**Determinants of Foreign Direct Investment: Empirical Evidence for Subsaharan Africa Countries**

**Abstrat:** This article seeks to strengthen the FDI literature in the context of sub-Saharan African countries by analyzing the factors that drive this type of investment for twenty-eight countries in the region between 2002 and 2017. Given that FDI is related to its past value as well as to other economic series used in this study, the use of the static panel is prone to some problems, especially endogeneity. Therefore, the empirical strategy adopted was the dynamic panel model using the Generalized Moments Method (GMM), proposed by Arrelano and Bond (1991), Arrelano and Bover (1995) and Blundell and Bover (1998), for generating more consistent estimators. The results suggest that FDI inflows into SSA during the observed period were mainly in search of market and natural resources. Since the level of domestic savings in the region is low, FDI flows constitute an important mechanism. Therefore, measures that enhance macroeconomic stability, induce economic growth and control of the inflation rate, generating greater predictability of the economy, coupled with a genuine operationalization of existing regional trade blocs, as well as an institutional reform agenda towards institutional stability, should be encouraged.

**Keywords:** Foreign Direct Investment (FDI); GMM system; Sub-Saharan Africa (SSA).

# **Introduction**

For decades, the behavior of multinational companies (EMNs) and foreign investment have been the main focus of international business research (Buckley, 2018)**,** giving rise to several theoretical trends, among which are the internalization (Coase, 1937), the industrial organization (Hymer, 1960), the life cycle of product (Vernon, 1966) and the eclectic paradigm (Dunning, 1977). FDI patterns lack analysis over time, since the factors that favor the initial investment of an EMN in a country may change, forcing the transfer of new investments to other places (Phelan, 2003).

Sub-Saharan Africa (SSA), the focus of this study, presents fragility in public sector balance sheets, low level of reserves and financial systems under pressure due to high default rate (IMF, 2019). In view of this, FDI funding in strategic sectors and implemented in a sustainable manner can benefit the dynamics of economic growth and development. However, this region has attracted a residual share of global flows of this type of investment, and the positive trends that have been seen substantially involve a small group of countries. However, it is understood that the continent has the potential to receive a higher volume of FDI, and that it needs to be exploited (Okafor, Piesse, and Webster, 2017).

This research seeks to contribute to the enrichment of the FDI economic literature, especially in the context of the sub-Saharan region, standing out for working with more recent data, which cover the post-international financial crisis period, having significantly affected the flow of FDI in the world and in the region in particular. It is also distinguished by the use of the dynamic panel model through the Generalized Moments Method (GMM), proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bover (1998), for generating more consistent estimators, given the endogeneity problem, which may assist *policy-makers and* investors in making decisions on the matter.

In addition to this brief introduction, this article includes five more sections. The second section presents a theoretical and empirical review on FDI, with special focus on the empirical contributions available for SSA. The empirical methodology is described in the third section. The fourth section presents the data sample and its treatment. In the fifth section the results are presented and finally in the sixth section the final considerations are presented.

# **Literature Review**

There are several theories explaining the behaviour of Multinational Enterprises (EMNs) and FDI, among which the contributions of Ohlin (1933) Coase (1937), Hymer (1960), Vernon (1966), Buckley and Casson (1976), and Dunning(1977) stand out, most of which were based on the neoclassical assumptions of trade (Letto-Gillies, 2004).

Ohlin (1933) argued that the main incentives for FDI are the ability to access raw materials, and the possibility of obtaining greater profit, due to the relatively high interest rate on financing practiced in the host country.

Coase(1937) focused on the internal organization of production of firms, and based on the circumstances of the functioning of imperfect markets, to develop its theory which serves as a basis for the theory of market imperfections. Firms only grow when they organize their production process internally, through planning and direction, and not through the price mechanism. Thus, a company will tend to expand as long as the costs inherent in its organization do not equal the costs of carrying out the same transaction.

Hymer (1960) based himself on the forms of organization of industrial production postulating that a company only invests abroad when it has specific advantages over local companies, and where the market is imperfect, allowing the exploitation of these advantages. Investors are motivated to seek control of the enterprise abroad for two reasons: to protect their investments from threats from competing investors and to eliminate competition from companies from other countries in the same sector, gaining market power.

