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Is Free Trade Good for Growth in Sub-Saharan Africa?

Stefania Galli

Supervisor: Klas Rönnbäck
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ABSTRACT

The debate over the determinants of growth has occupied scholars for decades. Among them, trade regime has gradually emerged, receiving a large consensus among academics. The identification of trade openness as the best way to achieve a sound and long-lasting economic growth has become the new golden-rule in development economics, with the support of the most powerful economic institutions. However, in Sub-Saharan Africa a persisting negative growth residual was registered despite a profound restructuring of trade regime imposed by World Bank and International Monetary Fund. As a result a new wave of research has blossomed focusing on Africa, attempting at finding specific motives for the absence of convergence of Sub-Saharan Africa with the rest of the world. Nonetheless, few studies have concentrated specifically on the impact of trade regime on economic performances. In spite of that, none of them have focused on the employment of tariffs as a proxy for trade regime instead employing other proxies, more complex but less direct. This study intends to fill the gap left open by using Tariffs as a proxy for trade regime. The author will investigate the problem by employing a multivariate quantitative analysis over the period 1990-2010 for a sample of 30 Sub-Saharan African. The results suggest that there is no definite evidence in favor or against the beneficial effects of free trade for the period considered, which seems to support the conclusion that trade is only part of a broader picture, so making its potential benefits depending upon contingent conditions of the host country.

Key words: trade, trade liberalization, trade openness, trade policy, growth rate, Sub-Saharan Africa, development, economic growth, development economics, *Structural Adjustment Programmes*, liberalization, reforms.

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GLOSSARY

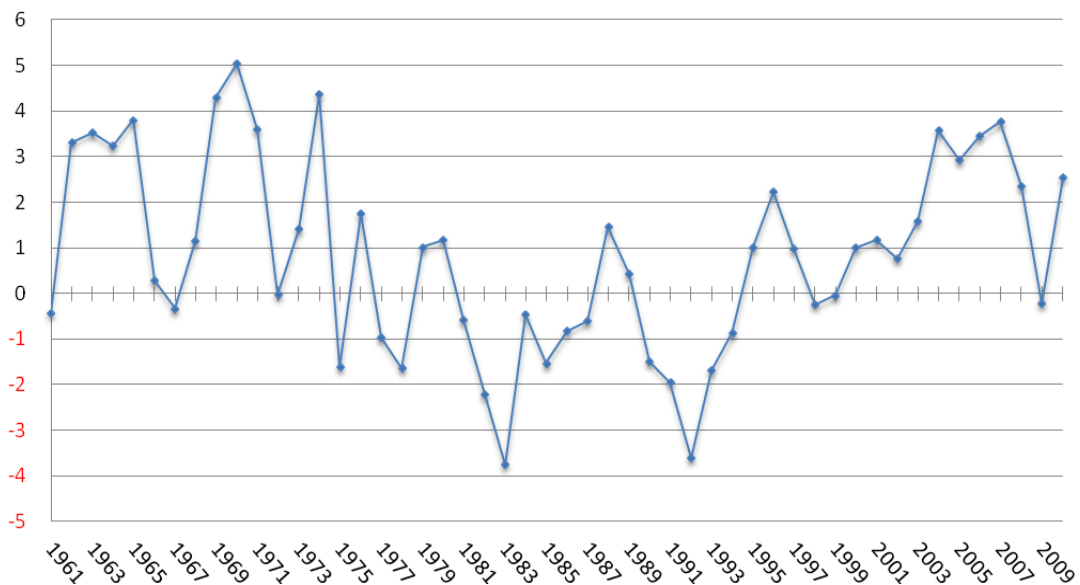
SSA	Sub-Saharan Africa
SAP	Structural Adjustment Programme
MFN	Most Favorite Nation
AC	Autocorrelation
PAC	Partial Autocorrelation
AIC	Akaike Information Criterion
GDP	GDP per capita annual growth rate
EDU	Educational attainments
DENS	Population-to-land ratio
TAR	Import Tariff Burden
OPEN	Trade Shares
POL	Political instability
ODA	Official Development Assistance

1. INTRODUCTION

The African post-colonial development has received great attention by economists over the past decades. The major reason for such an interest lies typically in the economic performance of the continent, which tends to be considered disappointing. The idea of disappointing performances lies its roots in the 1960s, when both the World Bank as well as influential economists claimed the great potentials of a newly independent Sub-Saharan Africa. As noted by Easterly and Levine:

“a leading development textbook ranked Africa's growth potential ahead of East Asia's, and the World Bank's chief economist listed seven African countries that clearly had the potential to reach or surpass a 7% growth rate” (Easterly and Levine, 1997, p. 1203).

Figure 1: GDP per capita growth (annual %), Sub-Saharan Africa



Source: Author's elaboration based on World Bank, 2014

However, when examining what happened in the following decades, it is crystal clear the fact that the continent has not been able to fulfill the expectations and emerge as the economic power it was forecasted to become. Despite few successful examples, as Botswana, the continent has been characterized by “[...] food shortages and growing indebtedness [that] cannot be understood in isolation

from the strategies of development which African governments have followed since independence” (Cheru, 1992, p. 497).

When looking at the data, Sub-Saharan African has had an irregular path of growth, with advancements followed by backwards bounds, allowing to define the African economic growth during the period 1960-2010 irregular. The situation worsens when taking into account GDP per capita growth rate as the Malthusian effect, mentioned in Barro and Lee (1993), is seen to play an important role. In countries characterized by low levels of development, an increase in income is typically associated with an increment in the fertility rate, limiting or nullifying the outcomes of a rise in GDP as it is possible to recognize in Figure 1 above. Elaborations from World Bank (2014) show that the GDP per capita in Sub-Saharan Africa grew of a mere 0.3% on average throughout the period 1965-1990, compared to an average of over 5% for Asia and 2% for Latin America (Easterly and Levine, 1997). It is noteworthy, however, the negative tendency over time that has characterized GDP per capita growth rate, which declined from some 2.7% during the years 1961-1965 to roughly 0.25 in 1976-1981, turning into negative in the following decades up to 1995 for then recovering slightly in the following decades, as in Table 1.

Table 1: SSA average GDP growth rate

1961- 1965	1966- 1970	1971- 1975	1976- 1980	1981- 1985	1986- 1990	1991- 1995	1996- 2000	2001- 2005	2006- 2010
2,69	2,09	1,54	0,26	-1,71	-0,21	-1,43	0,78	0,57	0,53

Source: World Bank, 2014

This trend supports the words of Arrighi (2002), who states:

“[i]t is only after 1975 that Africa experiences a true collapse—a plunge followed by continuing decline in the 1980s and 1990s, which is the main reason for the comparatively poor performance for the period 1960–99 as a whole” (Arrighi, 1992, p. 16)

The worsening of the economic indicators reflects in the constant decline of Sub-Saharan Africa relevance in the economic world. As in Table 2 the SSA share of GNP

Table 2: Shares of world GNP by region 1960-1999

	1960	1965	1970	1975	1980	1985	1990	1995	1999
SSA	19	18	17	18	16	13	12	11	10
Latin America	71	65	65	73	76	66	59	61	60
South Asia	6	6	6	5	5	6	6	7	7
East Asia	7	7	7	9	11	13	17	23	25
First World	359	374	397	413	431	456	479	475	486

Source: Arrighi, 2002

per capita as a percentage of world GNP per capita stood at 19 in 1960, well above the level for East Asia and in line with the average for the Third World. The values seemed to remain constant until 1980, when a first major decline occurred, followed by minor declines in the following decades, that led to a contraction of the SSA value down to 10. On the other hand, all the rest of the Third World was seen to improve its weight on the global stage, driven by the exceptional performances of East Asia. The deterioration of the African indicators along with the take off of Asia prove in the drop from 60% to 35% of the SSA GDP per capita as percentage of the GDP per capita of the developing world, as calculated by Sachs and Warner (1997).

Once proven the decline in the economic and living condition of the continent, it is necessary to examine what have been the drivers for such a phenomenon. The investigation of the motives underlying the disappointing performance and the seemingly inexplicable worsening of the conditions have attracted numerous well-known scholars to the topic. The inability to explain the slow growth of the continent when compared to the rest of the world has resulted in the development of the so called African dummy, a variable giving account in an aggregate way of all the supposed specificities of Sub-Saharan Africa that are to lead to the low rate of growth (Collier and Gunning, 1999). In order to make the

concept clearer, a dummy variable is designed as a proxy typically for qualitative factors that otherwise would be excluded from the regression. In the case under examination, the use of a dummy variable seemed the only way to overcome the inability of regressions to explain growth by appealing to the factors generally considered. The African dummy, however, could not be considered as an explanation of the negative growth residual. In fact it worked more as a cover for the lack of explanations than for the opposite. Consequently, scholars have attempted to eliminate the African dummy by looking for factors able to give account for the negative growth residual. A plentiful of indicators were used, which has made impossible to derive one and only explanation for the African disappointing performance (Azam et al., 2002).

As a partial record of the factors employed in the most well-known studies on the subject, it is possible to list here: lack of social capital, ethnicity (or ethnic fragmentation), poor economic policies, lack of openness, deficient public services, geography, lack of financial depths, high aid dependency, political instability, colonial legacies. It results clear that no univocal explanation can be drawn from them, since all the studies seem to take a specific and in some way original approach. In this regard, Rodriguez and Rodrik (2000) in their critical review of the studies on the growth-trade openness relationship assess that is more likely that no univocal explanation exists but that is contingent to factors dependent upon both domestic and external environment.

As for other subjects, the research regarding the relationship between openness and growth has been seen to follow in some way the theories in fashion throughout the decades. In the first place, as it will be clarified in the next section, scholars have centered their approach on growth theories as the catch-up theory, adjusted later on with the conditional convergence precept. Due to the failure in explaining meaningfully the path of growth employing such theories, scholars have shifted their focal point. The lion share of the research pointed at poor economic policies as determinant for the lack of growth, following the rising agreement around the so-called Washington consensus (Williamson, 1999). The propositions included in the Washington consensus were developed in the late 1980s following the commonly-agreed concepts in economics supported by World Bank and

International Monetary Fund, summarizing the policies to be implemented so as to facilitate growth. In the words of Williamson:

“[...] economists had become convinced that the key to rapid economic development lay not in a country’s natural resources, or even its physical or human capital, but rather in the set of economic policies that it pursued” (Williamson, 1999, p.254).

As in the original version of the Washington consensus by Williamson, the propositions were: fiscal discipline, redirection of public expenditure towards activities with high returns and income distribution, tax reform, interest rate liberalization, competitive exchange rate, trade liberalization, liberalization of FDI inflows, privatization, deregulation, secure property rights (Williamson, 1999). The majority of the scholars involved in the examination of African development have taken the above mentioned propositions as golden rules, attempting at explaining the slow growth by incriminating African rulers for their inability to modernize and reform their countries according to the precepts claimed by the economic community. That is well highlighted in a report by the World Bank, which affirms that the major reason for the failure to develop was poor policies stemming from the idea that the state had to have leading role in production and in regulating the economic activities (White, 1996) .

The propositions above soon translated into practice with the so called “Structural Adjustment Programmes” (SAPs), implemented for the first time in Senegal in the 1980 and by the end of the decade extended to the rest of the continent. The SAPs were developed to bring economic reforms to the countries plagued by poor economic performances, under the directions of World Bank and International Monetary Fund. In the article *Adjustment in Africa*, White defined such programmes by assessing that *“they dismantle the system of state control erected in African countries in the years since independence”* (White, 1996, p. 786), developing around market liberalization and private initiative. The market liberalization White referred to had mainly in focus the removal of constraints to trade while financial and institutional reforms were to work as a support to trade liberalization.

The new tendency in economic policy reflected in the economic debate, which focus moved from policy overall to trade liberalization specifically, becoming the new miraculous concept to be applied indistinctively in order to achieve economic growth, regardless of history and geography. Economists have consequently focused on creating indexes of openness and indicators of trade liberalization involving plentiful of factors in an attempt to determine the level of trade liberalization of a country. However, again the impossibility to come to an agreed conclusion and the contradictory results have led to a gradual but steady decline in the interest in the African economic failure, which by the early 2000s had been almost completely forgotten.

1.1. PURPOSE

The current study attempts at answering to the following simple research question *Is free trade good for growth in Sub-Saharan Africa?* developing the examination over the period 1990-2010, with the prerogative to establish whether a relationship between openness and growth exists in such a geographical area and it is robust enough to support the commonly agreed theoretical assumptions.

The choice of such a research question reflects the fact that no studies are available answering the same question, so creating a gap in research that requires to be filled. The need is even stronger considering two major facts. On the one hand, the frequent claims about an absence of convergence on the global stage have had the Sub-Saharan Africa's growth pace as their main evidence, which has led to the already mentioned rise of the African dummy. On the other hand, the individuation of trade regime as the long-sought explanation standing behind the negative growth residual needs still to be proven in a direct way. In fact, all the previous studies affirming the existence of a positive correlation between trade openness and growth have employed measures of openness that are afflicted by a certain degree of association with factors that have not much to do with trade regime but a lot to do with other policies and conditions, so giving possibly rise to confounding association. Such situation leaves the ground to a general confusion on the subject that might bias and have biased the selection of economic policies in Sub-Saharan Africa in favor of trade openness without a strong evidence directly supporting it.

In order to prevent, or trying to prevent, the recurrence of such a risk the author of the present report has chosen to run and compare two regression, differentiating in the measure chosen to represent trade openness, tariffs in the first case, trade shares in the second. The lion share of the analysis will be granted to the examination of the relation between openness and growth when using import tariff burden as proxy for trade regime, since no similar proxies have been individually employed so far. Such an analysis will be followed by the comparison of the results with the outcomes resulting from the use of trade shares as proxy for trade openness, the measure typically utilized in similar studies thanks to its broad availability. That aims at investigating whether the use of a more direct and often neglected measure as the burden of tariff barriers provides similar evidence as when using trade shares. If so, it might be possible to support the conclusion drawn by previous studies assessing that trade openness is beneficial, if not trade liberalization should be considered with great caution. The power of a measure relying on tariff barriers derives from the fact that it is the only direct measure available, so avoiding the identification of a misleading association between trade openness and growth.

The decision to structure the research in such a way was not due to a personal preference of the author, but to the lack of data relative to tariff barriers for Sub-Saharan Africa, which can impact on the significance of the conclusions. The lack of statistics about the continent has required the author to framework the research not only in terms of variables, but also in terms of countries considered and time span of the examination.

1.1.1 Research outline

The paper consists of four main parts. In the first part the author will provide a review of the existing literature on the subject. The theoretical framework will comprise two distinctive but complementary sections, so as to cover adequately in the first section the issue of the relationship between growth and trade regardless of the geographical location (in order not to neglect any important contribution to the topic) and the problem of growth and trade orientation specifically in Sub-Saharan Africa in the post-colonial period in the second section. The aim being to provide a background as exhaustive as possible

for the analysis to come. The second part will be occupied by the methodology, covering the choice made in terms of models as well as data and variables, giving account of the kind of data selected for the analysis. The third part will constitute the real empirical analysis, informing about the results when using Tariffs as a proxy, to be followed by a comparative analysis of the previous results with the outcomes resulting from the use of Trade shares instead. The concluding part will discuss the results of the empirical analysis in light of the existing literature, trying to provide the reader with a meaningful interpretation of them taking into consideration the context and the environment, as well as giving account of the limitations of the study at hand.

2. THEORETICAL FRAMEWORK

2.1 THE EMERGENCE OF THE FREE TRADE ARGUMENT

The discussion on economic development can be considered as the most long-lasting and most well debated topic in economics as no agreement has been found among scholars so far, in spite of more than a century of research and theorization. The idea underlying such a branch of economics is the attempt to find a receipt for long-term and sustainable growth that consent underdeveloped countries to reach a decent level of development. The theories produced over the last century are numerous and frequently in contrast with each other, which can be due to the inability of any of them to fully understand growth and consequently produce a general rule for development.

The world emerging from the WWII had to face the steady process of disaggregation of the empires created in the previous centuries, with an unusually high number of countries emerging from such a process. The majority of the old colonies were underdeveloped territories that had to undergo a process of exploitation of both resources and labor force during the colonial time. The colonial state was structured as to serve metropolitan interests, guaranteeing good standards to the foreigner and local elites living in the cities, while neglecting the interests of the rest. In addition to that

“[k]ey policy decisions were made by European powers and implemented through a bureaucracy. There was scarcely any participation in matters of state by the local people. Colonies were ill-equipped politically and administratively when independence arrived” (Gulhati, 1990, p. 1148)

Therefore the achievement of the independence in the 1960s-1970s, in spite of not implying the fade of the colonial legacies instantly, meant global recognition as nations but left the ex-colonies suffering from underdevelopment, lack of skilled labor force, weak institutions, lack of capital and other similar problems.

Development economics stepped into this field with the goal of increasing the levels of development and the living standards of poor and underdeveloped

countries, however the way of doing so has changed drastically throughout the decades in response to the shifts in economic theory.

The first and major contribution to the issue came from the Neo-Classical growth theory that, departing from the assumption of perfect competition, perfect factors mobility and alike actors, assumed that capital accumulation could boost economic growth in underdeveloped countries. Yet as capital accumulation is considered to be characterized by diminishing returns to scale, long-term growth can be guaranteed only by an increase in factor productivity achieved through technological improvements. The model determines the tendency towards convergence of the economic system, intended as the market's ability to even out the inequalities among countries, implying that in the long run developing countries will experience higher growth rate compared to developed countries. It is noteworthy that trade policy is considered to affect the long-term growth impacting on the levels of technological appropriation, as

“openness to trade provides access to imported inputs, which embody new technology; increases the effective size of the market facing producers, which raises the returns to innovation; and affects a country's specialization in research-intensive production” (Harrison, 1996, p.420)

This given, the presence of institutional constraints to free trade can inhibit convergence, hindering development, giving rise to the argument about the beneficial effects of free trade.

