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Economic Policy, Does it Help Life Expectancy?
An African Evidence of the Role of Economic Policy On Longevity

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Abstract

This paper evaluates some factors that affect longevity in Africa, with the aim of offering an insight on how government economic policy and consumption spending affect the lives of people in developing countries. Government economic policy was found to be contributing in a negative manner to life expectancy in the countries in our sample. It was also found that apathy between the civil service (the embodiment of institutions) and political office holders to be the greatest stumbling block against the success of governmental economic policy, this creates a hole in institutions since they remain the pipe through which revenue is disbursed and policies are implemented for the general good of the populace. After interacting institution with economic policy economic policy had significant effect on life expectancy it was likely that institutions were either circumvented or ignored, leading to possible short comings on the overall effect that government economic policy would have had on life expectancy.

Keywords: Corruption, life expectancy, economic policy, institutions, government spending.
JEL: H5, I15, I18, I28, I38, J1

Introduction

Several factors work together to increase mortality rate in developing countries and sub-Saharan Africa in particular. Some of these include infectious tropical diseases that often affect their marginalized population due to poor education, lack of social awareness, political instability and civil strife. Infectious tropical diseases are often a major cause of high death rate prevalent in many sub-Saharan African countries since most of the people in sub-Saharan Africa live below the poverty line, therefore the tendency for disease to spread and patients to die as a result of inability to afford medical treatment is high. Cholera for instance, according to the World Health Organization report 2010 caused about 130000 deaths with over 2.5 million infected worldwide. In Africa alone according to United Nations Children Emergency Fund (UNICEF) report 2011 more than 85000 cases of cholera infection has been recorded with a 4.7 percent mortality rate. Other diseases such as human immunodeficiency virus (HIV), responsible for acquired immune deficiency syndrome disease (AIDS) for instance is a major cause of death in sub-Saharan Africa.

Sub-Saharan Africa according to 2009 United Nations Statistics also accounts for about 65% of HIV AIDS infected people and about 75% of all deaths associated with HIV AIDS Worldwide. While malaria fever, polio, tuberculosis etc are widely responsible for a high amount of deaths among Africa's population. Government economic policies if favorable can empower people through employment, to afford access to health care and decent living which can prevent premature death. Social factors such as poor education and lack of information regarding treatment and preventive methods that could be useful in avoiding the risk of infection are also lacking, poor literacy rate makes it cumbersome to pass on such information to the populace. UNESCO World education regional review of year 2000 showed that only about 52% of the children in sub-Saharan Africa were enrolled in primary schools, this was the lowest anywhere in the World. Africa also recorded the highest number of children deprived of basic education according to Transparency International World report of 2010 conducted among 8500 educators in seven countries. Africa continues to account for the highest amount of illiterate adults worldwide and has one of the lowest school enrollment rates. Preventing major illness and other factors that can lead to early deaths can many a time hinge on early detection and prevention which can be achieved better in a more literate and socially aware society. Good information can help eradicate poor religious practices, outdated customary traditional rites and beliefs that are a risk to longevity such as female genital mutilation which can in some instance lead to death through female circumcision infections. Poverty and unemployment is also rampant among the population, this often makes a large section of the population to be vulnerable since in some instances they are likely not to be able to afford access to basic social amenities. Political factors such as instability and civil strife can in some cases lead to civil war and a high degree of uncertainty. This can make government to fail leading to a disruption in daily life. This in turn can affect economic activities and cause a lot of suffering due to shortages of basic supplies, which if exist for a prolonged period of time can lead to poor living standard and outbreak of epidemics. The second Congo civil war of 1998 to 2003 according to United Nations 2004 Statistics is recorded among the most devastating African civil wars in modern history, with the war alone responsible for as many as 5.4 million deaths, with most deaths as a result of the

underlying effects of the war particularly starvation. Institutional weakness within the body polity of a country can also be responsible for most political factors related deaths since good institutions can prevent a systematic breakdown of the governing authority thereby preventing a gradual drift into anarchy. The aim of this study is to examine the effect of government economic policy on life expectancy in Africa. Government spending can improve infrastructure and mitigate risk associated with mortality on the short-run. Therefore government economic decisions can be divided into two spheres which are its monetary and trade policies which is referred to as economic policy on the one hand in this paper, and it policies regarding social spending which is referred to as government consumption spending on the other, this is reasonable because government spending will likely contribute to longevity in a positive manner, but it is not expected that its monetary and trade policies will contribute positively to longevity particularly in developing countries with weak institutions, since institutions can weaken government policies if they are ineffective or bypassed. Secondly this paper will also study the extent to which government consumption spending (its fiscal policy component) cushions factors that are a risk to longevity in Africa. The rest of this paper is divided into four sections, literature review, some theory, empirical analysis and finally the concluding sections.

