, it was necessary to distinguish developing countries from developed countries. Equation 3 distinguished the two country groups, by including an interaction term: *LNFMFDI_DVP*. This is the product of *LNFMFDI* and *DVP*=1 and 0 otherwise. From equation 3, the effect for developed countries is the coefficient of LNFMFDI. That of developing countries is the Wald for the coefficients of *LNFMFDI* plus *LNFMFDI_DVP*, that is $\beta_1 + \beta_2$. The Wald is tested with a chi-square test. In large samples, the chi-square statistic for the Wald turns out to be the square of the *z* test statistic. In their respective studies, Hosmer and Lemeshow (1989), Hosmer et al. (2013), Tarlov et al. (1989) and Wells et al. (1989) have also applied this.

4. Results and Discussions

4.1 Background of the Data

The mean of HDI for developed countries exceeded that of developing countries (Table 2). Regarding the mean of the combined sample, 0.8291 is between 0.6761 and 0.9631 for developing and developed countries, respectively. In the case of FDI, the mean of LNFMFDI for developed countries, 19.18, exceeds that for developing countries, 18.05. The respective standard deviations are such that the variances are still below the means, hence there is no overdispersion of the respective data around the mean.

For the developed and developing countries' sub-samples as well as the combined sample, the means exceeded the standard deviation. This was the case for *POPG*, *HC*, *TO*, *FIXMOBILET* and *GE*. The exception was *INFLA*. The higher standard deviation (with consequent higher variance) is evidence of overdispersion for the distribution of *INFLA*.

Table 2. Descriptive Statistics

Variable	Observations	Mean	Standard deviation	Minimum	Maximum
Developing countries					
HDI	262	0.6761	0.1299	0.3960	0.9160
LNFMFDI	262	18.0476	1.9718	11.5129	23.5314
INFLA	262	12.7379	92.6259	-1.1250	1500
POPG	262	1.3607	0.8637	-3.8477	3.2256
HC	262	73.9771	26.4869	11.8538	121.1762
TO	262	65.8592	28.2885	21.9295	140.4370
FIXMOBILET	262	65.2856	55.7534	0.2123	193.5045
GE	262	12.8858	5.2161	4.0701	26.8400
Developed countries					
HDI	299	0.8360	0.1183	0.0394	0.946
LNFMFDI	299	19.1754	2.4379	11.5129	24.4765
INFLA	299	2.71939	2.9366	-1.7360	20.8130
POPG	299	0.3308	0.6708	-2.0813	2.7387
HC	299	106.6352	15.8984	81.0308	161.0332
TO	299	86.8038	42.9123	19.7865	290.9025
FIXMOBILET	299	122.6574	46.8488	17.5262	199.5712
GE	299	20.0608	2.9504	13.5873	27.3765
Combined					
HDI	561	0.8291	0.4204	0.3960	4.9150
LNFMFDI	561	18.6487	2.3004	11.5129	24.4765
LNFMFDI_DVP	561	8.4286	9.1121	0	23.5314
INFLA	561	7.3983	63.4689	-1.7360	1500
POPG	561	0.8118	0.9228	-3.8477	3.2256
HC	561	91.3831	26.9709	11.8538	161.0332
TO	561	77.0221	38.2397	19.7865	290.9025
FIXMOBILET	561	95.8634	58.6300	0.2123	199.5712
GE	561	16.7099	5.4909	4.0701	27.3765

4.2 Results of Estimation

Equation 3 was fitted to the data with the results presented in Table 3. All the models showed heteroscedasticity, serial correlation, and misspecification, but there was no evidence of multicollinearity of the covariates. The Hausman test statistic was not statistically significant in the case of model A1, but it was statistically significant in the case of model A2 – A5. These implied that the null hypothesis that the difference in coefficients of the fixed and random effects model are not systematic could not be rejected for model A1 but the reverse was the case for model A2-A5. Hence, the fixed effect estimator was preferred in the case of the latter. To correct for serial correlation and heteroscedasticity, model 1 (Table 4) was estimated with a dynamic panel data quasi maximum likelihood estimator (*xtdpdqml*) (Bhargava and Sargan, 1983; Hsiao et al., 2002; Kripfganz, 2016). The use of clustered standard errors accounted for heteroscedasticity. The square of the prediction of the dependent variable was also included as an additional explanatory variable to account for misspecification. To correct for the violations in model A2 – A5, a pooled OLS with Driscoll-Kraay standard errors was estimated (Driscoll and Kraay, 1998; Hoechle, 2007). The pooling

of the cross-sections was to account for serial correlation (Table 4). The Driscoll-Kraay standard errors accounted for heteroscedasticity. As in the case of model 1, the square of the prediction of the dependent variable was also included as an additional explanatory variable to account for misspecification based on the recommendations of Ramsey (1969).