In reality, the lack of evidence in favor of the convergence argument along with former colonies being considered as still dependent from bigger economic players -which interests lied in extracting commodities as minerals or foodstuff at low prices by influencing domestic policies- caused a shift in the perspective over development. As recognized by Sachs and Warner (1997), market-led economic development started being considered as a new way of colonization, leading to a greater intervention of the state in economic policy in response to the international intrusion, to which have to be added the reluctance of numerous governments to let the market freely operate. The policy of state intervention became the symbol of the 1970s as prescribed by the Neo-Structuralism approach, which built up around the idea that Third World countries needed to modify their

economic structure away from mainly primary sector towards more value-adding activities, so as to absorb the surplus of labor force and increase the general income level. In fact, structural changes can be operated only by the state, which is seen to work not only as regulator but also as coordinator, investor and entrepreneur, marking a great difference from the role of the state claimed by the neo-Classics. Neo-Structuralism asserted that the factor explaining the different growing rates of different economies could be found in the sectoral specialization of each country, implying that countries should specialize in the sectors that present high levels of elasticity of demand. That was due to the idea that there is economic growth when the elasticity of demand for exports is higher than the elasticity for imports, implying that the BOP can constraints the economic development. In presence of a misalignment between imports and exports elasticity, structural changes in the pattern of specialization of a country are needed in order to escape the risk of divergence. As assessed by Gerschenkron, pro-active governments can be the key to development in these early stages of growth, allowing to overcome the market failures responsible for the underdevelopment. Therefore capital allocation and high tariff barriers supporting infant industries could be seen as more beneficial than market incentives when taking place in the first phases of development (Crafts, 2004). As Rodrik (1995) affirms referring to the successful examples of South Korea and Taiwan, the government went way beyond these measures, largely employing subsidies and creating public enterprises in relevant fields so as to *“reshape comparative advantage in the desired direction”*.

In spite of a number of countries able to emerge from poverty through the implementation of neo-structuralist based policies, such policies were generally considered to have had a negative impact on developing countries, limiting their economic growth and instead provoking a take off in their debt burden. Thus, the 1980s saw the gradual abandon of protectionist policies worldwide and the recognition of the prominent role of markets for development. As Edwards recognized

“[m]any economists have argued that, with other things given, countries that have ‘liberalized’ their external sectors, and have reduced their

impediments to international trade will outperform those countries that have failed to do so. The World Bank and the International Monetary Fund have endorsed this view; they routinely condition funds to their member countries on the implementation of 'trade liberalization' policies" (Edwards, 1992, p. 31)

The recognition of the impossibility to achieve development without trade openness and good institutions to support it was the basic concept underlying the rise of Neo-Institutionalism. Such an approach, deriving from the Neo-Classical approach, attempted at explaining the different pace of development of different countries by looking at their institutional framework, meant as the "*rules of the game in a society*" as defined by North (Acemoglu et al., 2005). However, the importance credited to institutions does not undermine the prominence proper of the market, for which institutions work only as a support and not as a replacement. According to Acemoglu et al. (2005), the prerequisite to economic growth are the presence of a property rights' legislation along with the elimination of market distortions, so as to provide both investments' incentives and an efficient resources allocation. On the side, political institutions are seen to assume relevance due to their influential power that can be either beneficial or detrimental to development. It is noteworthy that bad institutions are recognized to be persistent and difficult to reform, impeding catch-up to take place (Crafts, 2004). Given such theoretical prerequisites, global economic institutions pushed for the adoption of the already mentioned Structural Adjustment Programmes, designed to reform institutions in order to reduce market failures and consent a sound economic growth, through the instrument of conditionality. As recorded by Gulhati (1990), the necessity to undergo a proper reform was felt particularly strong in the Sub-Saharan countries, where rent-seeking behaviors and bad domestic policies, together with the worsening of the terms of trade and serious droughts, were considered to have contributed to the deterioration of the economic standards and to the take off in the indebtedness recognizable since the mid-1970s. Gulhati well depicted the phenomenon by writing that

"[i]t seemed as if the implicit contract between international agencies and newly independent governments of Africa was being rewritten. During

the 1960s these new governments had been welcomed into the club of sovereign countries without being subjected to any rigorous tests of statehood. During the 1980s rulers of these countries were persuaded, induced and pressured to adopt improved economic policies” nevertheless “[t]here was considerable reluctance to accept the notion that domestic policies might be responsible for some of the problems. Time was lost hoping against hope that the terms of trade would improve or that donors would organize a rescue” (Gulhati, 1990, p. 1155)

so the actual implementation of the SAPs had to wait another decade.

The intervention of supra-national economic organizations into the domestic sphere of domestic policies marks the major difference from previous periods. That practice mirrored into the wave of institutional harmonization and economic integration that have taken place worldwide from the 1970s ending up in the creation of the World Trade Organization in the 1990s, which can count among its members virtually all the countries on the planet (Sachs and Warner, 1995). The emerging world order made market-led economy its cardinal virtue, implying trade openness being a prerequisite to development and so shaping trade policies in the form of trade liberalization and laws harmonization. Trade liberalization from being just one of the components contributing to a sustainable economic growth, along with fiscal and macroeconomics reforms, became the fulcrum of all the policy reforms, while the rest was left aside. That is well described by Sachs and Warner, who stated that

“[t]rade liberalization not only establishes powerful direct linkages between the economy and the world system, but also effectively forces the government to take actions on the other parts of the reform program under the pressures of international competition. For these reasons, it is convenient and fairly accurate to gauge a country's overall reform program according to the progress of its trade liberalization” (Sachs and Warner, 1995, p. 2)

In such context, the dispute over the relationship between openness and growth has become a sort of dispute between orthodox and unorthodox

economists, fought over econometrics and variables, in order to determine whether trade is really the manna is said to be for developing countries.

The brief summary provided here, intends to offer the reader a background to the theoretical discussion that will come in the next section. That, in the intention of the author, should allow to comprehend better the environment in which the debate over trade liberalization took place as well as the conditions of the Sub-Saharan economies after the independence.

2.2 EVIDENCE ON FREE TRADE AS BENEFICIAL

As Barro and Lee (1993) assess, the major challenge for an economist lies in understanding the reasons for different growth rates as observed worldwide, in order to be able to formulate a set of rules able to consent to lagging countries to improve their standards. As it appears from the previous discussion, trade has gradually emerged as the key factor for growth, promoting the convergence between poor and rich countries. According to Sachs and Warner

“trade promotes growth through a myriad of channels: increased specialization, efficient resource allocation according to comparative advantage, diffusion of international knowledge through trade, and heightened domestic competition as a result of international competition”
(Sachs and Warner, 1995, p. 3)

Based on this assumption poor countries should be able to take advantage of their backward position, growing at a higher rate than richer countries so closing the gap with the latter. However, no such tendency can be found overall. The reason for such a phenomenon has frequently been found in the trade regime, since closed economies seem not to be able to benefit from technological spillovers as open economies, hindering the supposedly positive effects stemming from the *“advantage of backwardness”* (Sachs and Warner, 1995).

In his early study on trade and growth, Dollar (1992) recognized the importance that market distortions have in regards to development. By employing an estimated indicator of exchange rate distortion to be compared with the hypothetical free-trade value, the author developed a system through which discriminate between inward-oriented countries and outward-oriented countries,

as a proxy for trade orientation. The elimination of exchange rate distortion appear to benefit greatly underdeveloped regions, as both Latin America and Africa are considered to be, since

“outward orientation with a stable real exchange rate could have added 1.5 percentage points to Latin American growth and 2.1 points to African growth. Given actual growth of - 0.4% in Africa and - 0.3% in Latin America during 1976-85, the estimated gains are quite large and would shift these regions from negative to modestly positive growth” (Dollar, 1992, p.535)

The underlying motive for such a conclusion lies in the fact that in Dollar's perspective outward orientation allows countries to collect external capital. The same capital is to be used by poor countries for development, without facing the constraints of debt repayment due to their good export position. On the contrary, inward orientation typically causes the rise of the debt burden leading to debt crises in less developed regions that undermine growth efforts. It is noteworthy however that Dollar himself appears cautions about his findings, in regards both to the direction of the correlation as well as the case in which omitted variables might affect the relationship.

In regards to the issues of excessive indebtedness of developing countries mentioned previously, Edwards (1992) states that the best way for highly indebted countries to deal with high debt is to *“grow out of it”*. What is meant by such an expression is to focus on reforms, referring mostly to trade liberalization reforms, which consent to eliminate the market distortions responsible for hindering economic take off. The author develops a simple endogenous model based on the concept of technological absorption where small countries are seen to benefit from trade openness. Trade liberalization is here consider to fosters technical advancements as stemming from contacts with commercial partner that induce imitation, guaranteeing faster growth. Edwards conducts a cross-country analysis using a number of alternative indicators of trade orientation, trade openness and level of trade intervention as the important. In regards to openness, the indicator appear to have positive impact on growth in all the period examined, supporting the conclusion that open economies tend to grow faster. When considering

intervention levels the conclusions do not change, as the higher the value for intervention, the slower the growth rate. Therefore, Edwards concludes that the outcomes of the analysis provide evidence for the idea that open economies succeed in outperform relatively close countries in terms of growth rate.

Barro and Lee (1993) contribute to the literature by assuming a slightly different perspective than the previous studies. They employ a cross-country methodology, structuring their analysis so as to include a great number of countries (in their case about 100) for two separate periods, and numerous indicators. Barro and Lee's study concludes with the individuation of a list of so called "*sources of growth*", able to explain the differences in terms of growth rate between countries growing slowly and others growing fast. According to them, the determinants of growth can be found in: conditional convergence effect, investment rate as percentage of GDP, government size, presence of government-induced market distortions, level of political instability. In the case of conditional convergence, no marked difference is found between the group of countries considered, while the major impact are seen to come from the presence versus absence of market distortions and in the size of the government, which is negatively correlated with growth rate. Despite the different perspective taken over the problem, Barro and Lee's conclusion provide new support to the orthodox view of free trade being beneficial to economic development, along with the importance of good institutions.

The issue of absence of convergence for numerous countries in the post war period is the starting point of the well-known study by Ben-David (1993). The author focuses on the effects on growth of the creation of the European Economic Community, testing whether it is possible to recognize convergence among its members. Considering that the EEC main aim had been the reduction and gradual elimination of internal trade barriers, the presence of convergence (in the form of a reduction of income disparities) among its members seem to point at lack of trade openness as a reason for non-convergence or divergence in other parts of the globe. It is noteworthy here that trade is not considered in isolation, but is seen as the mean through which technological diffusion spreads influencing productivity,

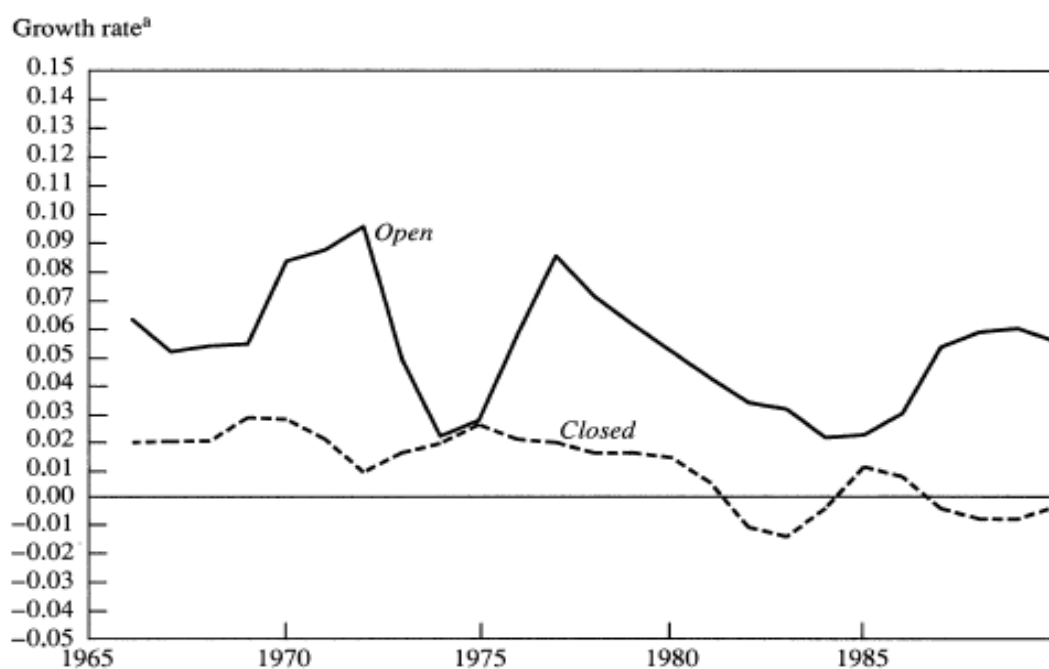
that is considered to ultimately determine the rate of growth of a country (Ben-David, 1993).

Even though the articles mentioned so far have had great importance in shaping the economic beliefs, the corner stone of the literature regarding trade and growth is considered *Economic reform and the process of global integration* by Sachs and Warner (1995). The analysis takes into account the majority of the existing countries, both developed and developing, in order to extend the discussion about convergence to virtually the entire globe. Sachs and Warner find that for the years 1970-1989 the economies considered as open, according to the authors' standards, have clearly outperformed the closed economies in terms of economic growth, avoidance of extreme macroeconomics crisis and structural change. They consequently affirm that economic integration is tightly related to economic convergence, as "*poor countries tend to grow faster than richer countries, as long as the poor and rich countries are linked together by international trade*" (Sachs and Warner, 1995, p.35). The definition of open or closed economy depended on five criteria: average tariff rates of 40% or more, non tariff barriers covering 40% or more of trade, black market exchange rate at least 20% lower than the official exchange rate, state monopoly on major exports and socialist economic system. Displaying one of the variable was judged to be enough for defining an economy as closed. The choice of using combined criteria to create the indicator of openness was meant to provide an exhaustive measure, limiting the aspects neglected in the analysis. The categorization of the countries is functional to the comparison of growth path between open and closed economies. Figure 2 below shows that not only open economies were seen to be constantly above the average growth rate for closed countries, in spite of greater fluctuations due to external shocks, but that the rate of growth for closed economies was seen to decline steadily over the decades averaging at 0% in the late 1980s. The deterioration of the growth rate for closed economies implies a process of divergence between the two groups, widening the already existing gap.

The results seem to hold when excluding developed countries from the sample, reducing it to developing countries only. In fact, the open economies in the group displayed an average annual growth rate of 4.49% while the value for closed

economies was only 0.69. Always open developing countries were seen to outperform always closed developing countries, as demonstrated by the fact that average growth rate of 3% or above was recorded by 11 always open countries compared to only 4 always closed economies, while 70 always closed countries had an average growth rate of less than 3 % annually as only 4 always open economies.

Figure 2: Average GDP growth rate for open and closed economies, 1965-1990



Source: Sachs and Warner (1995)

The authors conclude that closed economies constantly had recorded lower growth rate than open economies, limiting the process of convergence to open economies only.

Frankel and Romer, in their *Does Trade Cause Growth?*, take the discussion further to include geographical characteristics of the countries examined into account. By controlling for size and population, they find that to an increment in trade share of 1% corresponds an increase in GDP per capita of 2%, which is to be increased of a further 0.3% for every 1% increase in both country's size and population. According to the authors, that reflects the fact that within-country trade contributes to raise income. The article attempts at analyzing also the way

trade affects growth, and the findings point in the direction of increased contribution of both physical capital depth and schooling to output and productivity to output, respectively of an estimated 1.5% and 2% for every 1% increment in trade share (Frankel and Romer, 1999).

A recent article appeared on the topic is the one by Wacziarg and Welch (2008). The article not only revisits the study by Sachs and Warner (1995) by using an updated dataset, but also extends it to include the 1990s in the analysis. The authors' conclusion is that in the period 1950-1998, the countries that adopted trade liberalization policies grew of roughly 1.5% more than before the liberalization, driving an increment in investments in the range of 1.5-2% over the same period. An interesting point made by the authors refers to the timing of the effects, as they write

“the simple average difference between growth in non-liberalized and liberalized regimes may mask important timing issues. It provides no information on how soon the effects occur or whether they cease to be felt a few years after the reform” (Wacziarg and Welch, 2008, p. 202)

The authors take into account Tornell (1998), who highlights that roughly two thirds of the episodes of economic reforms (the umbrella under which trade liberalization falls) take place following a period of political or economic crisis, determining that the values for the three years before liberalization are depressed of some 0.5%. Such an argument is needed in order not to overestimate the effects in the post-liberalization phase. According to Wacziarg and Welch estimates, the growth rate increase from the basic levels only slightly in the first three years after the reform, reaching almost 1.5% increment within 3 to 6 years from the liberalization, declining to 1% in the years after 6.

Other contributions concluding that trade openness leads to a growth rise are the ones by Harrison (1996), Greenaway et al. (2002) and Dollar and Kraay (2003). In the paper by Harrison, numerous openness measures are employed to test the relationship between openness and growth leading to an overall positive association. Greenaway et al. employ three different indicators of openness, in order to overcome the problem of relying on just one indicator, concluding that trade liberalization is seen to have a positive impact on growth. As in the case of

Wacziarg and Welch (2008), they also find the impacts being delayed, however their precision is not as high as in the paper mentioned above. Dollar and Kraay analyze jointly trade and institutions, in order to determine whether growth can be attributed to only one of them or both. They come to the conclusion that long-term growth can only be achieved through a combination of openness and good institutions, while in the short to medium term the elimination of market distortions is seen to play a more relevant role.