Literature Review

Africa is plagued by a lot of diseases, social strife and civil wars, that are otherwise preventable. Malaria fever according World Health Organization report 2010 was responsible for about 655000 deaths in Africa in 2010 alone. Africa's has a high population living below the poverty line, this makes it one of the poorest continents in the world. This is consistent with past literature that state that the average per capita income in sub-Saharan Africa is less than one-twentieth that of North America (Acemoglu D et al (2002) and Acemoglu (2004)). Some basic reasons for this are the lack of viable markets for domestic trade, its high amount of poorly educated people, and finally the presence of old and outdated machineries which are nonexistent in some instances for its manufacturing industry (Acemoglu D. et al (2002)). However these are just some

theoretical and secondary reasons for under development in Africa[1]. The primary reason for underdevelopment in Africa continues to lie on the foundation upon which the present method of governance is built. Most of the institutions of governance were developed during the colonial era and where meant to serve the purpose of the colonial governments therefore they were not well suited to meet indigenous societal circumstances, since most of the colonies were used as raw material exporting economies particularly in tropical regions. This meant that institutions were apparently weak and unreliable. Africa's huge deposits of untapped natural resource also contributes to its burden, it makes it highly susceptible to corruption. Past studies also show that countries endowed with high levels of natural resources do tend to grow more slowly compared to those with little or no resource (see Sachs and Warner, 1995), and growth could also be weakened if institutional frameworks are weak (see Mehlum et al, 2006)[2]. The presence of natural resource in developing countries therefore plays a role in weakening institutions in developing countries, since it provides government with alternative revenue to run government, thereby preventing the setting up of effective taxation mechanism for sustainable revenue generation (see Ross 2001). Institutional weakness is also prevalent today among African countries because of the gross neglect of the civil service and due process in policy implementation, government can for example rely on its revenues from natural resource to repress dissent, either through paying off opposition (by awarding them contracts in high profile infrastructure projects) resulting to weakening of the civil service or governing through violence and intimidation. Corruption can also lead to failure of democratic governments in developing countries since this can have adverse effect on growth and internal stability (Karl, 1997; Ross, 2001)[3]. The weaknesses in the internal structures of developing countries often give room to corrupt officials to run government policies in a vague manner or to lead the populace in these developing countries in complete secrecy. Through the implementation of

[1] Acemoglu, Johnson and Robinson (2002) examine the differences in European death rates in order to estimate the effect of institutions, on economic performance. Europeans were noticed to have adopted very different colonization policies in different colonies with rest to its geographical position, with different associated institutions.

[2] Mehlum, Moene and Torvik (2006) also explain how institutions are weakened by the presences of natural resources through corruption and the scramble for allocation of exploration rights thereby limiting growth in resource rich countries.

[3] Michael Ross (2001) in "Extractive Sectors and the Poor" explains the link between corruption and mineral extraction and how democracies are likely to fail due to foreign interest and institutional weakness in resource rich developing countries. He finds that the scramble for power is often associated with the presence of natural resources in many developing countries.

weak economic policies an oligarch class often emerges that rules with impunity and become gradually insensitive to the plight of the populace. The effective use of institutions for governance in conjunction with a reliable civil service structure can help rectify this problem. Institutions can be classified into different categories such as judicial institutions, democratic institutions, and economic institutions. Life expectancy can have serious effects on productivity in developing countries. Past literature has also discussed the relation between longevity and growth in a host of industrialized countries. Barro (1989) discovered that as the life expectancy of a country rises to the age of 69, the level of investment and the growth rate increased in a reasonable manner for many developed countries; but in cases where life expectancy rises to the age of 70 and beyond, the level of investment and the growth rate drops, this was higher for developed countries compared to developing countries.[4] (See Lee, Zhang and Zhang (2002) for more explanations). Other papers have investigated the impact that population aging has on growth Auerbach and Kotlikoff (1992), found that population aging has a possible adverse impact on national savings, while Preston (1987) found that aging increases the competition for resources between the consumption and health needs of old people and the investment in children. Attaining old age also means that inheritance could likely be received by the children of such elderly people, who will likely pass on their wealth to their offspring, and the amount of such inheritance may be reduced however by longer years of consumption by the elderly due to sickness or possible periods of inactivity see Kalemi-Ozcan (2002) and Soares (2005). Interestingly other papers such as Kelley and Schmidt (1995)[5] found a positive effect, in the reduction in death rates, on growth in less developed countries suggesting that longevity drives growth in a number of countries, while Acemoglu and Johnson (2007) also find a that slight positive effect of life expectancy on growth but state that life expectancy does not affect income. To the best of our knowledge the direct link between economic policy and life expectancy

[4]Barro(1989) using a cross-section of countries, found that investment ratio and growth increased for developed countries with life expectancy of up to 69 years, but as life expectancy increased beyond 70 years growth rate decreased and investment reduced considerably.

