Pakistan Journal of Social Sciences 8 (1): 32-38, 2011
ISSN: 1683-8831

Effects of FDI and Human Capital on Economic Growth in Sub-Saharan Africa

Rasak Adetunji Adefabi
Department of Economics, Oyo State College of Education, Oyo, Nigeria

Abstract: This study examines the effect of FDI, human capital on economic growth in SSA. Using a panel of 24 countries in SSA, over the period 1970-2006, the study estimated a fixed effect model, on different levels of human capital that are capable of interacting with FDI to increase growth. The major finding of the study is that there exists weak effect of FDI and different measures of human capital on economic growth in SSA.

Key words: Foreign direct investment, human capital, economic growth, panel data, sub-saharan Africa, examine

INTRODUCTION

In recent times, developing countries, especially countries in Africa consider the role of FDI as crucial to their development. FDI as an engine of growth provides the much needed capital for investment. The benefits of FDI include serving as a source of capital, employment generation, facilitating access to foreign markets and generating both technological and efficiency spillover to local firms. It is expected that by providing access to foreign markets, transferring technology will lead to the integration of Sub-Saharan Africa (SSA) countries into the global economy and foster growth. FDI is seen as a key driver of economic growth and development. FDI not only boosts capital formation but also enhances the quality of capital stock (Ajayi, 2006). As a result, SSA governments have been very eager to attract FDI into their economies to facilitate rapid economic growth. Many SSA countries have adopted various initiatives in their attempts to attracting FDI.

Such initiatives include fiscal incentives such as reduced tax rates, tax holidays and subsidies, exemptions from import duties, accelerated depreciation allowances, grants and modified environmental standards. Others include the signing of investment treaties and investment promotion activities. Nevertheless, the adoption and application of these advanced technologies require the accumulation of a substantial amount of human capital in the host economy.

This means that the stock of human capital in the host country acts as a limit to the absorptive capability of a developing country (Borensztein *et al*., 1998). Hence, the quality of the labour force, its accumulated experience and human capital, its education system, etc., determine the economy's ability to create new ideas and adapt old ones. Foreign direct investment and human capital can complement each other in the process of productivity growth. FDI inflows create potential spillovers of knowledge to the local labour force while at the same time, the host country's level of human capital determines how much FDI it can attract and whether local firms are able to absorb the potential spillover benefits.

The hypothesis is that while some host economies with relatively high levels of human capital may be able to attract large amounts of FDI that contribute positively to the host country's labour skills, economies with weaker initial conditions are likely to experience smaller inflows of FDI and in which incoming MNCs that enter are likely to use simpler technologies that contribute only marginally to local learning and skill development.

Consequently, improvements in education and human capital are not only essential in absorbing and adapting foreign technology but also in generating sustainable long-run growth. The argument in the literature is that the productivity of foreign capital is dependent on the initial conditions in the host country. While some studies have argued that the contribution of FDI to growth is strongly dependent on the circumstances in recipient countries, some other studies have argued otherwise.

Dealing specifically with this issue, Pfeffermann and Madarassy (1992) concluded that as a result of technological progress and the concomitant shift of FDI toward more capital-knowledge and skill-intensive industries, the presence of a well-educated pool of labour has become increasingly attractive for MNEs relative to low labour costs per se. Therefore, the relative importance of the motivations for FDI is changing but these changes vary according to several factors including sector-specific patterns. Balasubramanyam *et al*. (1996) find that the effect on growth is stronger in countries with a policy of export promotion than in countries that pursue a policy of import substitution. A similar result was recorded by Mello (1996) and concluded that an increase in the productivity of FDI could only be achieved if there exists a sufficiently high level of human capital in a recipient economy. Borensztein *et al*. (1995, 1998)

developed a growth model in which technical progress, a determinant of growth is represented through the variety of capital goods available. Empirical evidence from their studies suggests that FDI is an important vehicle for the transfer of technology, contributing relatively more to growth than domestic investment. However, the higher productivity of FDI holds only when the host economy has a minimum threshold stock of human capital.

Thus FDI contributes to economic growth only when a sufficient absorptive capacity of the advanced technologies is available in the host economy. Some other studies such as Berthelemy and Demurger (2000), Perugini *et al.* (2005), Buckley *et al.* (2002) among others also found a similar result. A contrary result was however found by Lensink and Morrissey (2006).