2.3 CRITICISM AND CAUTION

As previously depicted, the prevailing view over the relationship between trade and growth points in the direction of a positive association between the two. However, the review of the debate would not be complete without mentioning the paper that summarizes the critics to the above presented literature, namely *Trade policy and economic growth: a skeptic's guide to the cross-national evidence* by Rodriguez and Rodrik (2000).

The authors formulate their question as follows “*Do countries with lower policy-induced barriers to international trade grow faster, once other relevant country characteristics are controlled for?*” (Rodriguez and Rodrik, 2000). According to them, the recent literature standing as theoretical background for the policy advice of the international economic organizations is not seen to provide a strong evidence in favor of trade liberalization as booster for growth as claimed by their authors. By saying so, Rodriguez and Rodrik do not intend to prove that protectionism is good for growth either, but as in their words

“*[t]he tendency to greatly overstate the systematic evidence in favor of trade openness has had a substantial influence on policy around the world. Our concern is that the priority afforded to trade policy has generated expectations that are unlikely to be met, and it may have crowded out other institutional reforms with potentially greater payoffs*” (Rodriguez and Rodrik, 2000, p. 317)

Such a conclusion is drawn after a detailed examination of the most well-known and relevant studies, among them Dollar (1992), Sachs and Warner (1995) and Ben-David (1993). The major critique moved to such studies has to do with the

indicators employed to measure the level of openness. Frequently it appears that such indicators can be strongly related to factors other than trade policies, which contribute to the poor economic performances of a country, or have shortcomings that influence the strength of the evidence. In this regard, according to the authors there is no evidence against the use of mere tariff barriers and not-tariff barriers measures as indicators of openness, instead the reason underlying the preference accorded to more complicated and inclusive indicators is more of a weak-ground assumption. It is due mentioning however that Dollar and Kraay (2003) claim that the reliance on tariff and not tariff barriers only can have some downsides. In terms of tariff barriers, they have to do with the risk of uncritically take into account blindly categories of goods that might not be that relevant for a country to the detriment of more important categories. In terms of non-tariff barriers the problem can lie in the inability to predict how binding such measure are in reality. In spite of such criticism, the author of the present paper believes that the use of an indicator properly built based on tariff and non tariff barriers burden is the most suitable indicator for the analysis of the relationship between trade regime and growth, since it allows to totally exclude the influence of factors not univocally correlated to trade regime and its reform.

The work of Rodriguez and Rodrik has its focal point on the scrutiny of the well-rewarded indicator of trade orientation created by Sachs and Warner. The five components, mentioned previously in this paper, do not appear to contribute uniformly to the dummy's strength, but the authors find that the variables playing the most important role are black market premium and state monopoly of export, while weak statistical evidence is derived from the most direct measures of trade regime, tariff and non tariff barriers. As the indicator seem to be so strongly dependent upon variables that can give account of macroeconomic instability, political crises and poor institutions instead of informing about trade regime, the authors conclude that it is not possible to draw strong inference from the results of the regressions run based on it without incurring into the risk of a biased result. According to such an analysis, the authors declare:

“[w]e are in fact skeptical that there is a general, unambiguous relationship between trade openness and growth waiting to be discovered.

We suspect that the relationship is a contingent one, dependent on a host of country and external characteristic” (Rodriguez and Rodrik, 2000, p. 266)

Despite being the most renowned critique to the openness-growth equation, Rodriguez and Rodrik (2000) are not the only one. Frankel and Romer (1999) and Winters (2004) point out that the relation openness-growth is not straightforward as it seems also considering that commonly the countries that implement trade liberalization policies adopt financial and macroeconomics reform, so the impacts on growth of trade liberalization can be difficult to isolate from the effects of policies others. Dollar too seem to predict caution in reading the results of his study, due to omitted-variables risk and to the inability to assess precisely the direction of the association between growth and trade regime. He remarks that

“[d]uring the time period under examination, many countries in Latin America and Africa suffered debt crises accompanied by slow or negative growth. It is possible to view these debt crises as exogenous shocks that cause both slow growth and inward orientation” (Dollar, 1992, p.536)

The issue of the causal relation between GDP growth rate and openness appears also in Harrison (1996). The author recognizes that trade policy could actually be a function of growth, as the studies that intended to verify such a case have not had univocal results.

In addition to what mentioned so far, it is worthwhile considering that some new growth theories in spite of considering openness to trade as a way to improve long-run growth rates, admit that some level of protectionism might be beneficial in the short-run when promoting investments in research-intensive sectors for the countries having an international advantage in such a production (Harrison, 1996). This is the focal point of a study by Yannikkaya (2003). In such study, the author examines the relationship between trade and growth from two slightly different perspectives. In the first case, the indicator used to measure openness is built based on trade values, in the second case the indicator considers trade restrictions as a proxy for trade regime. The analysis includes some 100 countries in the period 1970-1997, extracted both from the developed and developing group. The results

show that when using trade shares as indicator of trade openness there is a positive association between higher trade shares and higher growth, however the author appears to be cautious in assessing the direction of the association. In the second case, Yannikkaya finds that the association between trade restrictions and economic growth is not the one that scholars would expect. In fact, the outcomes of the regression highlight that there is a positive correlation between tariffs and growth, and not the vice versa. As the author emphasizes, the results are mainly driven by developing countries, implying that developing countries employing higher levels of trade restrictions are seen to grow at a faster rate than developing countries with lower degree of protection. Yannikkaya (2003) concludes by reminding that, according to new growth theory, there is no unambiguous relation between trade restrictions and growth, and the result of the association depends on the characteristics of a specific country.

2.4 AFRICAN GROWTH LITERATURE

As already mentioned, the growth pace of the African continent has puzzled scholars for more than fifty years. As shown in Figure 3 below, the countries recording negative growth in the period 1960-1988 were mainly located in Sub-Saharan Africa.

Figure 3: Regional Distribution of Negative Growth, average 1960-1988



Source: Easterly and Levine (1997)

However, the average growth rate spanned over such a long period is not explicative, in the sense that it does not give account of the drastic change occurred in the mid 1970s, when the average GDP growth rate from positive turned into negative, as affirmed in the introduction.

The inability to explain the growth pace of Sub-Saharan Africa, when employing large cross-country growth regressions considering different world regions and “*controlling for normally accepted growth variables*” (Easterly and Levine, 1997), had given rise to the so-called African dummy. Such a dummy, assuming a significant role in the regressions, was firstly interpreted by Barro (1991) as the failure of the analysis to capture the characteristics of a typical African country, implying African countries to be different by default from the rest of the world. The intrinsic difference was considered to lie in the African countries facing “*persistently slower-steady state growth*” than other countries.

Nevertheless, the African growth rate has not been uniform, but it has followed a decreasing trend since the mid 1970s, meaning that the case of Africa is not the one of a persistent slow-steady state of growth as it has been defined. In the studies following Barro’s analysis, scholars have tried to eliminate such an unexplained negative growth residual, as the African dummy has been termed in Jerven (2011), by appealing to numerous factors, i.e. ethnicity, geography, colonization, fiscal policy, institutional quality (Bertocchi and Canova, 2002; Jerven, 2009), concluding that the African issue lies in its policy makers and its institutions and in the initial conditions. However, keeping in mind the growth path of Sub-Saharan Africa and its initial successes, the concept of initial condition as detrimental is not seen to fit the specific case. It is worthwhile that the attempt to eliminate the African dummy has the bias to consider Africa to be wholly different from the rest of the world, limiting the understanding of the differences within the Sub-Saharan countries themselves (Bertocchi and Canova, 2002).

In regards to the recent wave of studies, focusing on the elimination of the African dummy, Jerven (2011) highlights how the outcomes have been disappointing, so the reasons underlying the economic performance of the continent are still not clear. In spite of that, the interpretation of the results have

not been at all cautious, forcing for a drastic shift in policy reforms. The shift mentioned here corresponds to the imposition of the Structural Adjustment Programmes (SAPs) by the international economic organizations in the 1980s. The motives requesting a change in the Sub-Saharan domestic policies were found in the inability of policy makers to drive their countries in the right direction, which mainly referred to trade regime. That is the focal point of Gulhati (1990), which declares that the economic issues were due not only to exogenous shocks, i.e. droughts, terms of trade deterioration, but also and mainly to the worsening of the economic policies implemented in the region. The same author affirms that in spite of a great level of autonomy when it comes to policy-making, African rulers have clearly failed to *“react speedily to the growing economic crisis during the early 1980s”* (Gulhati, 1990), justifying in some way the international intrusion in the matter. Herbst (1990) goes further by assessing that the intervention in regards to economic policy typical of African ruler was due to political reasons, functional to gain support and to favor some groups at detriment of others. The major field of intervention is recognized in the trade regime, particularly in terms of import policies. According to Herbsts, African rulers have continuously chosen to limit the market freedom by adopting restrictive import regulations, which are said to *“yields greater political benefits”* than letting the market operate. (Herbst, 1990). In this regard, Cheru (1992) offers a different picture of the situation, as he says that import restrictions were part of a broader set of policies of the type of import-substitution and export promotion aimed at improving the level of development of the relative countries. Whatever the reasons for the adoption of such policies were, Sachs and Warner (1997) as Collier and Gunning (1999) affirm that the lack of openness had had a central role in determining the performance of the Sub-Saharan economies. In that regard, Collier and Gunning state that by the 1980s, the African continent had become the region with the greatest trade restrictions, shaped as a mix of tariffs, quotas, foreign exchange controls and marketing boards. According to the authors, the negative impact of trade restrictions was increased by the size of the African economies, extremely small in comparison to the rest of the countries worldwide. Such a concept finds support in Alesina et al. (2000), where the authors state:

“[i]n a world of trade restrictions, large countries enjoy economic benefits, because political boundaries determine the size of the market. Under free trade and global markets even relatively small cultural, linguistic or ethnic groups can benefit from forming small, homogeneous political jurisdictions” (Alesina et al., 2000, p. 1276)

The model upon which they build their conclusions predicts that in a global environment characterized by trade restrictions, countries political boundaries have the power to affect its productivity, on the contrary trade openness makes such boundaries irrelevant so breaking the association between size and productivity.

Sachs and Warner (1997) in their attempt to eliminate the African dummy, conclude that there is no need to employ such a dummy when controlling for poor economic policies, more specifically in regards to *“openness to international markets”*, since Sub-Saharan Africa is considered to have performed worse than other world regions in terms of trade openness, to which have to be added inflation and savings rate. By saying so, they intend to eliminate the unexplained negative growth residual imputing the poor performance to an inefficient trade regime providing evidence for the implementation of SAPs. However, trade restrictions are only one of the factors that limit growth, as inflation and savings rate are also called in to explain the phenomenon (Sachs and Warner, 1997). Therefore, caution is required as the results of trade liberalization and policy reforms have received both positive and negative critiques. Jerven (2011), in his review of the literature on African development, points out that the *“poorest performances were registered when they were implemented”* adding that one of the motives could lie in the standardization of such reforms, on the basis of *one-fit-all* policy.

As no evidence from previous literature strictly supports any of the previous points of view and no data analysis has been provided yet, the author of the present paper does not intend to let one or the other perspectives prevail before submitting any evidence to the reader. However, the presentation of both orthodox and unorthodox perspectives can be considered as a prerequisite to the development of the analysis that will take place in the next sections.

3. EMPIRICAL FRAMEWORK

In order to examine whether, after controlling for other variables, it is possible to find a relationship between trade openness and growth in the African continent, the present study will be shaped as a multivariate quantitative analysis. The choice to prefer a panel study over other methodologies had to do with a number of reasons. First of all, given the topic under scrutiny, only two options seemed to possess the characteristics needed to answer to the above presented research question. Such methodologies, namely case studies and panel studies, however differ greatly in the way they approach the problem. On the one hand, case studies tend to provide a detailed examination of one specific case, the aim being to analyze extensively one problem in a specific context so as to be able to understand its complexity fully. On the other hand, panel studies allow to examine how a problem evolves over time for a larger number of entities, so allowing to expand the context of the examination notably. This given, the debate over the generalizability of the results drawn from a case study have tended to point to the conclusion that such a methodology cannot be employed to draw inference on anything more than the entities on which it was build, while that is not the case for panel studies (Bryman and Bell, 2011). Considering the goal of such study being to generalize the results to the whole Sub-Saharan Africa, with all the limitation and caution that the case requires, it seemed the best choice to grant preference to panel studies instead of case studies. The need to allow for generalization was felt strong considering the elements highlighted in the previous section, which shown the application of a one-fit-all trade liberalization policy that requires to consider the African continent as a whole when examining the policy's impacts.

3.1 EMPIRICAL MODEL

The analysis included in this report will be based on the use of the variables in Table 3 below. Given the plentiful of control variables that have been used by scholars in previous studies and the impossibility to control for all of them in one single study, the author had to make a selection. The reasons underlying the selection had to do with time constraint, data limitations, as well as sample size

dimensions, limiting the degrees of freedom and consequently the number of variables that could be employed. In order to reduce the number of variables to a manageable and meaningful number, previous studies were analyzed in order to select the most recurrent among the control variables used, while trying to reduce at the least the possibility of leaving strongly relevant variables aside giving rise to the confounding phenomenon.

Table 3: Definition and Description of Variables

GDP	GDP per capita annual growth rate
Educational attainments (EDU)	Primary completion rate as % of the relevant age group
Population-to-land ratio (DENS)	People per sq. km
Tariff burden (TAR)	Average of MFN import tariffs for manufacturing, metals and ores
Trade Shares (OPEN)	Ratio of the sum of imports and exports per absolute GDP levels
Political instability (POL)	Index of political instability calculated as the sum of the number of violent events occurred multiplied by their level of violence
Official Development Assistance (ODA)	Aid flows as % of GDP falling within the framework of Development Assistance Aid

3.1.1. Selection of Variables

The decision to exclude some of other frequently employed control variables as colonialism, colonial legacies, ethnicity, socialism, geography had to do with the above mentioned limitations but also to some specific factors. In the case of ethnicity, no proof has been given so far of a either positive or negative impact on development so lacking any support for the inclusion of such a variable in the examination. In regards to colonialism all the countries in the sample have had an experience of colonization, so eliminating the need to consider such an element as a differentiating element. Nevertheless, some scholars have pointed at different colonial powers as an element to take into consideration. The author on her part

agrees with such a picture, since direct or indirect rule seems to have contributed to the rise of differences in the institutional framework of the colonies that might have impacted on the economic development. However, given the sample size of the present study, no space was left for the inclusion of such a variable if not as a replacement of the more common and surely meaningful ones above.

When it comes to colonial legacies, political systems and colonial legacies have been frequently considered as correlated in the past, claiming that political instability was a result of the period of foreign rule. However as no definite evidence has proved the existence of any strong and meaningful tie between the two and considering the time distance between the period under examination and the gain of independence by the African countries, it has been preferred to focus on variables that might actually explain the economic performances in recent times, considering that any supposedly existing colonial legacies effect has faded until disappear in a time span of three decades.

When it comes to geography, strictly exogenous, that is automatically absorbed when running a regression using Fixed Effects so it does not require to be taken into consideration specifically, being a time-invariant variable.

A variable that assumed great importance in past studies was socialism. In the idea of the author such a variable was to be considered as well among the control variables, however the issues with sampling led to exclude 4 out of 6 of the countries that fell under the definition of socialism in the period considered, or at least during part of it. The African countries that self-declared themselves being socialist within the time framework of the study at hand were Angola, Benin, Congo-Brazzaville (then Republic of the Congo), Ethiopia, Mozambique and Somalia and all of them abandoned socialism by 1992. Due to data availability 4 out of 6 of these countries were excluded from the panels as no data for numerous variables could be collected, only Republic of the Congo and Mozambique were kept. As the experience of socialism of Mozambique concluded already in 1990 and the one of Congo in 1992, the observation for such a variable resulted too few to be considered, which resulted in the variable being automatically omitted from the regressions run. This fact given, the author has consequently decided to eliminate

such a variable completely from the panels in favor of the opportunity to add lagged variables or other more meaningful regressors.

One last remark has to do with the decision to exclude any variable referring directly and strictly to the level of democracy and of human rights of a country. The author has chosen deliberately not to enter in such a territory, considering that it has not been demonstrate in a definite manner that democracy is beneficial for economic performance as well as that democratic countries are able to consistently outperform countries characterized by authoritarian regimes. Brunetti (1997) was seen to step into the topic analyzing the relevance of five categories of political variables in growth regressions, namely democracy, government stability, political violence, policy volatility and subjective perception of politics. His conclusion was that *“measures of democracy are least successful in cross-country growth regressions”* also pointing at problem of reverse causation as a reason for such a results. Barro in his *Democracy and Growth* (1996) moves further into the topic, concluding that according to his study what matters for growth is economic freedom while

“the connection between economic freedom and political freedom is more controversial” since *“nothing in principle prevents nondemocratic governments from maintaining economic freedoms and private property”*
(Barro, 1996, p.1)

3.1.2. Analytical model

Moving on to the explanation of the empirical model employed, as commonly agreed among scholars the way trade impacts on economic growth and development has to do with the ability of a country to absorb and take advantage of technological know-how that indirectly imports carry, while at the same time having the opportunity to specialize in the sectors it has greater comparative advantages in. The absorptive capacity is however subdued to the characteristics of a country in terms of human capital, factors intensity, political situation and trade regime. As typically the emphasis would have been on the specific ability of a country to take advantage of technological spillovers, here the focus is posed on the effects trade regime has in fostering or hindering technological improvements

and consequently economic growth. As claimed by Edwards (1992), it is assumed that “*the country’s ability to appropriate world technical innovations depends positively on the degree of openness of the economy.*” This given, the model in the present report is derived from the typical production function where the absolute GDP level is a function of labor force (L), land (LAND), educational attainments (EDU), capital (K), political stability (POL) and technological know-how (A).

$$Y_{i,t}: A_{i,t} F (L_{i,t}, LAND_t, EDU_{i,t}, K_{i,t}, POL_{i,t})$$

When contextualizing the analysis, some modification are required in order to take in to consideration the specificities of the Sub-Saharan African context. One of them has to do with the labor force structure where still the typical subsistence economy labor structure plays an important role, so having all the components of the household participating to the family’s economic activities. This given, it is clear how the mere labor-to-land ratio frequently employed as a proxy for Labor (L) seems inadequate given the standard labor force definition, while a better approximation might be offered by population-to-land ratio (DENS).