[5]Kelly and Schmidt (1995) in "Aggregate Population and Economic Growth Correlation: The Role of The Component of Demographic Change" found that longevity has a positive significant effect on growth. The implication of their study is that cushioning factors that increase mortality will benefit government by allowing people to contribute more to the society if they live longer thereby creating wealth for the society.

has not yet been well researched even though lots of literature shed light on the role of institutions can have on life expectancy.

Theory

A simple theory is presented to depict how governmental policy will interplay with other interaction within and outside a system in shaping the life expectancy or longevity of people living within a specified geographical location. The theoretical model is such that a change in life expectancy depends on the change in government economic policy and its interaction with other country specific factors and exogenous variables that affect life expectancy. Changes in life expectancy will depend upon other interactions, such as other factors within the system e.g. wages (w) which represents the relative individual income that allows the citizenry to access the basic provisions within a system with an intent of living a comfortable life, the cost of capital (v) which depicts the cost of maintaining and providing social amenities, the quality of institutions (I) through which these policies are implemented and other exogenous variables (z). The model suggests that it is the factors that affect life expectancy in general that determine how long an individual within any given system will live. So government will tend to maximize their policy subject to the constraints that limit or improve how effective economic policies can produce the desired effects in improving longevity. If countries are considered as firms whose cost are functions of several factors. These include the cost of labor (w), the cost of capital (v) in executing socio economic projects, day to day costs of running institutions (I), and some other form of social or economic interest (z). The cost of labor is the wage rate per unit of output produced. The cost of capital can be viewed as the typical rental price of capital but also more broadly as to include additional factors impacting the cost of obtaining capital such as access to credit. Running costs are a function of provision of basic amenities such as health care and more importantly other forms infrastructure, while the cost of maintaining an international status and ideology of some form can be viewed a form of social or national interest that can attract investment or international confidence by portraying the presence of stability in a country to shore up investor confidence. So, the firms total cost function can be

written as $TC_i = f_i(w,v,I,z)X_i$. The marginal cost (MC) can be expressed as $f_i(w,v,I,z)$. as firms' investment in human capital increase we expect an increase in output leading to some level of prosperity thereby improving longevity. It can be assumed that eventually scarcities will occur and the marginal cost of production will rise. This can occur because of the rising cost of investing in an additional citizen and/or because of increase in capital costs of maintaining a citizen is rising. Eventually, there reaches a point at which equilibrium occurs. This profit maximization point (X_i^*) will represent the point at which $MR_i = MC_i$, also expressed as $P_i = f_i(w,v,I,z)$ where the cost in maintaining a citizen or catering for an additional citizen will equal the output that such a citizen will produce on the long-run . One of the goals of government economic policy (p_i) is to improve living conditions of the citizens in their countries. There are many ways in which this can occur. Government economic policy can increase education and training of workers, which would lower the firms labor cost per unit produced. So, the wage cost per unit produced can be expressed as a negative function of economic policy $w_i(p_i)$. Economic policy may also subsidize social amenities for citizens or come in the form of provisions of schools or product subsidy like petrol or gas used for individuals and households. Therefore the cost of capital can be written as a negative function of government economic policy, $v_i(p_i)$. The availability of wealth to a country may also lead to the promotion of a social status for a country with it might come some form of rent seeking behavior of government officials since more funds flowing into ideological projects may end up been diverted by corrupt officials seeking higher payout and have a spillover effect on the quality of institutions. Therefore, the costs imposed by rent seeking officials are modeled as a positive function of government economic policy, $z_i(p_i)$. with policy included in the model we can rewrite the equilibrium condition as $\sigma_i = f_i[w_i(p_i), v_i(p_i), I_i(p_i)Z_i(p_i)]$.

This equilibrium condition can be examined with respect to changes in economic policy. It is reasonable to assume that economic policy does not impact output; therefore, the differentiation of this condition with respect to economic policy is only a differentiation of the marginal cost function. This can be expressed as shown below.