The studies estimated various specifications of Borensztein *et al.* (1998) data for developing countries but obtained only a positive but insignificant coefficient on the interactive term between FDI and human capital. They found a weak complementary relationship between FDI and human capital in income growth. Bashir (2001) reached a similar conclusion while addressing the issue for the Middle East and North African (MENA) countries. Empirical evidence from his study showed that the interaction variable (FDI and human capital) is positive but not statistically significant thereby confirming the weak complementarity effect of FDI and human capital in the process of productivity growth. Thus, the findings reviewed above collectively suggest that there is no clear cut conclusion on the complementary nature of FDI and human capital in income growth. The key objective of this study therefore is to examine this bone of contention by focusing exclusively on SSA.

In most cases, studies (Balasubramanyam *et al.*, 1996; Lensink and Morrissey, 2006; Borensztein *et al.*, 1998) have focused on developing countries while aggregating SSA with the rest of developing countries. Since SSA is driven by different factors and policies, the research attempts to fill this gap by examining the hypothesis of whether the productivity of FDI depends on the stock of human capital exclusively for SSA. Due to the fact that FDI may be more attractive to resource rich countries, researchers also examine whether the hypothesis holds for resource and non-resource rich countries in SSA (this is because there is an argument that most of the FDI inflows into SSA have been concentrated in the extractive sectors, most especially petroleum). The period covered by this study is 37 years, 1970-2006. About 24 SSA countries were selected for this study. The choice of the period of study as well as the countries was guided by data availability considerations. Only the set of SSA countries with adequate data set were selected for this study (Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Congo Democratic Republic, Congo Republic, Chad, Cote d'Ivoire, Gambia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Togo, Zambia and Zimbabwe).

MATERIALS AND METHODS

With reference to the specification of Borensztein *et al.* (1998), researchers formulate a growth model in a linear form to empirically assess the effects of FDI and human capital on economic growth. Borensztein *et al.* (1998) presented a simple endogenous growth model in which FDI has a positive effect on growth. In the model, FDI affects growth via the accumulation of human capital.

The argument in the model is consistent with the endogenous growth framework which emphasizes the importance of FDI in enhancing technological change through technological diffusion. In facilitating technology transfers and marginal capital productivity improvement through the externalities that it may engender, FDI contributes to economic growth.

In addition, the effect of FDI on the growth rate of the economy in the Borensztein *et al.* (1998) model is positively associated with the level of human capital. That is the higher the level of human capital in the host country, the higher the effect of FDI on the growth rate of the economy. In specific terms the model is presented as:

$$g_{it} = \alpha_0+\alpha_1 FDI_{it}+\alpha_2 FDI_{it}*H_{it}+\alpha_3 H_{it}+\alpha_4 Y_0+\alpha_5 X_{it}+u_{it} \quad (1)$$

Where:

g = The per capita GDP growth
FDI = Foreign Direct Investment
H = The stock of human capital
Y_0 = Initial GDP per capita
X = A set of other variables that affect economic growth

Researchers hypothesize a positive relationship between FDI, human capital as well as the interactive term between FDI and human capital on economic growth. The initial GDP variable (Y_0) is expected to capture the role of the catch-up effect. Variable X is a vector of control and policy variables that are frequently used as determinants of growth in cross-country studies. These variables include government consumption, black market premium on foreign exchange, a measure of quality of institutions and governance, a proxy for financial developments and inflation rate. For each economy, economic growth

(GROWTH) is proxy by the growth rate of the gross domestic product per capita in real term. The use of this variable to measure growth is standard in the literature. Borensztein *et al.* (1995, 1998) adopted a similar measure of economic growth. Human capital is measured Tertiary school Enrolment (TER). The institutional environment is captured using the summary of ratings in the Economic Freedom Index (EFI).

The rating for each country is between 0 and 10, the higher the rating, the better the institutional environment. The components of the EFI used in rating countries are size of government, legal structure, security of property rights, access to sound money, freedom to trade internationally and regulation of credit, labour and business money and inflation.

The Black Market Premium (BMP) is measured as (Parallel Market exchange rate/Official exchange rate-1)*100). Infrastructure (TLPH) is measured as the addition of telephones per 1000 populations and mobile phone per 1,000 populations. This is expected to capture adequately the availability of infrastructure. Researchers however, include mobile phones per 1000 population.