Such a function can be written as follows for country *i* at time *t*

$$Y_{i,t}: A_{i,t} F (DENS_{i,t}, EDU_{i,t}, K_{i,t}, POL_{i,t})$$

Considering previous theoretical formulations, as Harrison (1996) and the specificities above mentioned, it is possible to rewrite the function above taking into consideration the effects of annual variation. So

$$\Delta y_{i,t}: \Delta A/A_{i,t} + \beta \Delta DENS_{i,t} + \beta \Delta EDU_{i,t} + \beta \Delta K_{i,t} + \beta \Delta POL_{i,t}$$

As claimed by Harrison, $\Delta A/A_{i,t}$ can be decomposed into three components: “*a country-specific effect f_i which does not change over time, a disturbance term ε_{it} and a third term, which is a function of trade policy in country *i* at time *t*” (Harrison, 1996). In the present analysis this last factor will be named OPEN or TAR in relation to the measure of trade openness used in the regression. The measure of capital accumulation (K) will be replaced by the use of data referring to Official Development Assistance (ODA), which gives account of the aid flows as % of GDP devoted to development assistance, this being one of the few measure of capital flows available for Sub-Saharan countries. This given, the indicator is employed as an imperfect replacement of capital, as no data have been elaborated on a large*

scale for capital accumulation in Sub-Saharan Africa. As it appears clear, ODA is only a greatly imperfect proxy for a measure of focal importance in developing economics as capital accumulation, however no better proxy could be developed on time or found for the geographical region under scrutiny. This given, the use of such a variable constitutes a great limitation to the study motivated only by the fact that the time available did not allow to build an *ex novo* measure for capital accumulation. The implication of the use of ODA instead of capital accumulation is that it provides no information on the capital stock but only of capital flows, so missing one important part of the capital accumulation process. As it is not possible to determine in which percentage the flows stay in the country of destination and which percentage is reimbursed, it seems impossible to make estimates over capital stock. In addition, the absence of data for FDI constitutes another factor hindering the calculation of the level of capital accumulation. Nonetheless, as no better informative measure could be employed in regards to capital, the author has then decided to make use of it by warning the reader about its limitations.

In addition to that, it needs to be taken into account another specificity of the region under scrutiny, which is the strong role played by the Malthusian effect on economic growth that can be masked when considering only absolute GDP growth rate. All this given, the function for the examination to come can be written as:

$$\Delta(y/POP)_{i,t} = \beta\Delta DENS_{i,t} + \beta\Delta EDU + \beta\Delta ODA_{i,t} + POL_{i,t} + f_i + TAR_{i,t} + \varepsilon_{it}^*$$

* y/POP : GDP per capita growth rate, annual %; $DENS$: people per sq. km; EDU : primary completion rate; ODA : Aid flows; POL ; level of political instability; f_i : country specific absorptive capacity; TAR : import tariff burden; ε : error terms

3.2 SAMPLING AND DATA COLLECTION

Given the model above, the empirical analysis will build on the examination of two panels, differing only in the proxy used for trade regime, TAR and $OPEN$, with the aim to determine whether it is possible to highlight an important and significant relation between trade openness and GDP per capita annual growth rate in the African continent. The decision to employ two different indicators for

trade regime was motivated by looking at previous studies, where Trade share (OPEN) has been largely employed as a proxy for trade regime while the use of Tariff Burden (TAR) has been neglected. Considering the intrinsic difference between tariff burden and trade share, the question the author here posed herself was whether trade share could actually be considered as a good proxy for trade regime. The author has then decided to first provide an analysis of the relation between growth and trade regime limited to Sub-Saharan Africa by employing the measure TAR, and in a second phase to compare the outcomes when using TAR to the outcomes when employing OPEN for the period 1990-2010, where data for tariffs as well as for trade share were available. Such a strategy was developed as a way to verify whether the conclusions drawn by other authors using trade share could replace the use of more direct indicators as tariff burden by providing the same results.

3.2.1. Sampling problems

The empirical analysis has required the construction of two datasets covering the period 1990-2010 where, *ceteris paribus*, the only differences lies in the indicator chosen to represent trade regime. One remark is due regarding the time span, as in the original idea of the author the study should have covered a longer period of time, ideally from the wave of independence to the late 1990s. However, the statistics for the African continent do not offer as much data as other world regions do, so data limitation had the best over the initial idea, obliging the author to adapt the study to what available even if not ideal. In order to guarantee some sort of validity to the study itself by having a decent number of countries in the sample, the study had to begin with the year 1990. This given, the time span expanded up to 2010 so as to maintain a relatively long-run perspective in the research at hand. The time limit is strongly tied to the sampling problem, which reflected in the selection of a sample of 30 Sub-Saharan African countries (for the complete list of the countries in the sample see Table A1 in the Appendix). Considering the problem of information accessibility, random sampling could not even considered in the case under scrutiny so forcing the author to turn to a convenience sample. The author is aware of the strong limitation that can cause, even more considering the problem arising with heterogeneity, however no better

way to overcome the issue could be found, so requiring to take outcomes of the present study with great caution.

3.2.2. Data selection

The type of data the study is based on is secondary data, which was selected considering the trade-off concerning both time and resources between primary data collection and data analysis. Considering the fact that the study at hand was intended to cover a spectrum of Sub-Saharan Africa as large as possible, collecting primary data for a large panel dataset would have required an enormous amount of time, which the author did not have, while at the same time subtracting precious time from the actual empirical analysis. This given, it was deliberately chosen to rely on secondary data, so as to be able to devote a good deal of time to the practical examination of the issue at hand in order to analyze as deeply as possible the relationship between trade regime and GDP growth rate in Africa. Nonetheless, the author of the present paper is aware of the drawbacks and of the limits of the use of such data. In fact, secondary data might be flawed by mistakes committed by the author of the original dataset, that can be easily transferred to the studies that make use of it if data are blindly taken and processed without undergoing a first control checking. Another risk with secondary data has to do with the fact that the source might have manipulated the data or even worse deliberately chosen not to publish some categories of data, typically for political reasons. In that regard, Jerven claims that

“[...] the arbitrariness of the quantification process produces observations with very large errors and levels of uncertainty” so “the conclusions of any study that compares economic performance across several countries depend on which source of growth evidence is used” (Jerven, 2014)

calling for the necessity of a cautious approach to the data.

Considering the *caveat* provided here, the author has chosen to rely as much as possible on one single data source, in order to guarantee the consistency of the measures and of the methods of data collection, which in turn is expected impacting on the reliability of the study overall. The preference was granted to the African Development Indicators dataset provided by the World Bank, which

collects numerous indicators useful for the examination at hand otherwise difficult to have access to. Keeping in mind that the risk of encountering mistakes affecting dataset compilation increases with the level of data processing, the rawer the data the lower the risk. Such a logic was employed in order to propend for World Bank data over other sources, as the World Bank dataset provides data that are not deeply processed but mainly polished to ease their use. Nevertheless, it is good practice to remember that official statistics from such supra-national institutions on the one hand allow to have access to a broad range of indicators for virtually the whole world, on the other hand might tend to present data accordingly to specific theories considered as orthodox by the international scientific community. This given, such problem was evaluate as less likely than the risk of having to deal with flawed data due to the above mentioned compiling error, so constituting the underlying reason for the discard of other frequently employed datasets as the Maddison dataset (limited to GDP) or the Penn World Tables (providing data on a large selection of indicators) in favor of the World Bank dataset. As for the Maddison database, much has been said in past decades over its reliability since much of the data are only estimates of otherwise missing data. Such a reason has led to a gradual replacement of the Maddison database with other databases as the Penn World Tables, also known as the Summer and Heston database. Again the debate over the validity of the data contained in it has been notable, with a recent article by Johnson et al. (2009) affirming among other things that

“[the] estimates vary substantially across different versions of the PWT [Penn World Tables] despite being derived from very similar underlying data and using almost identical methodologies; that this variability is systematic; and that it is intrinsic to the methodology deployed by the PWT to estimate growth rates. Moreover, this variability matters for the cross-country growth literature. While growth studies that use low frequency data remain robust to data revisions, studies that use annual data are less robust” (Johnson et al., 2009, p.1)

so shedding light on the issues affecting such database.

This given, in the case of a couple of indicators the World Bank dataset did not provide any data, so requiring the author to turn to other databases in order to

find the information needed. Again the logic in the selection of the data source followed the previous guidelines, while making sure of the comparability of the indicators from these different databases with the data from the World Bank dataset. The complementary data were found in the WITS database, where data about trade from different supra-national organization merge into one single dataset, and in the Social Conflicts in Africa Database by Cullen and Salehyan (2012). Regarding the WITS dataset, considering the difficulties in retrieving data about trade for the African continent the only choice available providing a certain amount of data was to rely on such a database. However, two great limitations needs to be recognized. Firstly, only data for tariffs could be found in a sufficient amount to be employed in a multivariate analysis, while no information whatsoever could be found giving account of all the others existing barriers to trade, falling under the umbrella of NTB (Non-Tariff Barriers to trade). Such a limit is a great limit when examining the impact of trade regime on growth in the African region, as typically underdeveloped countries and particularly African countries have been seen to rely greatly on NTB more than on Tariffs as a way to implement trade restrictions. This given, the author of the present paper is aware of the fact that the study at hand constitutes only a limited analysis of the problem due to such a data availability issue, however she gauges that something is better than nothing at all so providing the underlying reason for the choice to carry out the project anyway, without forgetting the strong limitations of it. Secondly, the data were collected from a source that greatly sponsored trade liberalization, which might cause some of the issues recognized by Jerven (2014).

As for the Social Conflicts database, numerous datasets exist giving account of conflicts, however the majority of them limit to a certain type of conflicts over another or to a certain geographical region, which make them incomplete for the purpose of the present report. Such a problem was overcome by the use of the above mentioned Social Conflicts Database, as it list plainly almost any kind of conflicts at any level occurring worldwide. Such data are taken from the Associated Press, Agence France Presse and from the Uppsala University Armed Conflicts Database (Cullen and Salehya, 2012) and compiled into a database without any further processing than the association of a value to any event in relation to the

degree of violence registered and to the extent of the spreading. Again, comments can be made on the reliability of the primary source of the data, namely news agencies, as well as on the goodness of fit of a certain value scale, however even if not ideally perfect such a database seemed to the author being the best choice among all the options practically available thanks to its broad coverage and its compilation's methodology. Even so, the drawbacks previously mentioned need not to be forgotten as they might be considered by some as a limit to the validity of the study.

3.3 VARIABLES DESCRIPTION

$GDP_{i,t}$: GDP per capita growth rate over the period 1990-2010, calculated from data on GDP per capita at constant 2000 US\$ as available on World Bank (2014). The choice of employing GDP per capita growth rate was determined by the relevance of the Malthusian effect in the continent, which would have been hidden when using absolute GDP growth rate. As Barro and Lee (1993) "*at very low incomes [...] the Malthusian effects dominates, and more income leads to more children*".

$OPEN_{i,t}$: Trade shares calculated as the sum of import and export as percentage of GDP, which gives account of the trade volumes of a country. Such a measure has been frequently employed as a proxy for trade openness due to its wide availability. The major drawback however lies in the fact that trade volumes are strongly influenced by the predisposition of a country towards trade, which can be related to exogenous factors as geography, and can be affected by exogenous shocks that nothing have to do with trade openness. The values used in the present research have been calculated departing from values on imports, exports and GDP at constant 2000 US\$ as presented by World Bank (2014).

$TAR_{i,t}$: The measure gives account of the applied tariff barriers to imports for manufacturing goods, ores and metals as imported under the principle of Most Favorite Nation (MFN). The preference accorded to MFN applied tariff was due to the fact that such tariffs are the most widely applied and the most restrictive as they are imposed on all the imports coming from the WTO countries members, lying outside preferential trade agreements and custom unions. The limited

availability of tariffs relatively to Sub-Saharan Africa has constrained the sectors considered, limiting the analysis to the most used and general tariffs as the tariffs on manufacturing goods and metals are. The data were taken from WITS (2014). As mentioned previously, ideally the variable TAR should include also data on NTB, as NTB coverage, given its absolute importance in determining the tendency in trade regime. However, the scarcity of data made such a strategy impossible to be pursued so leading to the creation of the indicator based limitedly on Tariffs. Additionally, the variable TAR has another important limit, having to do with its construction. Built as an average of the applied import tariffs referring to manufacturing, metals and ores it is clear that such a variable does not give full account of the tariffs applied on all imports, as some sectors are excluded. In addition to that, if all the sectors included in the indicator are given the same weight that might provide misleading information since every country is seen to be characterized by a different pattern of imports. Even though the risk of dealing with a biased sample is reduced when taking into account the diversity of the countries considered as well as the fact that the sectors included are generally the most representative in regards to imports, that does not eliminate the problem completely, so constituting an important limit of the present study. As a final remark, the construction of such a direct indicator if on the one hand allows to study the straightforward relationship between trade regime and growth in Sub-Saharan Africa, on the other hand might be too simplistic to capture more subtle tendencies affecting trade regime that are not as striking as tariffs reduction.

DENS_{i,t}: Population-to-land ratio as people per sq. km of land area, derived from the data provided by World Bank (2014). As presented by Sachs and Warner (1995), economic theory expects that the higher the labor-to-land ratio, the higher the benefits from trade liberalization, as it allows to “*benefit from the export of labor-intensive goods and the import of inexpensive food*” (Sachs and Warner, 1995). This given, as no data were available for merely labor-to-land ratio, the author has decided to employ population-to-land ratio as a proxy for it. The choice was also motivated by considering the peculiarities of the labor market structure of Sub-Saharan countries, where still frequently all the components of a household are

seen to take part in the family's economic activities, so widening the typical definition of labor force.

EDU_{i,t}: It gives account of the educational attainment measured as primary completion rate as percentage of the relevant age group. The decision to consider primary completion rate instead of more advanced educational levels has to do with the typical conformation of the African labor market, where the demand for higher educational is minimal. This given, as the demand for superior education is insignificant, its impact on growth can be consequently consider to be negligible. In any case, keeping in mind the specificity of the African labor market and sectoral structure, improvements in basic education are considered to impact on the growth rate of a country as they tend to improve the labor force absorptive capacity that reflects into a higher degree of productivity.

POL_{i,t}: As frequently stated, i.e. Barro and Lee 1993, political instability is considered as a factor able to affect negatively the growth rate of a country. The underlying reason for that lies in the fact that the higher the level of political instability the higher the uncertainty about policies and other elements impacting on economic performances. Such uncertainty can give rise to different example of political distortions, as well as reducing the propensity to invest of both public and private investors. In order to measure the level of political instability, the author of the present research has developed her own index by improving the structure of the *Elite political instability index* constructed by McGowan taking into consideration the variations occurred in the political climate over time. Mbaku (1988) described the original index as follows:

“Elite instability in Sub-Saharan Africa can be indexed by the number of successful coups d’etat, attempted coups and plots to overthrow the government. [...] we assume that each one of these named behavior types is qualitative different and assign weights to each. We then sum to derive a measure for elite instability. Assigning successful coups a weight of 5, attempted coups a weight of 3, and plots a weight of 1, we can produce a scale of elite instability” (Mbaku, 1988, p. 103)

As the index by McGowan limited to the period 1965-1985, the construction of a more update version was required. Additionally, considering the changes in

the way political instability has expressed itself from the end of the 1980s to nowadays, a need for an update also of the typologies of events considered was felt. In fact, since the mid 1990s political instability has modified its features moving from being an expression of elites' political power to become more of a way population employs to dissent with governments and to protest about a wide array of topics. Considering such limitations of the original index, which would have led to neglect some important occurrences, the expansion of the events base was operated to take into consideration a multitude of different events able to affect the level of political stability in the African Countries. The list of events occurred in the countries in the period considered was taken from the *Social Conflicts in Africa Database* which "contains information on protests, riots, strikes, and other social disturbances in Africa. Whereas conflict data is generally available for large-scale events such as civil and international war, the purpose of this dataset is to compile information on other types of social and political disorder" (Cullen and Salehyan, 2012). The database includes date of start, date of end, factions involved and other elements for a number of different levels of social conflicts. They are, from 1 to 10, Organized Demonstrations, Spontaneous Demonstrations, Organized Violent Riot, Spontaneous Violent Riots, General Strikes, Limited Strikes, Pro-Government Violence, Anti-Government Violence, Extra-government Violence, Intra-government Violence and separately reported, with a code of -9, Armed conflicts as reported by the Uppsala University Armed Conflicts Database (ACD). After a lengthy estimation of the importance of each of the categories above mentioned in contributing to the level of political instability of a country, the author of the present research has limited her consideration to the events falling within the categories of Pro-Government Violence, Anti-Government Violence, Extra-government Violence, Intra-government Violence and Armed conflicts. The choice to limit the examination to the categories above has relied on the scale of values presented by Cullen and Salehya in the explanation of their dataset, where such categories are on top of the scale when it comes to level and spread of violence and are expected to be able to weaken or subvert the existing political and social order. The categories considered allow to expand the index by McGowan to include not only coups and plots, but also other occurrences affecting a country's

stability in a more less obvious manner. The author has then employed the same scheme of weights as McGowan adjusting it to the scale by Cullen and Salehya (2012), so granting a value of 1 to Extra-government Violence, 3 to Pro-Government Violence and Anti-Government Violence and 5 to Intra-government Violence and Armed conflicts. The grading scale was motivated by looking at the extent the event spread and at the level of violence. The values were then aggregated by year, summed to obtain a unique yearly value for each country examined to be considered in the regression.