Vernon (1966) proposed the Product Life Cycle Theory, according to which there are three distinct phases in the life of a product, to be indicated: new product, product in maturation and standardized product, so that on the basis of the production decision abroad this is the prolongation of the production life cycle, minimizing variable costs through fiscal optimization and reduction of customs barriers.

Dunning (1988), inspired by the works of Coase (1937), Hymer (1960), Buckley and Casson (1976) a theory called Eclectic Paradigm or simply OLI, in order to encompass the previous theories, under the pretext that many of them did not present a full explanation of the process of internationalization of production. The key idea is that the EMN strategy depends on the combination of three essential factors: (i) Ownership advantages (O) refer to the specific characteristics of the firm, which may grant it superiority over its competitors. (ii) Location advantages (L) refer to a country's relative capacity to attract FDI. (iii) Internalization advantages (I), benefits that derive from internal production for the firm, which allows the multinational to bypass external markets and their associated transaction costs.

Later, Dunning (1993) classified firms according to the reasons for conducting FDI as follows: (i) market seekers, destined to serve the domestic market of FDI host countries; (ii) efficiency seekers, directed to the search for lower production costs; (iii) natural resource seekers, attracted by countries with the availability of production inputs, at relatively low prices; and, (iv) partner seekers, in order to obtain assets through mergers, acquisitions, *joint ventures*, among others.

## **2.1** **Review of Empirical Literature on Determinants of FDI**

Empirical studies on FDI have highlighted market size and growth, availability of natural resources, quality of infrastructure, openness to trade, human capital, fiscal incentives, macroeconomic and political stability, and quality of institutions, as main determinants of attracting FDI to an economy. Table 1 summarizes empirical studies conducted for Africa.

It should be noted that most of the revised work has addressed the empirical static panel strategy, which may not be the most appropriate given that economic series such as FDI present endogeneity problems. This may explain why in most of the papers variables with signs contrary to those expected by the literature were found (Ezeoha and Ugwu, 2015; Mijiyawa, 2015).

Table 1. Summary of literature review

|  |  |  |  |
| --- | --- | --- | --- |
| **Determinants of FDI** | **Positive effects** | **Negative effects** | **Non effects** |
| Market size | Krugell (2005), Asiedu (2006), Helmy (2013), Okafor et al., (2015), Suleinman et al. (2015), Khalil (2015), Mijiyawa (2015), Bekana (2016). | Chiatchoua and Pegou (2015) | Rodríguez-Pose and Cols (2017). |
| Inflation rate | Chiatchoua and Pegou (2015), Bekana (2016). | Onyeiwu and Shrestha (2004), Krugell (2005), Asiedu (2006), Okurut, Narayana, andChidozie (2012), Khalil (2015), Okafor et al. (2015), Rodríguez-Pose and Cols (2017), Abimbola and Oludiran (2018), Woldemichael, Githui, and Ngui (2019). |  |
| Trade opennes | Helmy (2013), Ezeoha and Ugwu (2015), Mijiyawa (2015), Asamoah et al.(2016), Rodríguez-Pose and Cols (2017), Abimbola and Oludiran (2018). | Rodríguez-Pose and Cols (2017) | Sichei and Kinyondo (2012), Chiatchoua and Pegou (2015), Bekana (2016). |
| Natural resources | Asiedu (2002), Asiedu (2006), Suleinman et al. (2015), Rodríguez-Pose and Cols (2017). | Okafor et al. (2015) | Ezeoha and Ugwu (2015) |
| Human capital | Asiedu (2006), Okafor et al. (2015), Cleeve et al.(2015), Bekana (2016). |  |  |
| Corruption Perceptions Index | Helmy (2013) | Asiedu (2006), Okafor et al. (2015). | Chiatchoua and Pegou (2015) |
| Quality of governance | Ezeoha and Ugwu (2015), Asamoah et al.(2016), Rodríguez-Pose and Cols (2017). |  |  |
| Institutional quality | Asiedu (2006), Asamoah et al. (2016), Rodríguez-Pose and Cols (2017) |  |  |
|  |