This is because with the rise of mobile phones the traditional use of only the telephone per 1000 population may not be an adequate proxy for infrastructure. As is standard in the literature, foreign direct investment is measured as the ratio of FDI flows to GDP. Inflation rate (INF) is measured as inflation, consumer prices (annual percentage). Openness (OPEN) is measured as the ratio of trade (imports+exports) to GDP. This is also a standard practice in the literature.

The initial GDP (YGDP) is measured as the logarithm value of GDP in 1970 to capture the role of the catch-up effect (N/N*). Financial depth is measured as liquid liabilities to GDP (M2GDP) while Domestic Investment (DINV) is proxy by gross fixed capital formation. GCEGDP is measured as government consumption as a share of GDP. The combination of a cross section and time series data is quite useful for some reasons.

The use of panel data analysis allows the expansion of the sample size and is also very useful when analyzing performance in a region such as SSA since the FDI performance of developing countries varies substantially overtime. The fixed effects estimation technique is adopted for this study. Since both cross-section and time series data are available, it is estimated the cross-country regression equation using the form:

$$x_{it} = Y_{it}\beta + Z_i\delta + \varepsilon_{it} \quad (2)$$

Where:

Y = A matrix of explanatory variables that vary across time and countries

Z = Matrix of variables that vary across individual countries but are constant for each individual country across the periods

x_{it} = The dependent variable

The fixed effects estimator is robust to the omission of any relevant time-invariant regressors. With fixed effects estimation, the regression has minimized the informational requirement necessary to satisfy the orthogonality condition. Although, the adoption of a standard within-group estimator may likely generate estimates that are inconsistent as the number of periods is kept fixed in a dynamic model. It should however be noticed that the cross-country regression may be subject to endogeneity problems. The correlation between FDI and growth rate could arise from an endogenous determination of FDI that is FDI itself may be influenced by innovations in the stochastic process governing growth rates (Borensztein *et al.*, 1998). Therefore, apply the instrumental variable techniques to take care of the likelihood of endogeneity problem envisaged. Specifically, the 2 Stages Least Square (2SLS) approach is used to account for the endogeneity problems that could arise in the model estimation.

The 2SLS is chosen in order to be able to compare the result with some others studies that made use of the estimation technique (Borensztein *et al.*, 1998) made use of the 2SLS approach to test for the endogeneity bias). Researchers make use of instruments which are highly correlated with FDI but not with the error term in these regressions. The growth rate regression adopted the use of 5 year average in order to purge them of the business cycle effect.

There exist a number of sources of data on FDI. A good coverage is provided by IMF balance of payment data on capital flows (however, direct investment and loans are not consistently recorded). The Organization of Economic Co-operation and Development (OECD) also provide another reliable series on FDI but it only covers flows from OECD members. Both sources are combined in UNCTAD's World Investment Reports, the basic published source for cross-country data. Other data are either from host countries reports of inflows of investment or compiled from surveys of investment activity. However, such data are better suited to country case studies. This study made use of the World Bank WDI data on the FDI GDP ratio (FDI). The choice of this source is that it provides wide coverage for a reasonably long period (1970-2006) and covers flows from all sources. The data on tertiary, tertiary and tertiary school enrolment rates which proxy human capital were sourced from Easterly and Sewadeh (2000) and the World Bank (2005)

data. Researchers could not use the initial level of average years of the male tertiary schooling which was constructed by Barro and Lee due to a substantial number of missing observations for SSA countries (although, supported by limited evidence, education at the tertiary school level appears to be the level of education that is necessary for attracting relatively high value-added, efficiency seeking FDI. This therefore informs our choice of tertiary school enrolment as a proxy for human capital in the study). The black market premium data was sourced from Easterly and Sewadeh (2000). The data from the Easterly and Sewadeh were updated by statistics obtained from Global Development Finance (GDF) and World Bank (2005).

The measure of the quality of institutions was obtained from the yearly publication of the Economic Freedom of the world, published by the Fraser Institute (Vancouver, Canada) and authorized by James Gwartney (Florida State University) and Richard Lawson (Capital University). Data for other explanatory variables such as inflation rate, measure of financial development, initial GDP, proxy for infrastructure, government consumption as a share of GDP and the proxy for return on investment were sourced from the World Bank (2005).