ODAi,t: ODA is defined by the OECD as the “[f]lows of official financing administered with the promotion of the economic development and welfare of developing countries as the main objective, and which are concessional in character with a grant element of at least 25 % (using a fixed 10 % rate of discount). By convention, ODA flows are granted by official agencies of the members of the Development Assistance Committee (DAC), by multilateral institutions, and by non-DAC countries to promote economic development and welfare in countries and territories in the DAC list of ODA recipients” (OECD, 2010). The DAC, acronym of Development Assistance Committee, is the branch of the OECD devoted to the management and recording of the aid flows directed to the list of countries considered to be in need of financial aid. In order to be considered ODA, the aid needs to fulfill three requirements, which are: being undertaken at the official level, with the aim of promoting economic development and on concessional terms as in the definition. The preference of the author went to *Net ODA received as percentage of GDP*, reflecting the actual aid transfer valued at the cost of the donor, as registered by World Bank (2014).

3.4 DESCRIPTIVE STATISTICS

Table 4: Variables Summary Table

Variable	Obs	Mean	Std. Dev.	Min	Max
gdp	630	0.928716	5.206209	-47.2872	37.12006
dens	630	61.89309	75.07479	1	430
edu	397	31.53784	20.36103	4.81315	95.69964
oda	627	11.45592	11.58002	-0.17457	95.53558
tar	273	14.1811	5.175046	4.4	41.73
pol	532	6.216165	11.1521	0	90

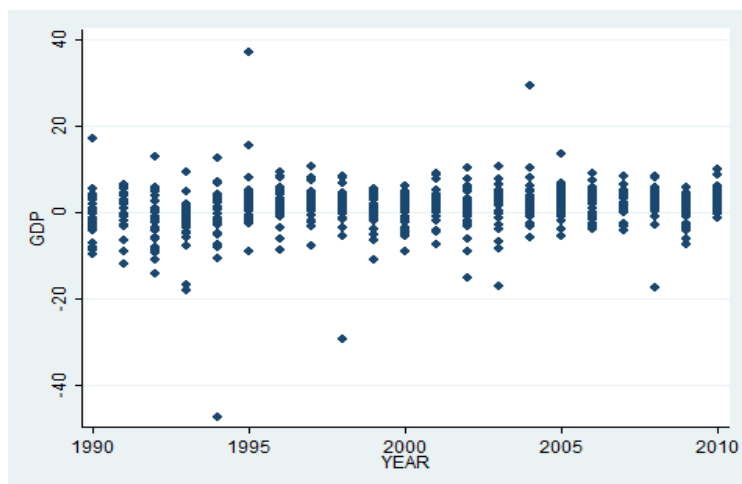
Source: Author Elaboration on World Bank (2014) and WITS (2014) data.

GDP per capita growth rate, annual %; DENS: people per sq. km; EDU: primary completion rate; ODA: Aid flows; TAR: import tariff burden; POL: level of political instability;

Table 4 above shows the summary statistics for the variables considered in the analysis. Our dependent variable, GDP, has a mean of 0.9% just slightly above zero and a standard deviation that stands at 5. Such a value can be considered as quite important, keeping in mind that the variable gives account of GDP per capita annual growth rate, so highlighting that the values vary strongly between countries and over time. As recognizable by looking at Figure A.2, the major source of deviation is Rwanda, with a maximum of +37% and a minimum of -47% (in 1995 and 1994, being 1994 the year when a genocide took place), followed by Chad (+29% and -18%), Guinea Bissau (+9% and -29%), Togo (12% and -16%), Malawi (+15%, -10%). In regards to the GDP trend by country over time, Figure A.1 shows a twofold tendency: on the one hand a number of countries fluctuating around zero with only limited ups and downs, on the other hand countries having notable high and low peaks (as in the case of the countries above mentioned) in correspondence with the occurrence of extreme events as wars, droughts or oil and gas discovery and exploitation, as in the case of Chad in the mid 2000s.

Figure 4 shows the behavior of the variable GDP over time for the sample considered. The graph is clearly depicting a cyclical trend, as the fluctuations appear to repeat themselves with a lag of ten years. However, the graph shows also

Figure 4: GDP Per Capita Growth Rate, 1990-2010.

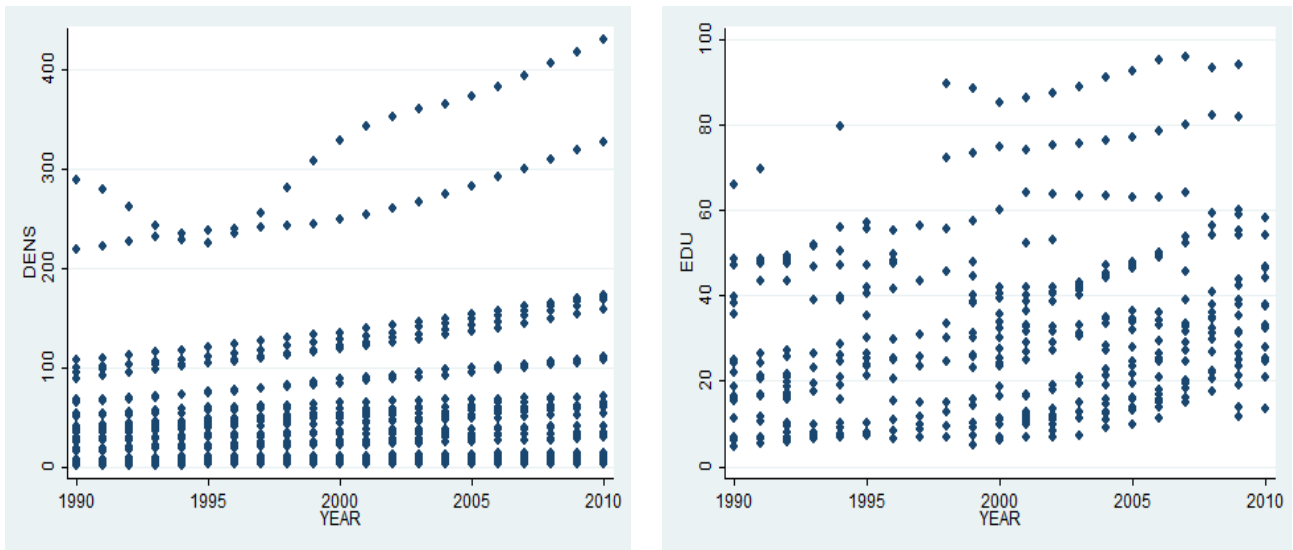


Source: Author's Elaboration on World Bank (2014) data.

As this and the GDP average data by themselves do not appear to say much, when looking backwards at the data presented in the first section of this report, it is possible to see that no major improvements have occurred over time, in spite of great changes in numerous aspects of the Sub-Saharan African political and economical policies.

As for the rest of the variables, the summary statistics presented above do not provide any specific information, so requiring the support of graphical tools. In the case of EDU and DENS, such variables are considered as the more endogenous among the variables examined, however that does not imply the absence of any similarities among the entities in the sample. In that regard, Figure 5 and Figure 6 show an overall increasing trend over time for the sample under scrutiny. The gradual increment in the population-to-land ratio affecting some half of the countries in the sample was to be expected keeping in mind the Malthusian effect previously mentioned. It has to be clarified here that the two lines of observation on top of the graph refer respectively to Rwanda and Nigeria, the most densely populated countries in the continent. The particular shape of the Rwandan line

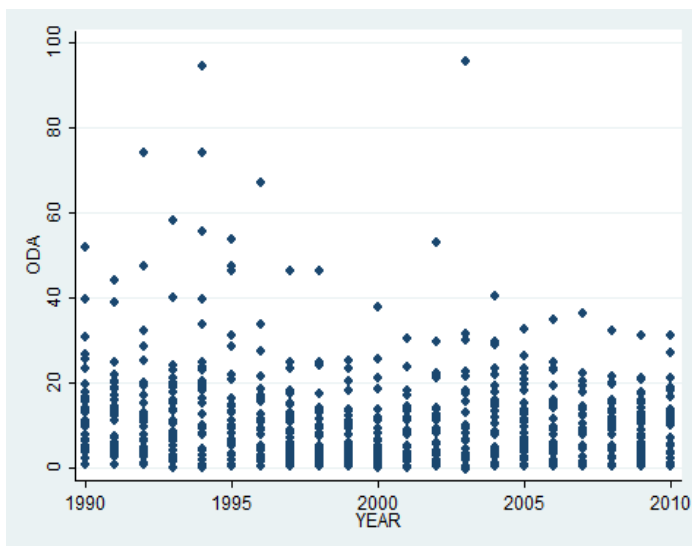
Figure 5 and Figure 6: Population-to-land Ratio and Primary Completion Rate, 1990-2010



Source: Author elaborations on World Bank (2014) data.

depicts the drama of the civil war culminated into the genocide, with a visible decrease from 1990 up to 1995, with a major drop in correspondence of 1994, when some 1/10 of the population was killed. As for EDU, the notable efforts both at national and supra-national level made in regards to improvements in educational achievements reflect in the general increasing trend recognizable in

Figure 7: Official Aid Flows, 1990-2010



Source: Author's Elaborations on World Bank (2014) data.

Figure 7. Besides such a general tendency, the lines on top of the graph show a slow increment (according to the data available), which is motivated by the fact that the decreasing returns to education consent a quick increment for low starting points that

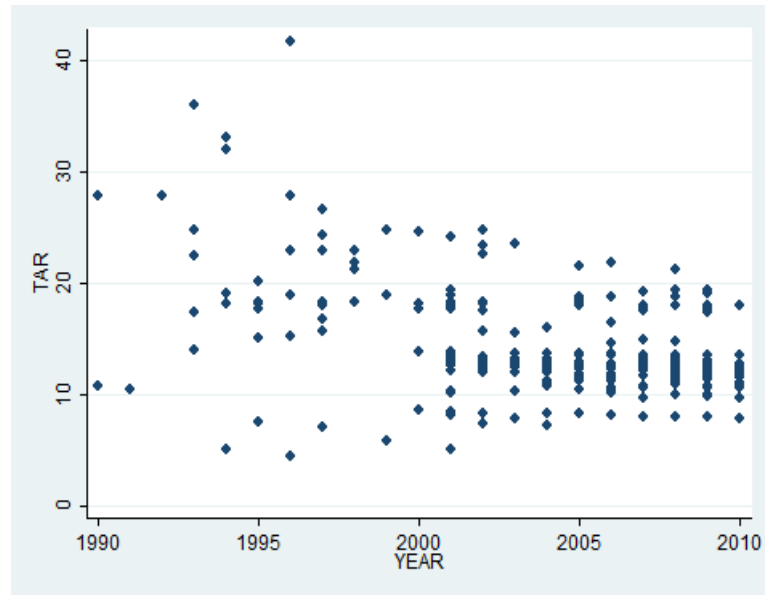
slow down gradually for higher levels of education.

When it comes to POL, such variable shows no definite tendency as it typically reflects outburst of chaos and violence related to the political situation. In spite of a general decrease in the level of political instability worldwide, Sub-Saharan Africa stands as an exception in such a process, as no declining tendency can be found but instead numerous events affecting political instability are seen as still taking place in the continent. A constant trend is seen to characterize the variable ODA, Figure 7, besides a small but recognizable normalization of the values on top of the graph. The latter tendency gives account of the fact that gradually the international community has reduced the aid flows due to a policy of conditionality as well as the rise of the idea that aid flows can be not as beneficial as previously assumed. The debate over aid flows however has impacted great disbursement, intended as over 40% of national GDP, but it has not impacted lower levels of support, under 25% of national GDP, which is seen to remain constant over time.

In regards to TAR, Table 3 shows that the average value for the period 1990-2010 for Sub-Saharan Africa stood just beyond 14%. As expectable however, there are great differences over time and among countries, with a minimum of 4.4% and a maximum of 41%. When examining those values, it is important to consider the country and time variance, as shown by Figure A.1 and Figure 8 respectively. At the country level, the maximum tariff coverage vary from 41% of Zimbabwe, 35% of Rwanda and 33% of Kenya to the 12% of Uganda and Senegal, and the same applies to the minimum levels. The picture becomes clearer when taking into account also the time variable, as depicted in Figure 8, where (discounted the lack of observation for the first half of the period considered) it is possible to recognize an overall convergent trend, both affecting maximum and minimum observation.

The highest observation are seen to move gradually from over 30% to 20% by the end of the period, minimum levels from 5% stabilize at about 8% while the bulk of the observations seems to converge to the range of 10%-15% during the 2000s. As mentioned previously in the paper, such a phenomenon of convergence is not taking place out of nowhere but it is the result of the rounds of negotiations on tariffs reduction included in the SAPs, started in the 1980s and continued gradually in the following decades.

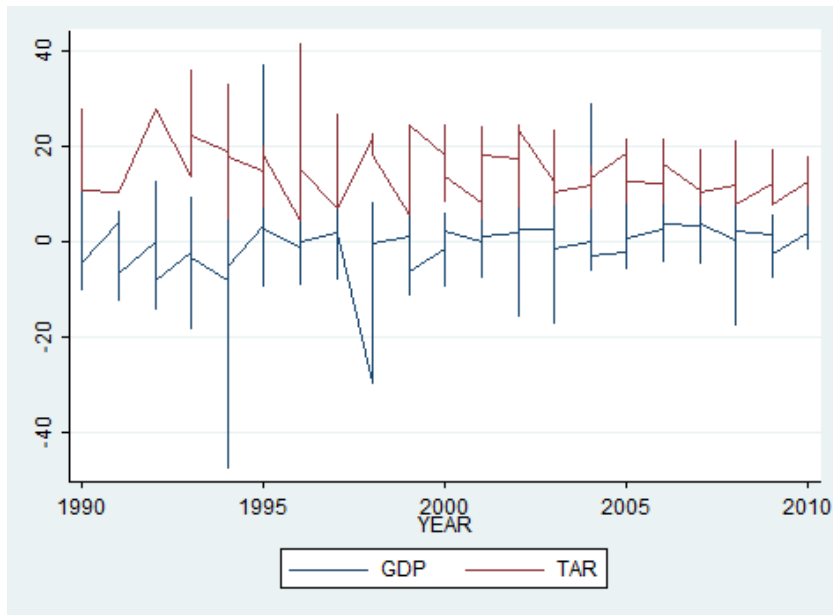
Figure 8: Import Tariff Burden, 1990-2010



Source: Author's Elaborations on WITS (2014) data.

Given such individual variables' tendencies, what really matters for the examination at hand is the analysis of the relation between dependent and independent variable. Figure 9 tiles the tendencies in GDP and tariffs over time, while Figures A.3, A.4, A.5, A.6 replace TAR with the rest of the explanatory variables. As it is possible to recognize in Figure 9 below, no similar tendencies can be find between the two variables implying that if any relation exists, it is not recognizable by sight. The same lack of a clear associability appear to be the case when examining the relation between tariff and GDP by country for the period 1990-2010. Figure A.7 says of no straight association overall, with few exception such as Botswana in the early 1990s, Nigeria and Rwanda for the whole period. Considering these elements and the fact that the direction of the association has not been clearly clarified yet, it is possible to conclude that more advanced tools are needed in order to draw some meaningful conclusions.

Figure 9: GDP-TAR trend, 1990-2010



Source: Author's elaborations on World Bank (2014) and WITS (2014) data.

4. EMPIRICAL ANALYSIS

The author will use methodologies typical of panel data to regress GDP on import tariff burden while controlling for other variables. Panel data methodologies consent to examine simultaneously both time and cross-country dimensions while at the same time offering *“a way to control for many unobservable time-constant characteristics, and can thus help alleviate some of the concerns over omitted variable bias”* (Wooldridge, 2010). Such unobserved factors can be either correlated or uncorrelated with the observed explanatory variables. Typically, a Fixed Effect Model considers such unobserved effects as correlated with the regressors, treating them as fixed unknown parameters. Conversely, a Random Effects Model assumes the unobserved characteristics to be uncorrelated with the independent variables, merging them into the error term.

In the case at hand, the unobserved characteristics are intuitively expected to be correlated with the regressors more than being uncorrelated, considering the unobserved effects as particular unobservable characteristics of the entities in the sample that do not change over time. More specifically, an unobserved characteristics in the present analysis can be the individual propensity to trade of a country, which is constant over time as it is motivated by geographical characteristics or culturally driven. It is clear how such an unobserved factor could be strongly correlated with the measure of trade regime for instance, as we can assume that a country which is more inclined to trade will also have lower tariff barriers and greater trade shares so pointing towards the employment of Fixed Effects.

4.1 REGRESSION ANALYSIS

Despite assuming that running a Fixed Effects model by country is the most appropriate choice for the case at hand, a Hausman test will be run for both panels. The Hausman test assumes no correlation between the explanatory variables and the unobserved effects as the null hypothesis, so providing a method to determine which model to employ. In relation to what above mentioned and the conclusion

provided by the Hausman test, a choice of model will be made for the follow-up analysis.

Table 5: Hausman Test for TAR dataset

Hausman fixed random						
	Coefficients		(b-B)	sqrt(diag(V_b-V_B))	Difference	S.E
	(b) fixed	(B) random				
dens	0.080744	0.009941	5	0.070802	0.0283	411
edu	-0.05235	-0.01072	4	-0.0416314	0.0444	423
oda	-0.10102	-0.08877	8	-0.0122492	0.0341	145
tar	0.063334	-0.02457	7	0.0879029	0.053	54
pol	-0.0064	0.008788	3	-0.0151869	0.0194	122

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(5) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 7.6 \quad 6 \\ \text{Prob}>\text{chi2} &= 0.176 \quad 3 \end{aligned}$$

Source: Author's elaborations on World Bank (2014) and WITS (2014) data.

that according to the Hausman test, the model to be employed when examining the TAR panel should be a Random Effect Model, since no need to recur to Fixed Effects is suggested. However the value of the p-value only suggests such an option, since what really matters is the meaningfulness of the use of such a model.