Table 3. Uncorrected Estimation

	A1	A2	A3	A4	A5
VARIABLES	HDI	HDI	HDI	HDI	HDI
LNFMFDI	0.0169*** (0.0022)	0.0040 (0.0028)	0.0035 (0.0027)	0.0029 (0.0027)	0.0001 (0.0027)
FFDI_DVP	-0.0063*** (0.0015)	0.0090** (0.0043)	0.0056 (0.0043)	0.0055 (0.0043)	0.0043 (0.0041)
TO		0.0019*** (0.0002)	0.0015*** (0.0002)	0.0016*** (0.0002)	0.0009*** (0.0002)
INFLA		-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)	-0.0000 (0.0000)
POPG		-0.0014 (0.0080)	0.0056 (0.0079)	0.0040 (0.0080)	0.0037 (0.0077)
HC			0.0016*** (0.0003)	0.0014*** (0.0003)	0.0008** (0.0003)
GE				0.0044** (0.0020)	0.0023 (0.0020)
FIXMOBILET					0.0005*** (0.0001)
CONSTANT	0.4983*** (0.0416)	0.4648*** (0.0400)	0.3831*** (0.0419)	0.3390*** (0.0466)	0.4951*** (0.0537)
Model diagnostics					
Observations	561	561	561	561	561
R-squared		0.2007	0.2423	0.2490	0.2901
Countries	44	44	44	44	44
Hausman statistic	2.24	14.37**	25.68***	103.41***	44.03***
Heteroskedasticity	1175***	1.4E+05***	3.9E+31***	3.7E+31***	1.3E+07***
Autocorrelation test	132.78***	135.83***	129.16***	108.80***	222.98***
VIF (Highest)	1.02	1.48	1.9	2.87	3.2
RESET test	19.30***	9.72***	18.23***	22.12***	8.65***

Notes: 1. Standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.1.

The statistical significance of the coefficients of the misspecification correction term suggests the misspecification has indeed, been accounted for in model 1 (Table 4). Model 1 was estimated using the general method of moments and the results were presented as model 2 (Table 4). Up to two lags were included because the one lag was not statistically significant. The statistical significance of the two lags suggested the appropriateness of the lags. The estimates of models 1 and 2 are similar in some respects. The coefficients of LNGMFDI and FFDI_DVP are both statistically significant except that the GMM showed a positive sign for the FFDI_DVP. The results for TO, POPG, HC and GE are similar as well. The two models, however, differed regarding *INFLA* and *FIXMOBILET*. For the GMM estimates, the coefficients of *FIXMOBILET* departs from theory. Following the similarly of the estimates of

models 1 and 2 and the departure of the estimates of *FIXMOBILET* in GMM from theory, that for model 1 is preferred to model 2.

Table 4. Results of Corrected Estimations

	1 (FE)	2 (GMM)
VARIABLES	HDI	HDI
L1.HDI		0.0548*** (0.0206)
L2.HDI		0.3490*** (0.0117)
LNFMFDI	0.0416*** (0.0065)	0.0076*** (0.0012)
FFDI_DVP	-0.0024*** (0.0005)	0.0042*** (0.0008)
TO	0.0001 (0.0002)	0.0001 (0.0001)
INFLA	0.0001*** (0.0000)	0.0002 (0.0002)
POPG	-0.0563*** (0.0041)	-0.0558*** (0.0060)
HC	0.0048*** (0.0006)	0.0010*** (0.0002)
GE	0.0029 (0.0018)	0.0008 (0.0005)
FIXMOBILET	0.0014*** (0.0002)	-0.0001* (0.0001)
p_6HDI2	-1.0197*** (0.1988)	
Constant	0.0287 (0.0839)	0.2010*** (0.0439)
Observations	561	347
Adjusted R squared	0.6838	-
Country	44	41
Estimator	FE	-
Country Effect	Yes	-
VIF (Highest)	3.2	-
Probability of AR(2)	-	0.3074
Probability of Sargan test	-	1.0000

Notes: 1. Robust standard errors in parentheses. 2. *** p<0.01, ** p<0.05, * p<0.10. 3. The standard error of the elasticities is by the delta method.