RESULTS AND DISCUSSION

The result in Table 1 shows several interesting scenarios on the complementary effects of FDI and human capital in economic growth. The fixed effect regression in column 1 of Table 1 shows that FDI has a positive and statistically significant impact on economic growth after controlling for initial income, human capital, government consumption and the parallel market premium for foreign exchange, government expenditure and human capital proxy at tertiary school enrollment level. The coefficient on FDI shows that for each percentage point increase in the FDI to GDP ratio, the rate of growth of the host economy in SSA increased by 0.19 percentage points. However, the coefficient of the proxy for human capital

Table 1: FDI, human capital (tertiary school enrolment) and per capita GDP growth for SSA countries

Variables	1	2	3	4	5	6	7	8	9	10
Constant	-28.003	-18.959	-26.164	12.389	-14.763	-4.500	12.092	5.491	11.109	12.238
	(0.230)	(0.151)	(0.208)	(0.092)	(0.106)	(0.031)	(0.081)	(0.039)	(0.082)	(0.091)
DINV	-	-	-	-	0.195*	0.192*	0.222*	0.149*	0.065	-0.003
					(4.457)	(4.526)	(4.302)	(2.035)	(0.396)	(0.042)
FDI	0.186*	-	-0.056	-0.500	0.031	-	-0.112	-0.106	-0.041	0.030
	(2.654)		(0.180)	(0.546)	(0.392)		(0.9111)	(0.911)	(0.190)	(0.228)
FDI* TER	-	0.008***	0.001	0.008	-	0.004	0.006	0.010	0.009	0.008
		(1.723)	(0.147)	(1.030)		(0.969)	(0.957)	(1.295)	(1.050)	(0.901)
TER	0.049	-0.057	0.050	-0.011	-0.023	-0.029	0.001	-0.090	0.039	-0.011
	(1.232)	(1.499)	(1.152)	(0.377)	(0.637)	(0.770)	(0.047)	(1.188)	(0.461)	(0.357)
GCEGDP	-0.137***	-0.135***	-0.136***	-0.175	-0.149**	-0.13***	-0.155**	-0.13***	-0.179	-0.176
	(1.830)	(1.708)	(1.724)	(0.684)	(2.223)	(1.798)	(2.063)	(1.719)	(0.694)	(0.688)
Log initial GDP	3.417	2.450	3.216	-1.362	1.569	0.442	-1.460	-0.547	-1.385	-1.344
	(0.201)	(0.182)	(0.238)	(0.092)	(0.105)	(0.028)	(0.092)	(0.036)	(0.092)	(0.091)
BMP	-0.066*	-0.066*	-0.006*	-6.005*	-0.005*	-0.005*	-0.005*	-0.004**	-0.005*	-0.005*
	(4.870)	(5.155)	(4.928)	(3.871)	(3.451)	(3.447)	(3.370)	(2.234)	(4.495)	(3.984)
DIV* TER	-	-	-	-	-	-	-	0.002	-0.002	-
								(0.844)	(0.660)	
Institution	-	-	-	0.367	-	-	-	-	0.400	0.376
				(0.433)					(0.423)	(0.404)
Financial depth	-	-	-	-0.011	-	-	-	-	-0.004	-0.011
				(0.123)					(0.044)	(0.121)
Inflation rate	-	-	-	-0.001*	-	-	-	-	-0.001*	-0.001*
				(5.031)					(4.268)	(4.136)
Openness	-	-	-	0.025	-	-	-	-	0.026	0.025
				(0.850)					(0.886)	(0.893)
Infrastructure	-	-	-	-0.001	-	-	-	-	-0.002	-0.001
				(0.386)					(0.599)	(0.186)
Adj. R^2	0.273	0.269	0.268	0.335	0.339	0.342	0.332	0.342	0.321	0.327
SE of Reg.	3.106	3.116	3.117	2.824	2.972	2.964	2.986	2.964	2.854	2.842
F statistics	3.169	3.121	3.042	2.681	3.838	2.882	3.671	3.701	2.488	2.571
No of countries	25.000	25.000	25.000	24.000	25.000	25.000	25.000	25.000	24.000	24.000
Observation	168.000	168.000	168.000	144.000	167.000	167.000	167.000	167.000	114.000	114.000