Table 6 below reports the Hausman test for the OPEN dataset. The table depicts a different picture from the previous one, since the p-value of 0.0212, clearly lower than the standard limit of 0.05 allows to reject the null hypothesis so suggesting a Fixed Effect model being more appropriate.

Considering the contradictory results offered by the Hausman test and the theoretical considerations above stated, the author believes that no strong evidence supports the employment of Random Effects over Fixed Effects, so the decision is to analyze the panels according to the latter so as to guarantee a high degree of consistency throughout the examination. The outcomes of the employment of the Random Effects model will be anyway provided at the end of this chapter as a robustness check.

Table 5 shows the results for the Hausman test relative to the TAR dataset. The null hypothesis of no correlation between unobserved factors and explanatory variables cannot be rejected at standard levels of significance since the p-value of the test stands at 0.17, beyond the common 0.05 limit. This implies

Table 6: Hausman Test for OPEN dataset

Hausman fixed random

	Coefficients		(b-B) Difference	s.e. = sqrt(diag(V_b-V_B))	N
	(b) fixed	(B) random			
dens	0.0039348	0.0098484	-0.00591	0.0202	538
edu	0.0553009	0.0090068	0.046294	0.043	94
oda	-0.037989	0.0067492	-0.04474	0.0297	391
open	0.0237312	0.0064685	0.017263	0.012	183
pol	0.0574947	-0.0098688	0.067364	0.0285	107

b= consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \chi^2(5) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 13.25 \\ \text{Prob}>\chi^2 &= 0.0212 \end{aligned}$$

Source: Author's elaboration on World Bank (2014) data.

aiming at checking if they consent to draw similar conclusion on the above mentioned relationship in light of the numerous previous studies recurring to OPEN as a proxy for trade regime.

4.1.1 TAR Dataset

Moving on to the practical analysis, Table 7 below reports the results of the regressions using Fixed Effects for TAR dataset. The regression has been adjusted for clustered standard errors, which implies that standard errors have been adjusted for the fact that the entities in the sample are not randomly selected, assuming non-independence of the countries in the sample. The importance of that lies in the fact that no specification in terms of standard errors might provide misleading information, which can result in an erroneously big standard error, flawing the analysis.

The present chapter will first offer an investigation of the association between trade regime and growth in Sub-Saharan Africa during the period 1990-2010 by recurring only to the TAR panel. This will be followed by the comparison of the outcomes from the analysis of both TAR and OPEN panels

Table 7: Fixed Effects regression with clustered standard errors

Fixed-effects (within) regression:

TAR

		Number of obs	169
Group variable: countrynum		Number of groups	29
R-sq:		Obs per group:	min 1
within	0.0825		avg 5.8
between	0.0356		max 11
overall	0.0035		
		F(5,28)	8.01
corr(u_i, Xb)=-0.9566		Prob > F	0.0001

	Robust					
gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
dens	0.003935	0.010218	0.39	0.703	-0.017	0.024865
edu	0.055301	0.053048	1.04	0.306	-0.05336	0.163964
oda	-0.03799	0.082475	-0.46	0.649	-0.20693	0.130954
tar	0.063334	0.092655	0.68	0.5	-0.12646	0.25313
pol	0.057495	0.091661	0.63	0.536	-0.13026	0.245254
_cons	-2.20028	3.166984	-0.69	0.493	-8.68755	4.286996
sigma_u	7.135826					
sigma_e	2.807135					
rho	0.865986	(fraction of variance due to u_i)				

Source: Author's Elaborations on World Bank (2014) and WITS (2014) data

It is noteworthy that the option cluster corrects also for heteroscedasticity. This assumed, when analyzing the results what immediately appears evident is the general lack of statistical significance at standard levels for all the explanatory variables included in the regression. As the report is interested in the impact of trade regime on GDP growth rate, it is interesting to note that the p-value relative to TAR of 0.5, notably far from the level of 0.10 considered as the upper limit of statistical significance, affirms of such a explanatory variable not being statistically significant as well as not having notable impacts on growth. In addition to that, the coefficients do not show any interesting element, as no variable can be said to have economic relevance, so claiming of no direct impacts of the explanatory variables as they are on GDP per capita growth rate of Sub-Saharan African during the years 1990-2010. To conclude for the above presented regression, the p-value of the F-

statistics stands at a level of 0.0001, which is extremely close to 0. This implies that the value apt at describing the significance of all the parameters of the regression informs about the fact that the regression at hand can be considered statistically valid overall, so allowing to make inference from it. However, the conclusion that can be drawn from is that no explanatory variable seems to be really able to give account for the GDP growth rate in the period and in the region considered, at least when considered simultaneously.

The implication of what above presented are twofold: either the analysis does not carry any meaning at all, or it is possible that the lack of significance can be due to a more subtle problem as the timing issue. The timing problem cannot be considered to be of second importance, given the fact that numerous scholars have argued about it examining its impacts. Such contributions, among them the one presented above by Wacziarg and Welch (2008), reflect on the fact that the effects of numerous policies can be felt with a lag. It is logical to assume that structural changes as well as shifts in policies do not instantly show their effects, so impacting on future growth (how future depends on a myriad of factors) more than on contemporaneous growth levels. According to these elements, the author of the present paper believes that the inclusion of lags is needed in order to provide the reader with an exhaustive analysis. If relying on Wacziarg and Welch (2008), we would expect trade liberalization to impact on growth for some 10 years after the first wave of liberalization, so requiring a large number of lags for TAR. However, considering that the period under scrutiny follows by a decade the first great trade liberalization, occurred in the early 1980s, we can logically assume that an additional liberalization of trade regime will not have the same strong and long-lasting impact as an *ex-novo* trade liberalization. By assuming so, the impacts will be more limited in time and closer to t_0 as all the mechanisms required to take advantage of trade liberalization are expected to be already in place and working so not requiring to assume extremely postponed effects of an additional wave of trade liberalization for that reason. In regards to the rest of the explanatory variables, it will be logical expecting Population-to-land ratio to have simultaneous effects and the same can be assumed for Education, even though such a variable can show its effects with one or two year lags also. When it comes to Aid Flows and

Political Instability the situation becomes slightly more unclear. In fact, Aid Flows is expected to impact on future growth rate, however as Aid Flows are conditional to the implementation of specific projects for development, their effects can be assumed to follow the timing of such projects, which can vary strongly and without an apparent general logic. Political Instability by its definition is expected to influence economic performances mainly simultaneously, however a certain degree of instability can be expected to affect future periods as the normalization generally takes time to be completed successfully.

This given, a scientific approach will be employed to find out the variables for which lags can have a certain relevance as well as to determine how many lags to include in the new regression, keeping however in mind the above discussion. Autocorrelation and Partial Autocorrelation tests were run for each independent variable up to 5 years backwards. The tests were run for a sample of 5 countries, namely Nigeria, Botswana, Burkina Faso, Kenya and Uganda, selected as representing different characteristics and history of the overall sample and a summary of the results of such a process is provide in Table 8. According to the aggregation of the results of the tests, some 14 lagged variables appeared to be

Table 8: Summary of the results from Autocorrelation (AC) and Partial Autocorrelation (PAC) tests

	dens	edu	tar	pol	oda
BFA		1*,2,3*,4*,5*			1*
BWA	1*	1*,2*,3*,4*			1*
NGA	1*,2*,3,4,5*	1*	1*,2,3*		
KEN	1*,2*3*	1*,2*3*	1*		1*
UGA	1*,2*	1*,2,3*,4*,5*	1*		1*

*statistically significant at 0.05 level

Source: Author's elaborations based on World Bank (2014) and WITS (2014) data

potentially significant. With TAR only limiting to three lags, while EDU and DENS potentially requiring the use of some 5 lags. Surprisingly enough ODA shows a univocal timing pattern, with only one lag expected to be meaningful, while POL

seems not to have postponed effects according to such a methodology. Nonetheless, such a high number of lags could not be added to the basic regression without facing issues in regards to the degrees of freedom, which in turn constrain the estimation of the F-statistics of the regression, undermining the predictive power of the model. It is noteworthy that in the case under scrutiny the maximum number of variables allowed is 10, so limiting the number of lags up to 5. In order to overcome the problem above while at the same time reducing the number of lagged variables in the most scientific and objective manner, a Akaike information criterion test (AIC) was run. Such a test is typically used for the purpose of model and lags selection, as it gives account of the trade-off existing between complexity and goodness of fit. The lowest the result the better the specification, so providing support for the selection of certain lagged variables instead of others. Table A.5 shows the results for different specification where different specifications are used and interchanged. By comparing the AIC values reported, it stands out the fact that the simple regression presented above with the use of only simultaneous variables registers the highest coefficient in the table, so implying that such specification lacks in explanatory ability by leaving too many factors aside. This conclusion supports what above stated, that is not possible to draw significant conclusion from that regression so providing stronger evidence for the necessity to introduce new elements in the analysis. By adding lagged variables the situation improves greatly, with the AIC coefficient dropping from 800.5 from the previous case to 537.7 when adding 3 lags for density and 2 lags for education. The introduction of lagged variables for TAR is seen to provoke another great decline in the coefficient down to 256.21 when including three lags for TAR and one lag for DENS. However, the lowest point of 254.3 is achieved when limiting the lagged variables only to include 3 lags for TAR and none for the rest of the regressors. According to the Akaike test then, lagged TAR variables are seen to be the most significant specification among all the possibilities offered by the combination of Autocorrelation and Partial Autocorrelation test. That is in line with the logical assumptions provided above, where TAR, if it has an impact, is expected to manifest it somewhat postponed but not as postponed as in the case of the first wave of trade liberalization given the fact that no great adjustments need to be

done to take advantage of such an additional tariffs reduction. As expectable, EDU and DENS are seen to have more of a simultaneous impact, despite the suggestions offered by the Autocorrelation and Partial Autocorrelation test, while ODA and POL do not seem to require the addition of lagged variables at least for the panel at hand.

Once determined which lags to use, the resulting regression is expected to carry more meaningful results than the previous one. Table 9 below reports the outcomes of the regression with the supposedly corrected specification.

Table 9: Fixed Effects regression with lagged variables for TAR and clustered standard errors

Fixed-effects (within) regression						
TAR						
Group variable: countrinum			Number of obs	61		
			Number of groups	16		
R-sq:	Obs per group:		min	1		
within	0.1279		avg	3.8		
between	0.0041		max	8		
overall	0.0338					
corr(u_i, Xb) -0.9894			F(8,15)	45.76		
			Prob > F	0		
	Robust					
gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
dens	-0.16537	0.068316	-2.42	0.029	-0.31099	-0.01976
edu	0.055294	0.088857	0.62	0.543	-0.1341	0.244688
oda	0.005716	0.214356	0.03	0.979	-0.45117	0.462604
tar	0.223031	0.213846	1.04	0.313	-0.23277	0.678833
pol	0.04959	0.071008	0.7	0.496	-0.10176	0.20094
lag1tar	0.931117	0.234055	3.98	0.001	0.432241	1.429993
lag2tar	-0.22756	0.228037	-1	0.334	-0.71361	0.258489
lag3tar	0.288675	0.350752	0.82	0.423	-0.45894	1.036286
_cons	-3.51469	6.09083	-0.58	0.572	-16.497	9.467606
sigma_u	12.75293					
sigma_e	2.191048					
rho	0.971329 (fraction of variance due to u_i)					

Source: Author's elaborations on data from World Bank (2014) and WITS (2014)

First of all, we register a loss of entities between this regression and the previous one, however such fact is not seen to undermine the validity of the new regression at all. In fact the p-value of the present regression, $P > F$, lies in the territory of statistical significance, as a p-value of 0 says of a strongly fair amount of validity of the test overall so allowing to neglect the fact that few countries were excluded from the analysis due to lack of data. This given, the introduction of lagged TAR variables is seen to impact greatly on the basic specifications. In fact DENS assumes great statistical significance in the new regression, with a p-value of 0.029 that constitutes a notable improvement from the 0.703 of the simple regression, however the coefficient turn from slightly positive to negative. Such a fact means that for one % increment in population-to-land ratio we can expect a decrease of 0.16% in growth rate. Besides that, also POL and TAR are seen to acquire some new significance, as the comparison of the p-values shows, from 0.53 to 0.49 for POL and from 0.5 to 0.31 for TAR. In regards to TAR it is important to highlight that to the improvement in statistical significance corresponds also an increment in the economical impact over growth, as for every additional percentage of tariffs it is possible to expect a beneficial effect on GDP per capita growth in Sub-Saharan Africa of some 0.22%. Among the basic specifications, EDU appears being the only variables losing significance, however as EDU was not statistically significant before the fact does not assume any importance. Regarding the lagged variables, statistically speaking only LAG1TAR registers a strong and evident significance, while LAG2TAR and LAG3TAR show a decreasing statistical significance, from a p-value of 0.33 for LAG1TAR to 0.42 adding another lag. The lagged variables, along with TAR, are seen to impact the most among the specifications in the regression on growth. Particularly, LAG1TAR carries strong economical power since its coefficient stands as high as 0.931 so implying that for 1% increment in tariff barriers, the growth rate of GDP per capita will benefit the next year almost in the same way, 0.93%. Conversely, the LAG2TAR coefficient depicts another story, with tariffs affecting negatively growth in Sub-Saharan Africa as we could have expected if relying on the orthodox literature. Again the results are overturned by LAG3TAR that, keeping in mind its low statistical significance, is assumed to have a positive impact on future growth of some 0.3%.

As a robustness check the outliers emerging from the descriptive statistics were removed, running the same regression with and without them. Nevertheless, no difference could be highlighted in the outcomes so allowing to conclude that such outliers are not responsible for any variations in the regression.

In order to sum up the outcomes of the regression presented above, we see the major effect of TAR being postponed of one year, while having some sort of importance simultaneously as well as up to 3 years backwards. As highlighted the effects of TAR and lags TAR varies also in regards to the direction of the effects, alternating positive to negative with no solution of continuity. Such an inconsistent tendency when it comes to the effects of tariff barriers does not allow to draw any strong and univocal conclusion about the effect of trade regime. Such a results could be however due to at least a couple of reason. The first in order of importance has to do with the time period under scrutiny. In fact, it has been mentioned already that the period 1990-2010 covers the second phase in the trade liberalization process implemented in Sub-Saharan Africa. More specifically, the lack of data prevented the author from analyzing the previous phase, when the first great reduction in tariff and non-tariff barriers occurred. Considering the difficulties in isolating the effects of trade policies from other policies or events, it will be logic to expect that such effects could more visible in the first phase, than in the second phase when other factors can confuse the results. In addition, a longer period including the first liberalization in trade regime would have allowed to develop a broader perspective over the timing issues, which seems to be extremely relevant for the topic at hand. In spite of these limitations that can affect the validity of the results of this study, the author believes that such outcomes can depict another kind of picture, as the fact that in Sub-Saharan Africa does not appear to be any direct relationship between trade regime and growth. That means the absence of a direct relationship between the two, but not the absence of any relationship whatsoever. In fact, it seems as trade regime is one element among other that can contribute to growth. If that is the case as the author believes, the fostering/hindering effects of trade regime on GDP per capita growth rate can be reasonably expected to be subdued to contingency in the African continent.

4.1.2 Comparative analysis

The present section will provide the comparison of the results achieved by employing TAR opposed to the results when using OPEN as a proxy for trade regime. The need for benchmarking the analysis above with a more widely used indicator of trade regime as it is OPEN was due to the general neglect of TAR in favor of OPEN in previous literature. Nonetheless the author of the present paper, in light of the explanation provided above about the construction of OPEN, would like to affirm that such an attempt aims at answering to the needs of completeness but it receives no personal favor from the author herself. Since the variable OPEN, as it is, behind a façade as a measure of trade regime masks other factors, which can take the shape of exogenous shocks, policies others than trade policies, and many more.

The comparative analysis of the simple regressions provides a picture that is not dissimilar when replacing TAR with OPEN. As in Table 10 below, the only difference between the two panels lies in the fact that OPEN appears to more statistically significant than TAR at this stage with a p-value of 0.279 versus 0.5, however its impact on growth seems to be absolutely negligible. Besides that, as already noticed before for TAR, none of the explanatory variables when taken into consideration simultaneously appear to have explanatory power in the case under scrutiny. As expectable, the need for the inclusion of lagged variables feels strong not only for the TAR dataset, but in the same way for OPEN. Considering the reasoning provided above about the selection of lagged variables for the panel TAR, we will employ the same number and types of lags also when analyzing the panel OPEN as a way to maintain as high as possible the degree of consistency of the comparison.