# **Panel Data Methodology and Estimated Models**

The basic equation translating the theoretical discussions on FDI determinants is formulated according to equation (1):

|  |  |
| --- | --- |
| $$FDI\_{it}=α\_{it}+βx\_{it}+ℇ\_{it}$$ | (1) |

of which$ FDI$ the flow of FDI, $x\_{it} $ is the matrix of explanatory variables with $k $regressors without the constant, $i=1,...N$, refers to the *cross-section* unit (country*)* and $t=1,...T$, denotes the year and is the error term with no autocorrelation of *IID* waste (independently and identically distributed), the parameter $α\_{it}$ is a stochastic term inherent to individual units, which captures individual effects and may or may not be correlated with the vector of explanatory variables. It is assumed that $α\_{it}\~N(0,σ^{2})$and that $ε\_{it}\~N(0,$ $σ^{2})$, with $σ^{2}>0$.

In this work, it sought to estimate the model via fixed effect and dynamic model, The estimation by means of a model with fixed effects should be made assuming the existence of correlation between the unobserved fixed effect and the explanatory variables, that is, if the c$ov (α\_{i},x\_{ij})\ne 0$. For this purpose, for each i, the average of equation (1) is calculated over time:

|  |  |
| --- | --- |
| $$\overbar{FDI}\_{i}=α\_{i}+β\overbar{x}\_{i}+\overbar{ε}\_{i}$$ | (2) |

Where it is fixed in time, it appears in both equation (1) and equation (2). However, the fixed effect estimator has implicitly the idea of eliminating the unobserved fixed effect before the estimation, based on the hypothesis of strict exogeneity, that is, $E\left(x\_{i}, α\_{i}\right)=0$. For this, fixed effects transformation is used, which is also called intra-group transformation, consisting of the subtraction of (2) from (1), resulting in data centered on the average of $FDI, x and ε$ in time.

It is worth noting that the static panel is susceptible to some problems with endogeneity, resulting from the correlation between some explanatory variable and the error term. Furthermore, certain economic series may relate not only to each other but also to their past values (Frascarolli and Oliveira, 2017). Therefore, we resort to the dynamic panel model using the Generalized Moments Method (GMM) proposed by Arellano and Bond (1991)(1991) and Bover (1995), and (1995) and Bover (1998), for generating more consistent estimators.

The dynamic model portrays the time path of the dependent variable in relation to its past values. That is, according to Greene(2002), in models with lagged endogenous variables, both the current values of the variables and exogenous disturbances, and their previous time path, determine the current value of endogenous variables. Therefore, in order to test the effects of macroeconomic variables on the FDI inflow, we estimate the dynamic model, specified as follows:

|  |  |
| --- | --- |
| $$FDI\_{it}=γFDI\_{it-1}+βx\_{it}^{´}+α\_{i}+ε\_{it}, i=1,…,N, t=1,….,T$$ | (3) |

of which $γ$ is a climb, $α\_{i}$ denotes the individual effect associated with each country and invariant in time (or unobserved heterogeneity), $ε\_{it}$ is the term for unobserved disturbance, and portrays country-specific shocks, variants in time.

The model is dynamic because of the presence of the lagged explanatory variable $FDI\_{it-1}$. Possibly, the vector of explanatory variables, $x\_{it}$The finite distributed delay dynamic is not likely to generate any problem of inference(Kiviet, 1995). The model assumes that it is $E\left(ε\_{it}ε\_{js}\right)=0, $for each *i, j, t, s*, with .

The robustness of the estimated model is analysed using the first and second order autocorrelation tests of Arellano and Bond (1991) overidentification tests of Sargan (1958) and Hansen (1982), in order to check the validity of the instruments, i.e. whether the instruments chosen are independent of the error term. To check whether the estimator is consistent the Arellano and Bond tests of first and second order apply. In the case of the first-order autocorrelation test, it is expected to present serial correction, while in the second order the autocorrelation is eliminated, that is, without statistical significance.

In the case of overidentification tests, the main objective is to check whether the instruments are valid. The null hypothesis of the test is that the instruments are not correlated with the error term. Through the estimation procedure, the most appropriate test should be chosen. If the homoscedastic (one-step) matrix of variance-covariance is used, the Sargan test should be chosen, but if the estimation procedure is with the heteroscedastic (Two-Step) matrix of variance-covariance, the most appropriate test is the Hansen test.