(1) The dependent variable is per capita GDP growth; (2) the absolute t-statistics values in parenthesis are based on White cross-section standard errors and covariance (d.f. corrected); (3) all estimates incorporate fixed effects; (4) *, **, *** indicate that a coefficient is significant at the 1, 5 and 10% level respective

(tertiary school enrolment) although, positive is not significant. Including the interaction term between FDI and human capital (tertiary school enrolment) improves the performance of the model. The specification in the regression of column 2 of Table 1 replaces the FDI variables by the interactive term between FDI and human capital (tertiary school enrolment) and yields a coefficient that is positive and statistically significant. The impact on economic growth of the interactive term was however, marginal to the tune of 0.008 percentage point.

Although, the specification of the model follows closely the framework developed in the theoretical model, the significance of the interactive term may be the result of the omission of other relevant factors, most especially the FDI variable itself. Therefore, it was necessary to include FDI and human capital (tertiary school enrolment) individually alongside their product. This enabled us to test jointly if these variables affect growth by themselves or through the interaction term.

Such specification is adopted in the regression in column 3 of Table 1 which shows that the coefficient on FDI is negative and insignificant while the interaction term is positive but insignificant. The reason might be due to the inclusion of the interactive term which allows the entry of multicollinearity in the model, thereby making the independent FDI variable negative and insignificant. Regressions in column 4 include additional variables that proxy other factors affecting economic growth such as the quality of institutions and financial development. It is also controlled for the level of infrastructure, openness and inflation rate. The result still reveals that the interaction term between FDI and human capital (tertiary school enrolment) and also human capital are positive but statistically insignificant. In addition, as expected the parallel market premium and inflation rate enters with negative but statistically significant coefficients while the measure of institutional quality is positive but not significantly correlated with growth. However, against the a-priori expectation, the coefficients on infrastructure and financial development are negative. The coefficient on the initial GDP is negative and significant in columns 3 and 4 therefore, suggesting convergence. The initial statistical significance of the estimated effect of the interactive term between FDI and human capital (tertiary school enrolment) as in Eq. 2 could therefore be as a result of the omission of other policy variables which have now become insignificant on growth after controlling for these policy variables therefore suggesting that policy matters. In order to explore the possibility of higher efficiency of FDI, researchers test whether FDI has effects over and above those of aggregate investment in the growth equations. Regressions results in column 5-10 of Table 1 report the result. The results do not differ quantitatively from those obtained without the inclusion of aggregate investment. In columns 5 and 6, FDI as well as the interaction term between FDI and human capital (tertiary school enrolment) turns out to positively influence economic growth but not in a significant manner.

Aggregate domestic investment remained positive and significant in the 2 regressions. By way of illustration, in the basic regression of column 7 in Table 1, aggregate domestic investment and the interaction term of FDI and human capital (tertiary school enrolment) are positive and statistically significant. The coefficient on the FDI is however negative and significant. The significance of the interactive term and the negative impact of FDI on growth recorded in column 7 might therefore be linked to the inclusion of the domestic investment in the model. In column 8 of Table 1. It is examined whether the interaction effect is peculiar to FDI or it applies to investment from all sources. It is therefore, add an interaction term between aggregate domestic investment and human capital (tertiary school enrolment) and this was found positive and insignificant.

Aggregate domestic investment although positive is no longer significant. This may be an indication of the potency of FDI in the interactive process between human capital and total investment in the growth process. It may also be because FDI has different technologies which go into sectors which make its impact felt more directly on growth. On the other hand, domestic investment may be done only in the traditional activities which may not make the interaction between investment and human capital large enough to be felt. The rest of the coefficients are very similar to those obtained in specifications in which this term is not included. Other determinants of economic growth are included in the regression of result presented in column 9 of Table 1. The inclusion of the additional variables collapses the significance of the interactive term between FDI and human capital.