Tab.10: Fixed Effects regression with clustered standard errors for OPEN and TAR

OPEN						TAR					
			Number of obs	251					Number of obs	169	
Group variable: countrynum			Number of groups	29		Group variable: countrynum			Number of groups	29	
R-sq:			Obs per group:	min	1	R-sq:			Obs per group:	min	1
within	0.0368			avg	8.7	within	0.0825			avg	5.8
between	0.0046			max	16	between	0.0356			max	11
overall	0					overall	0.0035				
				F(5,28)	1.68					F(5,28)	8.01
corr(u _i , X _b)=-0.6873			Prob > F		0.1723	corr(u _i , X _b)=-0.9566			Prob > F		0.0001
Robust						Robust					
gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
dens	0.003935	0.010218	0.39	0.703	-0.017 0.024865	dens	0.003935	0.010218	0.39	0.703	-0.017 0.024865
edu	0.055301	0.053048	1.04	0.306	-0.05336 0.163964	edu	0.055301	0.053048	1.04	0.306	-0.05336 0.163964
oda	-0.03799	0.082475	-0.46	0.649	-0.20693 0.130954	oda	-0.03799	0.082475	-0.46	0.649	-0.20693 0.130954
open	0.023731	0.021489	1.1	0.279	-0.02029 0.06775	tar	0.063334	0.092655	0.68	0.5	-0.12646 0.25313
pol	0.057495	0.091661	0.63	0.536	-0.13026 0.245254	pol	0.057495	0.091661	0.63	0.536	-0.13026 0.245254
_cons	-2.20028	3.166984	-0.69	0.493	-8.68755 4.286996	_cons	-2.20028	3.166984	-0.69	0.493	-8.68755 4.286996
sigma_u	3.051347					sigma_u	7.135826				
sigma_e	4.048954					sigma_e	2.807135				
rho	0.362218 (fraction of variance due to u _i)					rho	0.865986 (fraction of variance due to u _i)				

Source: Author's elaborations on World Bank (2014) and WITS (2014) data

Figure 11 below reports the regression for both panels when adding lagged explanatory variables. First of all, both regression appear to have a F statistic that allows to consider them trustful at least in statistical sense, in fact the p-value is below the critical value of 0.05 in both cases. Turning to the explanatory variables, we see of few similarities between. However the similarities stop when examining the coefficients since only LAG1TAR seems to hold a good level of explanatory power, while LAG1OPEN's coefficients stands at only 0.05 so nullifying its predictive power.

Table 11: Fixed Effects Regressions for OPEN and TAR with lagged variables and clustered standard errors

OPEN						TAR					
Group variable: countrynum		Number of obs		213		Group variable: countrynum		Number of obs		61	
		Number of groups		24				Number of groups		16	
R-sq:		Obs per group:		min		R-sq:		Obs per group:		min	
within	0.0597	avg		1		within	0.1279	avg		1	
between	0.0242	max		8.9		between	0.0041	max		3.8	
overall	0.0229			15		overall	0.0338			8	
corr(u _i , X _b)=-0.5071		F(8,23)		3.21		corr(u _i , X _b)=-0.9894		F(8,15)		45.76	
		Prob > F		0.0135				Prob > F		0	
Robust						Robust					
gdp	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	gdp	Coef.	Std. Err.	t	P>t	[95% Conf Interval]
dens	0.013322	0.027223	0.49	0.629	-0.04299 0.069636	dens	-0.16537	0.068316	-2.42	0.029	-0.31099 -0.01976
edu	0.021679	0.07963	0.27	0.788	-0.14305 0.186406	edu	0.055294	0.088857	0.62	0.543	-0.1341 0.244688
oda	0.071955	0.088669	0.81	0.425	-0.11147 0.255381	oda	0.005716	0.214356	0.03	0.979	-0.45117 0.462604
open	-0.03704	0.027363	-1.35	0.189	-0.09365 0.019562	tar	0.223031	0.213846	1.04	0.313	-0.23277 0.678833
pol	-0.00884	0.070732	-0.13	0.902	-0.15516 0.137478	pol	0.04959	0.071008	0.7	0.496	-0.10176 0.20094
lag1open	0.05384	0.028492	1.89	0.071	-0.0051 0.11278	lag1tar	0.931117	0.234055	3.98	0.001	0.432241 1.429993
lag2open	0.047755	0.040515	1.18	0.251	-0.03606 0.131566	lag2tar	-0.22756	0.228037	-1	0.334	-0.71361 0.258489
lag3open	-0.04087	0.029585	-1.38	0.18	-0.10208 0.020326	lag3tar	0.288675	0.350752	0.82	0.423	-0.45894 1.036286
_cons	-2.01721	3.255774	-0.62	0.542	-8.75229 4.717876	_cons	-3.51469	6.09083	-0.58	0.572	-16.497 9.467606
sigma_u	2.63638					sigma_u	12.75293				
sigma_e	3.797218					sigma_e	2.191048				
rho	0.325255 (fraction of variance due to u _i)					rho	0.971329 (fraction of variance due to u _i)				

Source: Author's elaborations on World Bank (2014) and WITS (2014) data

Besides that, if we expected the effects of the lagged variables fading as for TAR we are contradicted by OPEN, where the LAG3OPEN possess a greater statistical significance than the previous lag. In spite of that the coefficients do not acquire importance, but they instead decline to 0.04 to -0.04 for LAG3OPEN, which is incomparably lower than the coefficients belonging to lagged TAR. One interesting thing to note has to do with the sign of the association between OPEN and GDP, even if almost insignificants the coefficients do show a contradictory tendency as noted previously with TAR. To conclude, the overall predictive power of the panel OPEN is clearly lower than the predictive power of TAR, and that can be due to the conformation of the indicator itself which may mask the true effects of trade regime's variation among other factors. This given, it is noteworthy that even when

employing another kind of proxy as OPEN the relationships between GDP growth rate and trade regime in Sub-Saharan Africa does not become clearer. Such fact can be interpreted as another piece of evidence supporting the assumptions made above in regards to the non-existence of a direct relationship between trade regime and growth in Sub-Saharan Africa.

4.2 ROBUSTNESS CHECK

With the aim to provide one last robustness test, the TAR dataset will be tested also accordingly to the Random Effects Model, to see if that allows to draw different conclusion than the ones drawn so far. Considering the fact that in the case of Random Effects the differences between entities are assumed not to be correlated with the explanatory variables so ignoring them by including them in the error terms. Table 12 below provides the outcomes of the simple regression for the TAR panel data by using a Random Effects model.

Table 12: Random Effects regression with clustered standard errors for TAR

Group variable : countrynum		Number of obs	169		
		Number of groups	29		
R-sq:		Obs per group:	min	1	
within	0.0428		avg	5.8	
between	0.0725		max	11	
overall	0.0117				
corr(u_i, X)= 0 (assumed)		Wald chi2(5)	7		
		Prob >chi2	0.2208		
		Robust			
	Coef.	Std. Err.	z	P>z	[95% Conf Interval]
gdp					
dens	0.009942	0.00486	2.05	0.041	0.000416 0.019467
edu	-0.01072	0.023557	-0.45	0.649	-0.05689 0.035455
oda	-0.08877	0.078846	-1.13	0.26	-0.24331 0.065765
tar	-0.02457	0.096894	-0.25	0.8	-0.21448 0.16534
pol	0.008788	0.029874	0.29	0.769	-0.04976 0.06734
_cons	2.444155	2.346464	1.04	0.298	-2.15483 7.043141
sigma_u	2.495326				
sigma_e	2.807135				
rho	0.441398 (fraction of variance due to u_i)				

Source: Author's elaboration on World Bank (2014) and WITS (2014) data

According to the regression at hand, when including the unobserved factors into the residuals e obtain a slightly different picture than when using Fixed Effects. First of all, DENS assumes a strong statistical significance, with a p-value of 0.041, that reverses the insignificance predicted by Fixed Effects. TAR instead is seen to become notably more irrelevant, as the p-value of 0.8 can easily tell. Concerning the rest of the explanatory variables, all of them show some variation in significance however none of them can be told to assume new significance in strictly statistical terms. When looking at the coefficients, it is pretty clear that the values do not say of the presence of great predictive power for any of the explanatory variables, since the impacts such variables have on growth can be judged as totally irrelevant. Again, the simple regression does not provide any information itself, which strongly supports the necessity to introduce lagged explanatory variables in order to examine the relationship between trade regime and GDP per capita growth in Sub-Saharan Africa.

Table 13 shows the effects when adding lagged variables for tariffs, which affects strongly the regression's outcomes overall. The first thing to take notice of is that DENS loses all of its statistical significance when introducing lagged variables in favor of TAR and TAR lags. Besides that, a minor but still mentionable effect is the loss of significance of ODA, moving from 0.26 to 0.987. POL and EDU do show some variations, however they are only negligible. In terms of coefficients, none of the coefficients for the above mentioned explanatory variables can be considered as holding explanatory power. When turning to the examination of TAR and its lags the situation changes drastically. As for TAR, the variable is seen to acquire greater statistical significance not only limitedly to the previous case but also in comparison with the results obtained with Fixed Effects.

Table 13: Random Effect regression with clustered standard errors and lagged variables for TAR.

Group variable : countrynum		Number of obs =	61		
		Number of groups =	16		
R-sq:		Obs per group: min =	1		
within	0.0482	avg =	3.8		
between	0.2907	max =	8		
overall	0.1695				
		Wald chi2(8) =	252.7		
corr(u_i, X)= 0 (assumed)		Prob >chi2 =	0		
 (Std. Err. adjusted for 16 clusters in countrynum)					
		Robust			
gdp	Coef.	Std. Err.	z	P>z	[95% Conf.Interval]
dens	0.002206	0.006262	0.35	0.725	-0.01007 0.014479
edu	-0.01844	0.025932	-0.71	0.477	-0.06926 0.032389
oda	-0.00159	0.094134	-0.02	0.987	-0.18609 0.182914
tar	-0.25266	0.166251	-1.52	0.129	-0.57851 0.073186
pol	-0.01176	0.039552	-0.3	0.766	-0.08928 0.065762
lag1tar	0.750271	0.193844	3.87	0	0.370343 1.130198
lag2tar	-0.69484	0.299537	-2.32	0.02	-1.28192 -0.10776
lag3tar	0.003946	0.412412	0.01	0.992	-0.80437 0.812259
_cons	4.784363	2.886253	1.66	0.097	-0.87259 10.44132
sigma_u	1.341516				
sigma_e	2.191048				
rho	0.272662	(fraction of variance due to u_i)			

Source: Author's elaborations on World Bank (2014) and WITS (2014) data.

In addition to that, with Random Effects the explanatory power of TAR is notable, however if here for 1% increment in Tariff barriers the GDP per capita growth rate is expected to decline of a 0.25%, with Fixed Effects it was expected to provoke an improvement of almost the same magnitude, 0.22%. Proceeding with the lagged variables, LAG1TAR is strictly significant as when using Fixed Effects, however its coefficient is relatively smaller, 0.75 compared to 0.93. LAG2TAR appears to be as strongly significant as LAG1TAR, however it is expected to carry negative effects on future growth as for an increment in tariff burden GDP per capita growth rate is assumed to decline of some 0.7% two years afterwards. LAG3TAR instead does not hold strong meaning as both its statistical as its economical relevance are negligible.

Considering what above presented, it seems as both models carry similar conclusions, with LAG1TAR being the strongest specification for GDP growth rate to which needs to be added the fact that in spite of the model employed no univocal direction is seen to characterize TAR and its lags.

5. CONCLUSION

In light of what presented in the previous empirical analysis, it is now possible to examine the outcomes within the framework provided by the theoretical background. The attempt of such study was to verify whether the employment of a straightforward indicator as the import tariff burden could reveal any evidence in support of either a beneficial or non-beneficial effects of trade liberalization on the rate of growth of GDP per capita in Sub-Saharan Africa. According to what a great number of scholars have stated over the past decades, the logical expectation was to be able to find a strongly significant beneficial impact of the reduction of Tariff burden on imports, as that was considered to foster technological appropriation and consequently economic growth. However, the evidence provided suggest of no univocal and direct association between trade and growth, in spite of the indicator and the model employed to analyze it. In fact, a significant and negative association between TAR and GDP, as expectable by relying on previous studies, is registered only for t_{-2} while in t_0 and t_{-1} we register the contrary, saying of the existence of a robust and meaningful positive relation between GDP per capita growth and tariffs. According to such evidence, the present research concludes that no clear evidence can be drawn in regards to the period 1990-2010 about the impact of trade liberalization on growth for the African continent. It has to be mentioned however, that the biggest reductions in terms of tariff burden came in the decade that precede the period under scrutiny, so leaving enough space to question whether such a conclusion could remain intact if data for the previous period were available. Such a reflections is necessary considering that typically drastic changes in the *status quo* of a country are expected to carry the most evident results, while when the process is ongoing for some years it might be that the evidence once strong faded away with the time and the normalization of the situation. If this was the case, trade liberalization could not be considered as the *panacea* tout court but its effects would be determined by the situation a certain country found itself in.

The attempt at finding a way to get beyond the problem of data availability by recurring to the use of Trade shares was seen to result in a vain attempt. On the

one hand, according to the data at hand, it is not possible to affirm that tariff burden and trade shares can be interchanged as a proxy for trade regime, as the results they carry are widely different, with tariffs assumed having a large predictive power on GDP per capita growth rate and trade shares being almost insignificant when it comes to explain growth. On the other hand, the fact that OPEN carries such meaningless evidence leads to think that such proxy is not as accurate as the simple tariff burden. Considering the structure of such indicator the evidence provided is not unexpected, since the diverse factors merging into the OPEN indicator might have contrasting tendencies so masking the individual effect of trade liberalization among the rest. In addition to that, the doubtful meaning of such an indicator constitutes, according to the author, a question mark itself as the use it has been made of it in the past (due to its wide availability) does not improve its meaningfulness. Relying on the results at hand, it is not possible to confirm what other studies have previously stated that trade shares can be considered as a good proxy for trade regime. In fact, the use of tariff burden seems to allow to make more inference than by employing trade shares. Consequently, it is also not possible for the author to state anything regarding the beneficial effects of free trade based on the use of trade shares, as again the plain evidence is that no economical power is granted to such a regressor.

To conclude, since no univocal conclusion can be drawn from the analysis at hand, that leads to think that if a relationship between the two variables exists in Sub-Saharan Africa it is merely a contingent one, as other factors are expected to play a role as strong and as significant as the one of trade regime. Such a conclusion seems to provide support to the explanation proposed by Rodriguez and Rodrik (2000), who say that *"[w]e are in fact skeptical that there is a general, unambiguous relationship between trade openness and growth waiting to be discovered"*. As the evidence provided above seems to suggest, it seems the case where domestic and external characteristics combine with trade regime determining the success or the failure of a trade liberalization policy in Sub-Saharan Africa. If that is so, we can assume that the impacts of trade liberalization are in large part determined by the conditions of the country itself where such a policy is implemented more than the other way around. An example of this is

provided by Rodrik (2009), where the author claims that trade liberalization in a context of low social returns will do no good to the economic performances, but instead depressing it. At the same time, the attempt to reduce market distortions by applying one-fit-all policies in regards to trade regime can be as negative as not implementing any policy at all, since what matters is the adaptation to the host country's conditions.

5.1 SUGGESTIONS FOR FUTURE RESEARCH

The limits of the study have been already mentioned, so it will be just enough to say that further research is needed in order to fill the gap that still remains open after the conclusion of this study, particularly in regards to the collection of data on tariff burden for previous periods, which might consent to come to an agreed conclusion on the topic. As time and resources availability did not allow the author to go any further, the hope is that this study will be considered as a starting point for a new wave of research on the topic of trade liberalization, focusing on the polishing of the tariff burden indicator so as to develop a better indicator able to stand alone without requiring other proxies to be employed any longer. Besides that, the hope is that new data for tariffs will be made available to the public so as to make data collection less complex and time consuming, as well as allowing to have panels less sparse in data for tariffs.

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7. APPENDIX

Table A.1: List of Countries

Burundi, Burkina Faso, Botswana, Central African Republic, Cote d'Ivoire, Cameroon, Republic of the Congo, Gabon, Ghana, Gambia, Guinea Bissau, Kenya, Lesotho, Madagascar, Mali, Mozambique, Malawi, Namibia, Niger, Nigeria, Rwanda, Sudan, Senegal, Swaziland, Tchad, Togo, Uganda, South Africa, Democratic Republic of the Congo, Zimbabwe.

Table A.2: Summary statistics

Variable		Mean	s.d.	Min	Max	Obs
gdp	overall	0.928716	5.206209	-47.2872	37.12006	N
	between		1.795249	-3.49485	3.615294	n
	within		4.897363	-49.3851	35.02217	T
dens	overall	61.89309	75.07479	1	430	N
	between		74.50939	1.761905	321.1905	n
	within		16.15851	-34.2974	170.7026	T
edu	overall	31.53784	20.36103	4.81315	95.69964	N
	between		18.07913	8.036756	86.80955	n
	within		7.374363	3.887767	57.3218	T-bar
oda	overall	11.45592	11.58002	-0.17457	95.53558	N
	between		8.875047	0.323515	34.50124	n
	within		7.619752	-11.5188	91.70196	T-bar
tar	overall	14.1811	5.175046	4.4	41.73	N
	between		3.478818	9.243846	21.21625	n
	within		3.844273	1.649432	34.69485	T-bar
pol	overall	6.216165	11.1521	0	90	N
	between		6.407179	0	26.85714	n
	within		8.965151	-18.641	69.35902	T-bar

Source: Author's elaborations based on World Bank (2014) and WITS (2014) data.

Table A.3: GDP per capita growth rate summary statistics by country

COUNTRY	mean	sd	max	min
BDI	-1.17893	3.844487	4.04271	-8.97327
BFA	2.42514	2.944356	7.98459	-3.23993
BWA	3.04532	3.256204	8.28767	-6.11013
CAF	-1.04191	3.721529	4.61467	-8.77827
CIV	-0.746963	2.82589	4.78291	-5.66761
CMR	-0.463711	3.530747	2.62596	-8.76875
COG	0.313824	3.702159	6.02284	-8.00518
GAB	-0.292832	3.573389	4.62597	-11.1153
GHA	2.38885	1.441549	5.85878	0.4961
GMB	0.57805	2.763567	3.92204	-6.08781
GNB	0.006498	7.748103	9.41099	-29.4834
KEN	0.269748	2.260637	4.298	-3.97735
LSO	2.44574	1.783618	5.35595	-1.3303
MDG	-0.711048	4.844949	6.50282	-15.3063
MLI	1.66095	3.0513	8.78246	-4.62748
MOZ	3.60235	3.764948	8.96066	-8.09208
MWI	1.75315	5.908008	15.4156	-10.7044
NAM	1.80448	3.215662	10.3489	-4.87222
NER	-0.499144	3.76457	6.62943	-9.48462
NGA	2.27349	2.839427	7.89796	-2.24856
RWA	3.0266	14.19129	37.1201	-47.2872
SDN	3.19865	3.755488	9.08274	-8.25272
SEN	0.615702	2.209841	3.81541	-3.6143
SWZ	2.32654	3.530266	16.9577	-1.05118
TCD	2.40374	9.438068	29.1035	-18.2095
TGO	-0.269337	6.117168	12.52	-16.7279
UGA	3.61529	2.101925	8.1095	0.0266
ZAF	0.751527	2.478264	4.42562	-4.15782
ZAR	-3.49485	6.531447	4.67369	-16.9191
ZWE	-1.94546	7.37805	8.77034	-17.4726

Source: Author's elaborations based on World Bank (2014) data.