The adjusted R squared value is 68.38%. This is appreciable and shows variables fit the model quite well. Also, having addressed the violations of the linear regression model, chose the appropriate panel specification, the use of variables in the model informed by the literature, and the consistency of the estimates across the two models, the about 70% adjusted R squared can certainly not be due to inappropriate independent variables. Such levels of R squared are observable in the literature reviewed. Moreover, if the model is not used for prediction (forecasting) but for drawing inference, such levels of adjusted R square are allowable (Greene, 2000; Heckman and Leamer, 2007; Min, 2019; Seddighi, 2013).

4.3 Discussion of the Effect of food manufacturing on Human Development

The coefficient of *LNFMFDI* of 0.0416 with a Driscoll-Kraay standard error of 0.0065 provides a test statistic above the threshold hence, the coefficient is statistically distinguishable from zero (Table 4). Based on the positive sign of the coefficient, the coefficient of *LNFMFDI* is positive and statistically significantly different from zero. This implies an increase in FMFDI for developed countries by one US dollar, will induce a 0.1658 per cent increase in the total economy's HDI. The coefficient of *LNFMFDI_DVP* is 0.0024 with a Driscoll -Kraay standard error of 0.0005 (Table 4). This ratio of the former to the latter far exceeds the threshold, hence the coefficient is statistically significant. This result implies that there is a partial effect of FMFDI on HDI. The result of the developing countries is a partial effect. Thus, the total effect ought to be computed. The computation and subsequent testing with the chi-square test are reported in Table 5. The result for developed countries was further tested.

Table 5. Effect of Food Manufacturing Foreign Direct Investment on Human Development

Country Group	Wald	Chi-Square Test	Decision
Developing countries	0.0392	37.39***	Positive effect
Developed countries	0.0416	40.67***	Positive effect
Difference	-0.0024	20.08***	Developing countries' effect less than developed countries' effect
Combined	0.0807	39.09***	Positive effect

Note: *** $p<0.01$.

The total effect for developing countries is 0.0392. At a chi-square value of 37.39, the probability is less than one per cent. Thus, in developing countries, FMFDI positively influences human development. For developed countries, the coefficient is 0.0416, the same as that found in Table 4. However, whilst the latter was based on a *t* distribution, the significance of that in Table 5 is based on a chi-square distribution. The relevance of the chi-square test is to have comparable rigour with that of developing countries. Based on the size of the Wald, the effect for developed countries exceeds that of developing countries nominally. The nominal difference, 0.0024 was subjected to a chi-square test, as shown in Table 5. The chi-square value of 20.08 is statistically significant at less than one per cent level of probability. This confirms that the effect for developed countries is, indeed, greater than the effect for developing countries. In the case of the effect for the combined sample, developing and developed countries, the effect is statistically significant and positive. These results are instructive. The foreign direct investment is for the food manufacturing sub-sector, whilst the HDI relates to the total economy. Thus, the ability of a sub-sectorial variable to influence a variable for the total economy is indicative not only of the statistical strength of the indicator but also the economic effect. Indeed, manufactured food is consumed by all.

The positive effect for developing countries is like the total economy result for Africa, sub-Saharan Africa, Middle East and North African countries, North Africa, Morocco, and Pakistan as respectively reported by Tamer (2013), Ganiyu (2016), Hamdi and Hakimi (2021), Kolster (2015), Manouri (2019) and Minhaj et al. (2007). For developing countries, Afoakwa (2016), De Groot (2004) and Nakouwo (2019) provided contrary evidence, a negative effect. There was no empirical evidence for developed countries independently. However, for the combined sample result, the finding of Kaukab and Surwandono (2021) and Orbes Cervantes (2019) agrees with the outcome of this study. However, Srivastava and Talwar (2020) found no significant effect on the total economy for the World.

In the literature, Orbes Cervantes (2019) noted that the host country's economic growth and higher income which in turn are likely to encourage governments and individuals to spend more on education and health is plausible with foreign direct investment inflow. These offer benefits that enhance human development. In the view of Ganiyu (2016), foreign investment creates more jobs, develops local skills, and stimulates technological progress, so human development will improve. Tamer (2013) pointed out that foreign direct investment is more effective in countries with comparatively better economies, infrastructure, and business environments. These explanations can be associated with the findings of this study. Further, the level of development is low such that efforts at improving these economies tend to produce a greater impact.