Although, positive it is no longer significant. The same result obtains when the interaction term between FDI and human capital is included in the specifications that has domestic investment and other determinants of growth as presented in the column 10 of Table 1. The omission of other relevant variables could therefore be the reason for the initial statistical significance of the interactive term of the FDI and human capital as in column 2. This therefore underscores the role of policy variables in growth equations. A basic conclusion from the regression results analyzed above is that there is a weak complementary effect between FDI, human capital (at all levels of education) and economic growth in SSA. This result is inconsistent with the idea that the flow of

advanced technology brought along by FDI can increase the growth rate of the host economy only by interacting with that country's absorptive capability. The reason for this may not be far-fetched.

For example, the bulk of FDI flows in SSA move primarily into the extractive industries (resource seeking) and as a result there exists little or no spillovers to the domestic economies the AERC (2004) study explained that a rent-seeking investor will locate subsidiaries abroad to secure a more stable or cheaper supply of inputs with the purpose of lowering production cost. A market-seeking investor will seek to defend market positions established through exporting new markets with the motive of reducing the cost of supplying the market. However, efficiency-seeking investors will attempt to rationalize their activities, aiming to produce in as few countries as possible, each with his advantages in terms of location, endowments and government incentives in order to service a large number of markets).

Many of the Multi-National Corporations (MNCs) involved in oil/petroleum extraction (and other extractive concerns) usually bring along their own (already trained and highly skilled) crews and engage in virtually no domestic training yielding little or no externalities (nearly all of the investment going to Nigeria, Angola and Equatorial Guinea is oil-related with most of the investments in Chad and Sudan in off-shore oil facilities. Similarly much of the foreign investment in Ghana, Zambia, Namibia, Botswana and South Africa and more recently Tanzania has been in large mining projects. The large portion of the FDI in such enclave projects has been a limit to the integration of MNC's with local firms and the local economy. Also, most of the FDI's have had very few spillover effects because they have been capital intensive). Thus, too much technological investments disconnected from the domestic productive sector may be adverse rather than beneficial to economic growth.

In the case of SSA, the marginal dependence of FDI on the stock of human capital availability can therefore be explained by the lack of spillovers from the foreign firms to human capital accumulation. Another plausible explanation could be that SSA lacked the quality and quantity of human capital available to interact with FDI to increase economic growth.

CONCLUSION

The last three decades have witnessed significant attempts by many Sub-Saharan African (SSA) countries to attract Foreign Direct Investment (FDI) to foster economic growth. This is because FDI contribution to growth had always come through its role as a conduit for transferring advanced technology from developed to developing economies. However, it has been argued that FDI spillovers are dependent on the host country's absorptive capacity such as the accumulation of a substantial amount of human capital. It was on this basis that the study examined the complementarity of FDI and human capital in the process of economic growth in SSA.

There is a weak complementarity effect of FDI and human capital in economic growth for SSA and non-SSA countries. Empirical evidence revealed that FDI can affect growth positively but not through the accumulation of human capital. The evidence was confirmed for other developing countries as well. This could be because bulk of FDI flows in SSA moved primarily into the extractive industries (resource seeking) with little or no spillovers to the other sectors such as manufacturing and services.

In addition, the type of education received in SSA is largely in the areas of humanities. SSA countries tend to emphasize the learning of theories to the detriment of technical knowledge, vocational know-how and entrepreneurial skills. SSA countries should put in more effort to develop the education system to make it adaptive to the technology level from MNCs. This is because the type of education is also very important for FDI and human capital to interact and stimulate economic growth. This is because it could be the type of education, rather than the level that could be responsible for making FDI spillovers affect economic growth through human capital accumulation.

For example, while the students in the developed countries are concentrating in scientific discoveries the SSA students mostly do concentrate on the humanities. Investment in the need areas of human capital by SSA governments would bring about educated force which is crucial to attracting private investment and improving the efficiency on the public institutions in the region.

Thus, governments should make attempts at attracting market-seeking and efficiency-seeking FDI to generate substantial spillovers into the domestic economies and improve the quality of education in institutions towards the types that can adapt high level of technology. Efficiency-seeking FDI will tend to locate in those destinations that are able to supply a skilled and disciplined labour force. While labour may appear cheap in SSA, there is nonetheless an overall shortage of skilled labour in the continent.

This is because of poor education and lack of on the job training. The lack of middle or senior level entrepreneurial experience has increased the existing skills gap. Also, there exist weak complementary effect of domestic investment and human capital in SSA and countries.

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