# **Data Processing and Analysis**

The study used panel data from a sample of twenty-eight SSA countries (Table 2), covering the annual period from 2002 to 2017, given the availability of data, as information on institutional variables is available from 2002 onwards.

Table 2. List of countries in the study sample

|  |  |
| --- | --- |
| SSA region | Angola, Benin, Burkina Faso, Burundi, Cabo Verde, Cameroon, Congo, Dem. Rep, Cote D´ívoire, Suazilandia, Guinea Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Togo, Uganda, Zambia and Zimbabwe. |

The dependent variable is the FDI flow as a proportion of GDP. The explanatory variables, presented in Table 3, are macroeconomic, political and institutional, selected according to the literature review and data availability, collected at the World Bank. Assuming that the investor in decision making tends to opt for a more structural analysis, we have chosen to work with an average of some explanatory variables in the last five years.

Table 3. List of variables

|  |  |  |  |
| --- | --- | --- | --- |
| **Explanatory Variables** | **Symbol** | **Description** | **Expected signal** |
| Economic growth | GDP | Average GDP growth rate over the past five years. | + |
| Market size | POP | Country’s population size (log) | + |
| Macroeconomic instability | INF | Average inflation rate over the past five years | - |
| Trade Openness | OPEN | Average of the last five years of exports and imports as a percentage of GDP. | + |
| Natural resources | NAT | Forestry and mineral exploration (% of GDP) | + |
| Infrastructural development | INFR | Sum of the number of mobile phone and telephone lines per 100 people (log). | + |
| GovernmentEffectiveness | GOVEF | Mesure the perceptions of the quality of public services, independence from political pressures, the quality of policy formulation and implementation lity of the government's commitment to such policies: Ranges from 0 (lowest) to 100 (highest) rank. | + |
| Control of Corruption | CCOR | Measures the extent to which public power for personal gain is controlled (log): Ranges from 0 (lowest) to 100 (highest) rank. | + |

The quality of institutions is evaluated by two of the six dimensions of governance of the World Bank, the same that was used by Asamoah et al.(2016) and Rodríguez-Pose and Cols (2017). Government effectiveness reflects the level of quality of public services, the credibility of government policies, among other attributes of government, and the control of corruption captures the perception of how inadequate public power is exercised for the benefit of the private sector.

Table 4 shows that the sample mean of the FDI/GDP ratio is 5.0%. The maximum value of this ratio was recorded in 2010 by Liberia, which also accumulates the highest average (30.7%) for the group of countries. Angola stood out with the record of the minimum value in 2017. FDI inflows into SSA proved to be volatile, showing a standard deviation twice the average. Also the dynamics demonstrated by some explanatory variables, such as inflation and infrastructure, show that countries are faced with price risks and consequent volatility in the business environment, and some inequality in the level of infrastructure.

Table 4. Descritive statistics of variables analyzed

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Variável** | **Mean**  | **Standard Deviation** | **Minimun Value** | **Maximun Value** |
|  FDI | 5.041871 | 10.19285 | -6.057209 | 103.3374 |
|  GDP | 4.833712 | 2.441066 | -7.82061 | 12.9087 |
|  POP | 16.20207 | 1.2669 | 13.00121 | 19.06712 |
|  INF | 8.147989 | 16.36464 | 0.3455982 | 193.5188 |
|  OPEN | 71.1255 | 34.33466 | 23.22153 | 239.7814 |
|  NAT | 8.56821 | 7.804474 | 0.0011335 | 53.62712 |
|  INFR | 49.20451 | 39.14508 | 0.3934237 | 178.1417 |
|  GOVEF | 3.093375 | 0.753847 | 1.059391 | 4.40343 |
|  CCOR | 3.173019 | 0.8064579 | -0.6830969 | 4.385626 |

Pearson's correlation with statistical significance of 5% was applied to investigate the first relationships between the independent variables, with the FDI flow, and is presented in Table 5.