In food manufacturing, agricultural raw materials are processed into food (Djokoto, 2021a). The use of agricultural products provides market access for farmers. This increases agricultural income. The availability of income provides households income to spend to promote health and education. The manufactured products provide food and nourishment for humans. Processed food reduces waste, thereby making better use of the resources of a nation. Also, processed food makes food available when the raw material from which they are produced is out of season. Available and adequate manufactured food improves nutrition, reduces hunger, and generally promotes food security (Djokoto, 2021a; FAO, 2010; Leonard et al., 2020; Phan et al., 2020; Stadler et al., 2020). These would lead to better (improved) health. The good health of children would increase primary school enrolment that will feed into secondary school enrolment. Persons in good health can also contribute to labour that would increase output.

The greater effect of developed countries than for developing countries is contrary to the conclusions of Gohou and Soumaré (2012) and Ranjkeshan (2021). Although, they note that foreign direct investment has a greater impact on poverty reduction the poorer and the less developed the country is, the result of this study departs because as can also be seen from the data, more developed countries reported food manufacturing FDI data than developing countries. Moreover, the means of FDI inflows to developed countries exceed that of developing countries.

4.4 Discussion of Control Variables

The results of the effect of FDI on human development are in Tables 4 and 5. However, that of the control variables are restricted to Table 4. It must be noted that the results of the control variables relate to the total economy. And these are derived from the existing literature (Afoakwa, 2016; Djokoto, 2021b,c; Ganiyu, 2016; De Groot, 2014; Hamdi and Hakimi, 2021; Kolster, 2015; Orbes Cervantes, 2019; Srivstatava and Talwar, 2020; Tamer, 2013). The sign of the coefficient of *TO* is positive but statistically insignificant. This suggests that although trade openness promotes human development the effect is not statistically significant. External trade offers the opportunity to buy and sell inputs and final products. Income generated would register as income to households. Households would spend part of the income on food (including manufactured food), health, and education. The income from the exports would also provide a foreign exchange that can be spent on consumption goods. The foreign currency would offer resources to import raw materials and finished goods for use in the country. The outcome regarding the effect of trade openness on human development is inconsistent with the extant results of Djokoto (2021b), Orbes Cervantes (2019) and Tamer (2013). However, the findings of Afoakwa (2016), De Groot (2014), Hamdi and Hakimi (2021), Kolster (2015) and Nakouwo (2019) are consistent.

The statistically significant positive coefficient of INFLA implies inflation increases with human development (Table 4). This is consistent with the short-run positive effect found by Hamdi and Hakimi (2021) and the long-run effect reported by Djokoto (2021b). Although the

finding of the current study is contrary to the findings of Djokoto (2021c), Ganiyu (2016) and Nakouwo (2019), it must be noted that deflations are uncommon. On the contrary, inflation is a common phenomenon that occurs in the presence of health and education improvements. As the coefficients are small, the result means that some human development can take place in the presence of inflation.

The negative sign of the statistically significant coefficient of POPG suggests that as the population growth rate increases, human development decreases. This can be attributable to the competition effect (Agbloyor, 2019). At the macroeconomic level, the GDP/GNI would have to be distributed among the population. As a result, the per capita income reduces with higher population growth if GNI does not increase at the same rate as population growth. Also, population increases would put pressure on the health and education facilities of economies. Without commensurate expansion, competition would set in. At the household level, this competition would be observed among members of the household. Thus, the negative sign of the POPG coefficient is justified. The finding of De Groot (2014) agrees with the outcome of the current study. Afoakwa (2016) however, found a neutral effect of population growth on human development.

Human capital promotes human development. This is based on the positive and statistically significant coefficient of the *HC*, 0.0048. Although the HDI contains a measure of education, the measure of human capital used here is secondary school enrolment as a percentage of gross enrolment. Not only is this measure based on achievement or actual educational attainment, but secondary school graduates are also closer to the working-class age than those in say, primary school. It is therefore not surprising that HC is related to HDI with components of education as primary school enrolment and expected years of schooling. Also, improved enrolment would lead to improved completion and consequently, availability of manpower for employment that would lead to increased GDP and consequently increase in income per capita. Aside from spending higher income to attain better health that would instigate higher life expectancy, education would enable school levers to follow and appreciate health education programmes. Consistent with our findings, and that of Djokoto (2021b,c), Ganiyu (2016, page 75) added that ”the higher a country’s quality of human capital, the more likely the country would attract resource seeking (human resource) investors, and the more the spillover effect for better welfare” (page 75).