Table A.4: Import Tariff Burden summary statistics per country

COUNTRY	mean	sd	max	min
BDI	16.85	4.442403	23.43	12.49
BFA	13.7482	3.655863	24.76	12.34
BWA	10.57	2.914621	17.27	5.76
CAF	17.8857	0.7467	18.8	16.36
CIV	13.822	3.716049	22.5	11.98
CMR	17.7171	0.223287	18.05	17.44
COG	18.092	0.862943	19.1	16.74
GAB	18.1089	0.178986	18.34	17.84
GHA	12.925	0.741424	13.92	12.34
GMB	19.2933	0.037859	19.32	19.25
GNB	13.534	0.128426	13.69	13.33
KEN	15.485	6.789888	33.01	11.36
LSO	10.5062	2.950527	17.27	5.76
MDG	10.5514	3.110409	13.62	5
MLI	12.6836	0.758779	14.96	12.36
MOZ	11.126	2.830988	15.7	5
MWI	19.3733	7.696053	31.91	12.56
NAM	11.19	4.988812	17.27	5.76
NER	12.791	0.09769	13.03	12.65
NGA	19.7893	6.775586	27.79	10.61
RWA	18.2425	8.77657	35.93	10.26
SDN	16.9317	6.354064	22.63	4.4
SEN	12.401	0.169735	12.68	12.19
SWZ	10.8554	2.980807	17.27	5.76
TCD	17.06	2.089464	18.34	11.98
TGO	13.167	0.261918	13.52	12.66
UGA	10.1782	2.114719	12.34	7.14
ZAF	9.24385	3.296985	17.27	5.76
ZAR	12.282	0.237635	12.56	12.03
ZWE	21.2162	9.015147	41.73	13.1

Source: Author's elaborations based on WITS (2014) data

Table A.5: Akaike Information Criterion

1. xtreg gdp dens edu oda tar pol, fe cluster (countrynum)

Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
		-169	-402.53	395.2556	5	800.5113	816.1608

2. xtreg gdp dens edu oda tar pol lag1tar lag2tar, fe cluster (countrynum)

Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
	80	-16	-1.3099	155.8698	7	325.7396	342.4138

3. xtreg gdp dens edu oda tar pol lag1tar lag2tar lag3tar,
fe cluster(countrynum)

Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
	61	-12	-3.3286	119.1538	8	254.3076	271.1945

4. xtreg gdp dens edu oda tar pol lag1tar lag2tar lag3tar lag1dens,
fe cluster(countrynum)

Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
	61	-12	3.3286	-119.106	9	256.2121	275.2099

5. xtreg gdp dens edu tar oda pol, lag1edu lag2edu lag3edu lag1dens
lag2dens, fe cluster(countrynum)

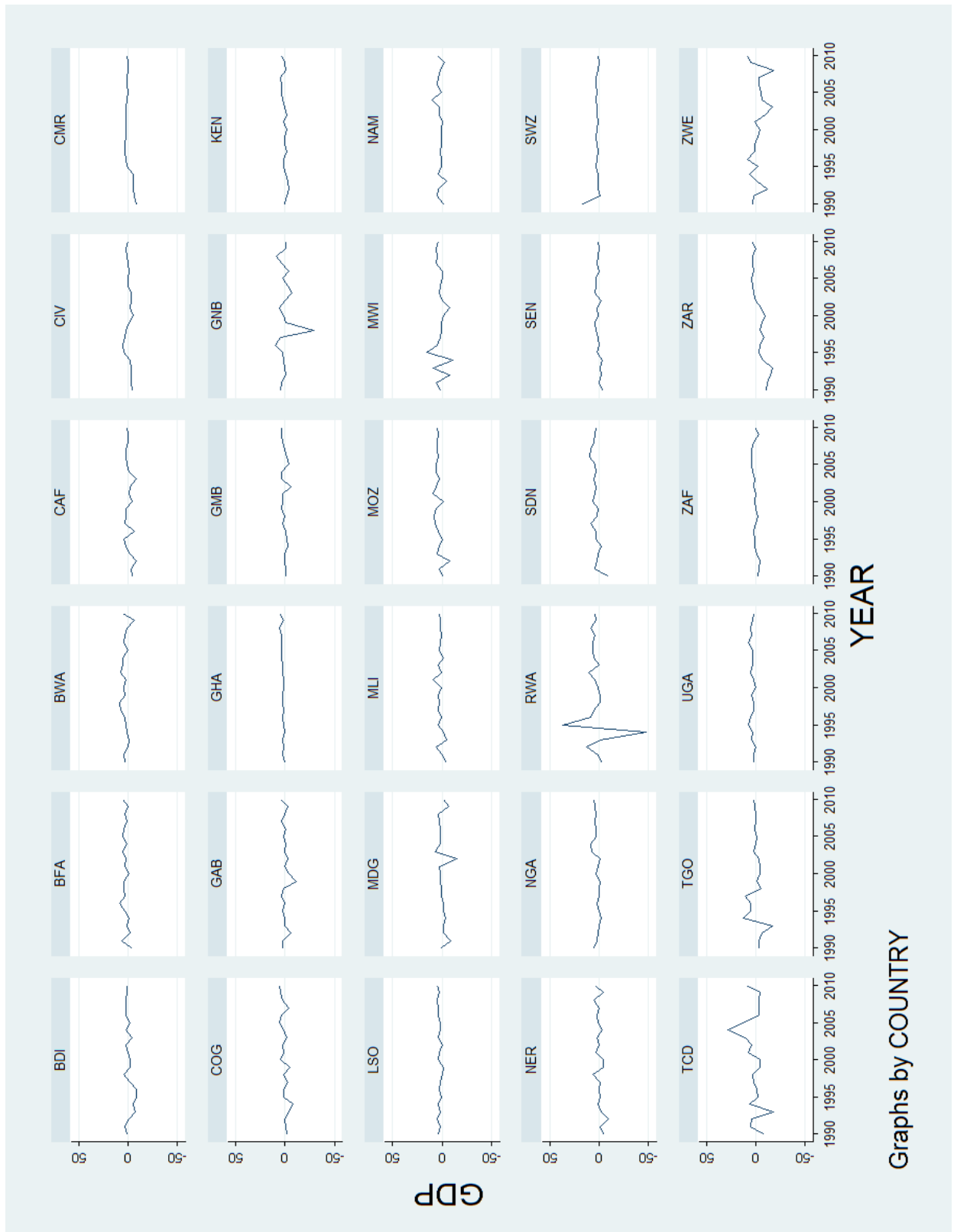
Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
	111	-27	-1.5978	258.8795	10	537.7589	564.8542

6. xtreg gdp dens edu tar oda pol lag1dens lag2dens lag3dens lag1tar
lag2tar, fe cluster (countrynum)

Model	Obs	ll	(null) l	l(model)	df	AIC	BIC
	80	-16	-1.3099	154.9694	10	329.9388	353.759

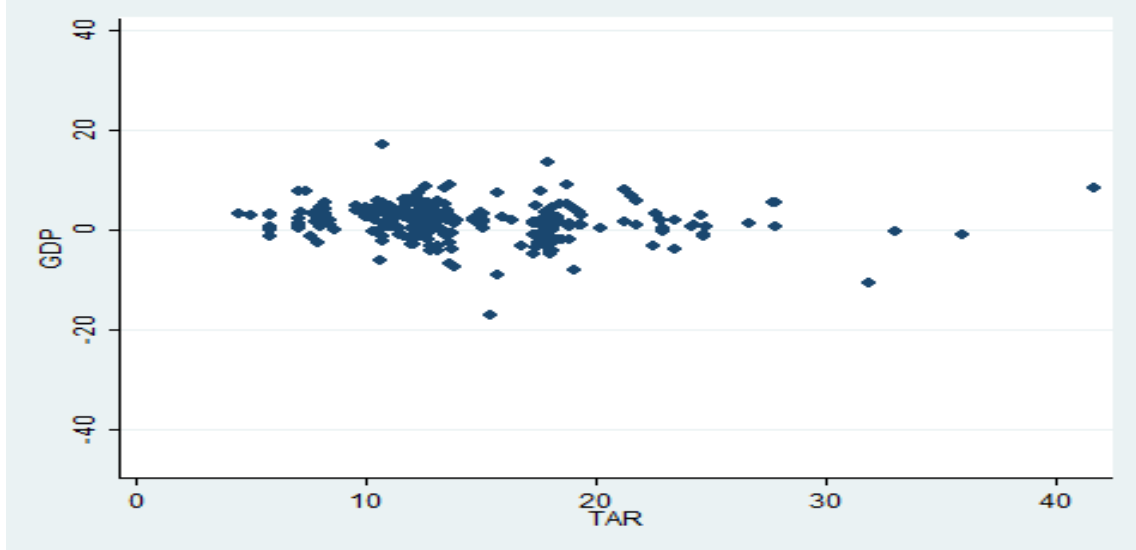
Source: Author's elaborations based on World Bank (2014) and WITS (2014) data

Figure A.1: GDP per capita growth rate by country, 1990-2010.



Source: Author's elaborations based on World Bank (2014) data

Figure A.2: GDP per capita growth rate – Import Tariff Burden scatter plot, 1990-2010



Source: Author's elaborations based on World Bank (2014) and WITS (2014) data

Figure A.3: GDP per capita growth rate- Population to land ratio

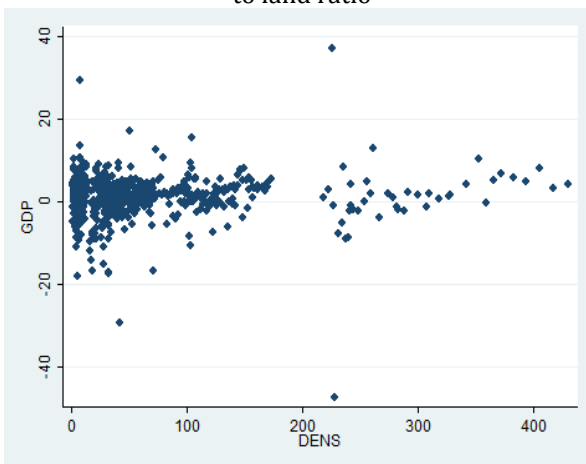


Figure A.4: GDP per capita growth rate- Primary completion rate

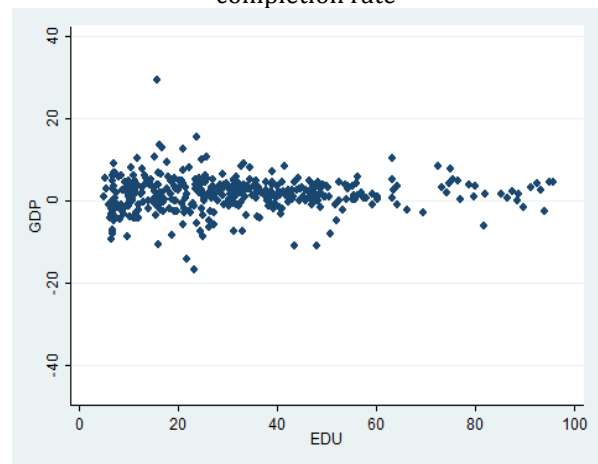


Figure A.5: GDP per capita growth rate – Aid flows

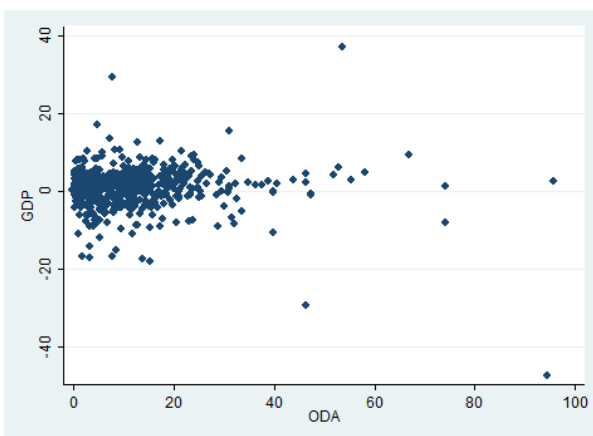
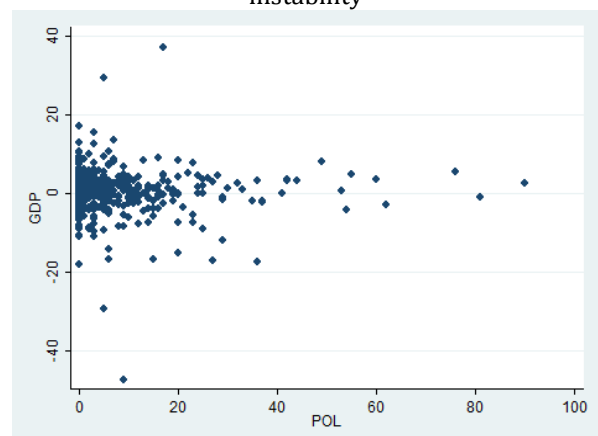
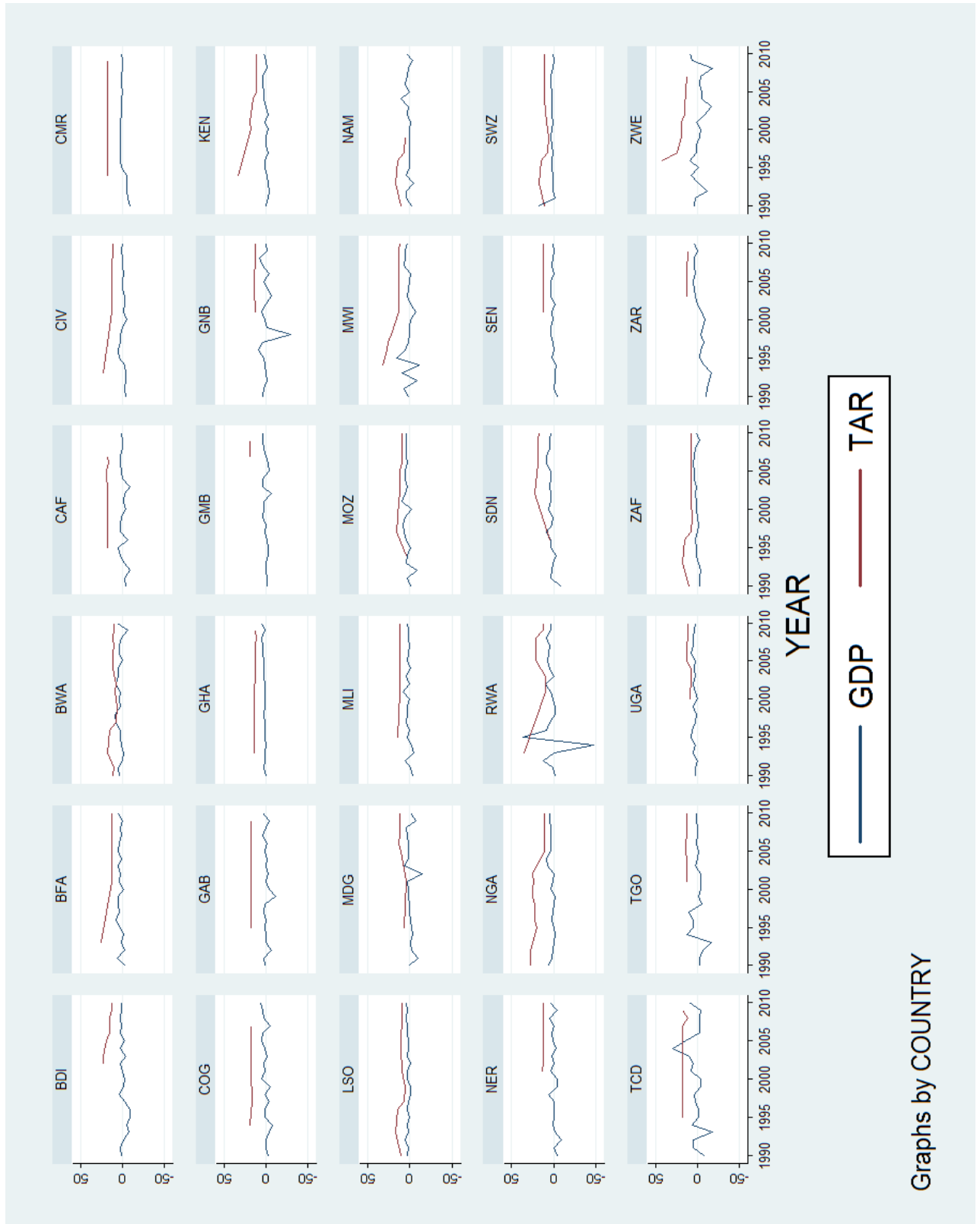


Figure A.6: GDP per capita growth rate – Political instability



Source: Author's elaborations based on World Bank (2014) data

Figure A.7: GDP per capita growth rate - Import Tariff burden by country 1990-2010



Source: Author's elaborations based on World Bank (2014) and WITS (2014) data