Table 5. Correlation matrix

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | FDI | GDP | POP | INF | OPEN | NAT | INFR | GOVEF | CCOR |
|  FDI | 1.0000 |  |  |  |  |  |  |  |  |
|  GDP | 0.0639 | 1.0000 |  |  |  |  |  |  |  |
|  POP | -0.1187\* | 0.2166\* | 1.0000 |  |  |  |  |  |  |
|  INF | 0.0556 | 0.1386\* | 0.1201\* | 1.0000 |  |  |  |  |  |
|  OPEN | 0.4215\* | -0.1150\* | -0.5014\* | 0.1558\* | 1.0000 |  |  |  |  |
|  NAT | 0.2768\* | -0.021 | -0.0742 | -0.078 | -0.0958\* | 1.0000 |  |  |  |
|  INFR | 0.0309 | -0.0859 | -0.1149\* | -0.1885\* | 0.2504\* | -0.1931\* | 1.0000 |  |  |
|  GOVEF | -0.1592\* | 0.2059\* | 0.0473 | -0.1403\* | -0.1777\* | -0.4281\* | 0.2553\* | 1.0000 |  |
|  CCOR | 0.0188 | 0.0615 | -0.2100\* | -0.1994\* | 0.0425 | -0.1528\* | 0.1885\* | 0.7173\* | 1.0000 |

Overall, the results suggest for a weak correlation of variables with FDI. A positive and statistically significant correlation of FDI with trade openness and the availability of natural resources is observed, as expected. On the other hand, the market size correlation coefficients and the government's effectiveness did not follow the expected behavior, since they were statistically significant, but with a negative sign.

# **Estimated Model Results**

Hausman's test indicates the adoption of fixed effects models (models 1 and 2), as they provide a better fit than random effects models. The estimation of the dynamic panel (models 3 and 4) was performed, using GMM system in two steps with robust errors, being the best approach to the problem of instrument proliferation, eliminating overidentification. This restriction is due to the fact that the number of instruments should be smaller than the number of countries under study. Model specification tests at the 5% significance level indicated that the estimates have no second order autocorrelation problem [RA (2)], and the Hansen test confirms the validity of the instruments used. The Hansen difference tests indicate that the instruments are exogenous.

The results of the dynamic model are more consistent with the literature, possibly taking into account the problem of endogeneity, so the analysis of the results focuses on those obtained by models 3 (excludes institutional variables) and 4 (includes institutional variables). The lagged FDI coefficient was statistically significant and positive, suggesting that FDI has relationships with its past level.

Table 6. Econometrics Models

|  |
| --- |
| **Dependent Variable: Foreign Direct Investment** |
|  | **Fixed Effects**  |  |  | **System GMM** |
|  | **Modelo 1** |  | **Modelo 2** |  | **Modelo 3** |  | **Modelo 4** |
|  | **Coefficient** | **t** |  | **Coefficient** | **t** |  | **Coefficient** | **z** |  | **Coefficient** | **z** |
| FDIit-1 |  |  |  |  |  |  | 0.3704177 | 3.35\* |  | 0.3543129 | 3.27\* |
| CPIB | 0.284521 | 1.26 |  | 0.2329972 | 0.99 |  | 0.4637947 | 1.89\*\*\* |  | 0.4951846 | 2.00\*\* |
| TMERC | 10.48955 | 1.72\*\*\* |  | 10.7966 | 1.75\*\*\* |  | 0.6676805 | 1.27 |  | 1.177716 | 1.66\*\*\* |
| INFL | 0.0763304 | 2.41\*\* |  | 0.0820246 | 2.54\*\* |  | -0.048422 | -2.75\* |  | -0.0428026 | -2.38\*\* |
| GAE | 0.0740901 | 2.09\*\* |  | 0.0759423 | 2.13\*\* |  | 0.1184514 | 3.19\* |  | 0.1241961 | 3.05\* |
| RNAT | 0.0667587 | 0.61 |  | 676928 | 0.61 |  | 0.1804271 | 2.10\*\* |  | 0.1731759 | 2.03\*\* |
| INFRAEST | -0.0101299 | -0.44 |  | -0.011962 | -0.51 |  | -0.01479 | -1.58 |  | -0.0153217 | -1.28 |
| EGOV |  |  |  | 1.467472 | 0.95 |  |  |  |  | -1.426446 | -0.95 |
| CCORR |  |  |  | -0.793267 | -0.63 |  |  |  |  | 1.800297 | 1.82\*\*\* |
| CONST | -172.5956 | -1.77\*\*\* |   | -179.4773 | -1.82\*\*\* |   | -18.59539 | -1.67\*\*\* |   | -28.72326 | -1.96\*\*\* |
| No. of obs. | 429  |   |   |   |  |  | No. of obs.: 400 | 400 |
| R2 |  (0.0607) |  |  (0.0630) |  | No. of countries: 28 | 28 |
| Teste F  | 4.93 (0.000) |  |  4.74(0.000]) |  | No. of instruments: 23 | 25 |
| Hausman test  | 4664 (0.000) |  |  66.63 (0.000) |  |  |  |
| P-values in parentheses  |  |  | AR (1): (0.013) AR (1) | (0.012) |
| \* Significance at 1% level. |  |  |  AR (2): (0.126) AR (2) | (0.202]) |
| \*\* Significance at 5% level. |  |  |  Hansen (0.448]) Hansen | (0.358]) |
| \*\*\* Significance at 10% level. |   |   |  Hansen-Diff (0.970) Hansen-Diff  | (0.578)  |
| AR (1) = Test of first order autocorrelationAR (2) = Test of second order autocorrelation  |  |  |  |  |