The coefficient of final government expenditure on goods and services, GE, is statistically insignificant but positively signed. Although it was expected that this should have led to an increase in HDI, the extent of channelling resources into an increase in primary school enrolment and to services and infrastructure that would increase life expectancy has not been appreciable. The finding of Afoakwa (2016) is inconsistent with the findings of this study. However, Orbes Cervantes (2019), Ganiyu (2016), De Groot (2014) and Tamer (2013) reported a neutral effect in line with our findings. Kolster (2015) and Sharma and Gani (20004) reported a statistically significant positive effect.

The coefficient of *FIXMOBILET* is statistically significant and positive in sign. This implies, as infrastructure increases, human development increases. This finding is expected. This is because infrastructure includes education, health, roads, and others. These are essential not only for education and health but for supporting economic activities. Indeed, it is consistent with the finding of Kolster (2015) who used paved roads as the proxy rather than this study that used fixed and mobile phone subscriptions per 100 persons. Djokoto (2021c) using fixed and mobile phone subscriptions per 100 persons made consistent conclusions. Having followed the econometric procedures meticulously, this study's result falling in line with intuition and the empirical evidence is desirable. Telephony and associated internet services do support economic activity and may well be representative of infrastructure in an economy.

5. Conclusions and Recommendations

Whilst some studies investigated the effect of FMFDI on microeconomic and macroeconomic indicators, the human development effect, which is the ultimate for economic management, have not been given attention. The study investigated the effect of FMFDI on human development in developing and developed countries. The data used was an unbalanced panel data of 44 countries from 1991 to 2018.

It was found that developing countries' FMFDI positively influences the human development of the total economy. Also, developed countries' FMFDI positively influences the human development of the total economy. Further, the effect for developed countries exceeded that for developing countries. The combined effect of FMFDI for both developing and developed countries positively influences the human development of the total economy. One of the means of promoting human development is through food manufacturing. Foreign direct investment should be promoted into the food manufacturing subsector. As the effect for developed countries exceeds that of developing countries, there may be a need for enhancing FMFDI in developed countries. However, as foreign direct investment enhances human development, and fewer developing countries have attracted foreign direct investment into their food manufacturing sectors, the foreign direct investment must be reallocated to developing countries. Economic managers must improve the macroeconomic environment that often spurs foreign direct investment inflow in general. International bodies such as the United Nations Conference on Trade and Development should use their platform to influence the reallocation of FMFDI into developing countries. Beyond the profit motive, transnational corporations should consider the human development effect (as part of corporate social responsibility) as a criterion for locating in a country. Since food is essential for human survival and manufactured food has many benefits alluded to in the introduction, it is appropriate that foreign direct investment is promoted into the food manufacturing sector to among others promote human development. The higher effect of FDI on human development is also evidence to managers of developing countries to promote food manufacturing. This is apt because many developing countries are producers of primary products largely agricultural produce. Investments in processing the raw materials would indeed pay off.

As population growth decreases human development, policymakers are faced with increasing social and human development services, policies to curb population growth or both. A cost-benefit analysis would be useful in settling on the appropriate option. Both developing and developed countries need to priorities human capital development.

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Appendix. List of Countries

Developing			
Bangladesh	India	Paraguay	Tunisia
Brazil	Israel	Philippines	Turkey
Cambodia	Malawi	Republic of Korea	Uruguay
Chile	Mexico	Saudi Arabia	
Costa Rica	Pakistan	Thailand	
Developed			
Austria	France	Lithuania	Slovenia
Belgium	Germany	Malta	Spain
Bulgaria	Greece	Netherlands	Sweden
Croatia	Hungary	Poland	US
Cyprus	Iceland	Portugal	UK
Czechia	Italy	Romania	
Estonia	Latvia	Slovakia	

Note: Classification of countries into developing and developed is based on United Nations (2020). World Economic Situation and Prospects. Statistical Annex.