The results satisfy the hypothesis that the larger the market size of the SSA countries, and the more people's purchasing power grows, the greater will be the FDI flows, in the expectation of serving these markets. In the case of the economic stability indicator, inflation, suggests that the level of inflation is a very important factor for FDI inflows and may be associated with the fact that unstable macroeconomic environments with high inflation rates affect the formation of expectations about the future and consequently the investment decision. Moreover, inflationary environments, besides reducing predictability, negatively influence business profitability. In this sense, the efforts of policy makers are moving towards keeping inflation under control.

Trade openness remains consistent with the literature and is associated with the fact that open economies are more likely to maintain stable and credible macroeconomic policies than local government regimes, in addition to facilitating the repatriation of gains by direct investors, and to minimise the risk of arbitrary expropriation of assets (Onyeiwu and Shrestha, 2004) should also be noted that this result is in line with the efforts of African countries to introduce regulatory measures aimed at liberalising trade and attracting more foreign investment.

The results of the GMM estimation, contrary to those obtained in the fixed-effect models, indicate that the availability of natural resources impacts on the attraction of FDI flows to SSA, mainly for productive investments whose raw materials are not available in the country of origin and consequently of high cost.

Regarding the class of institutional variables, the results found suggest that the corruption control indicator presents a greater impact on FDI determinants when compared with government effectiveness that did not present statistical significance. Corruption undermines the attractiveness of FDI, as it increases the costs of economic activities and generally persists in countries where the institutional framework is considered weak. In the case of government efficiency two notes deserve attention, the first is that African countries in general more recently have benefited from institutional improvements, while FDI flows have been less dynamic than before the 2008 financial crisis as a reflection of the low dynamics of world FDI. Another aspect is that possibly the effective governance index has links with GDP growth and inflation control and the same can be observed in the analysis of the correlation between the variables, which may impact on the observed relationships.

# **Conclusion**

This study seeks to strengthen the FDI literature for sub-Saharan African countries by analyzing the factors that drive FDI to the region between 2002 and 2017. The results of the dynamic GMM model suggest that FDI inflows into SSA were mainly in search of markets and natural resources. Given that the level of domestic savings in the region is low and that the challenges of reducing poverty and exploiting the demographic dividend through a more robust labor market persist, FDI flows constitute an important complementary mechanism.

Therefore, measures that can strengthen macroeconomic stability, induce economic growth and control the inflation rate, generating greater predictability in the economy should be a priority. Given that trade openness and market size have a positive influence on FDI, one of the alternatives for the region is a real operationalisation of existing regional trade blocs. Finally, institutional reforms should be encouraged, as countries with high corruption push FDI away because they signal institutional instability.

The problems related to data availability were one of the main limitations of the work, as they did not allow the inclusion of more countries, variables and still obtain a longer series. Therefore, for future research, it is advisable to develop the model, following the same analysis methodology, exploring more variables related to FDI facilitation policies, namely bilateral investor treaties, double taxation treaties and special investment zones.

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