(1.) $$\frac{\partial l_i}{\partial p_i} = \frac{\partial l_i}{\partial w_i}\frac{\partial w_i}{\partial p_i} + \frac{\partial l_i}{\partial v_i}\frac{\partial v_i}{\partial p_i} + \frac{\partial l_i}{\partial I_i}\frac{\partial I_i}{\partial p_i} + \frac{\partial l_i}{\partial z_i}\frac{\partial z}{\partial p_i}$$

first expression on the right hand side ($\frac{\partial l_i}{\partial w_i}\frac{\partial w_i}{\partial p_i} \leq 0$) represents government economic policy potentially lowering the cost of labor. The scenario where government economic policy potentially lowers cost of capital is represented as $\frac{\partial l_i}{\partial v_i}\frac{\partial v_i}{\partial p_i} \leq 0$. The potential reduction in costs of running institutions is shown as $\frac{\partial l_i}{\partial I_i}\frac{\partial I_i}{\partial p_i} \leq 0$. The possible rise in rent seeking or other socio economic interest costs of some sorts is the last term on the right hand side which is $\frac{\partial l_i}{\partial z_i}\frac{\partial z_i}{\partial p_i} \geq 0$. Therefore, the overall impact of government economic policy is combining three potential cost reduction factors (w, v, I,) with one potential cost increase (z). Whether or not the overall sign of $\frac{\partial l_i}{\partial p_i}$ is greater or less than zero will depend to a large extent on the quality of a country's institutions and on how the government economic policy is directed. If government economic policy is directed towards more productive uses that lower ' labor, capital and/or institutional costs of providing basic social amenities then this will help turn the prediction towards lower marginal costs. If marginal costs of providing basic social amenities fall for countries as a result of effective government economic policy devoid of corruption, then life expectancy will increase. In other words, if $\frac{\partial l_i}{\partial p_i} < 0$ and $\frac{\partial x_i}{\partial p_i} > 0$. Two variants of our life expectancy equation are estimated as shown in equation 2 and 3 below, variables such as country specific income using GDP/capita, total labor market participation rate and institutional quality, medical access, provision of social amenities, used to depict exogenous effects that affect life expectancy. The model present a case where life expectancy ($Life.exp_{it}$) is a function of, government economic policy ($policy_{i,t}$), and the vector of exogenous effects that affect life expectancy X_{it} . The list of exogenous variables in equation 2, consist of, income (GDP per capita), the quality of institutions which captures the effectiveness of

(2.) $$\boldsymbol{Life.exp_{it} = \beta_0 + \beta_1 X_{i,t} + \beta_2\, policy_{i,t} + \varepsilon_{it}}$$

(3.) $$\boldsymbol{Life.exp_{it} = \beta_0 + \beta_1 X_{i,t} + \beta_2 Gov.Spending_{i,t} + \varepsilon_{it}}$$

institutions in executing government policies and bringing its impact close to the grassroots, labor market participation rate which reflects the percentage of the population that can access basic facilities (since they are not free) through been empowered by some form of employment, foreign aid since most African countries receive foreign aid, access to basic health care which reflects how easy it is for the population living within a country to access basic health services to reduce risk of death related to infections and diseases, access to basic clean drinking water which captures the availability of social amenities, country specific total population which puts a strain on the budget of a country depending on how populated a country is although we use the logarithm of population in our final analysis due to scaling issues in our estimates. The fiscal variables is separated from what we refer to as government economic policy so as to allow us differentiate the difference of the impact of government monetary and trade policy from its fiscal policy. The reason for this is that government consumption spending is likely to have a strong positive effect on life expectancy therefore investigating its effect on life expectancy will allows us know the extent to which government welfare spending in African countries contributes to longevity life expectancy. (See Appendix D. for the summary of all data and their sources). Equation 2 can be rewritten in equation 3 to depict the effect of government consumption spending $Gov.Spending_{i,t}$ on life expectancy as shown above. Finally economic policy is interacted with institutions to determine the effect of institutions on economic policy effectiveness. In this case equation 2 is rewritten below as equation $2^{!}$

$$(2^{!}.) \qquad \boldsymbol{Life.exp = \beta_0 + \beta_1 X_{i,t} + \beta_2 \widehat{policy}_{i,t} + \beta_3 interact_{i,t} + \varepsilon_{it}}$$

Where interact = economic policy*institutional quality, some hypothesis that we wish to test in this paper are as follows,

Hypothesis #1.) Government Economic policy (it's monetary and trade policy) can have either a positive or negative effect on life expectancy due to poor institutions.

Hypothesis #2.) Government Consumption spending (government fiscal policy) will have a positive effect on life expectancy due to high prevalence of diseases and shortages of social amenities in Africa.

Hypothesis #3.) Economic policy will have a positive effect on life expectancy if institutions are taken into consideration in executing economic policies.

Hypothesis #4.) Social amenities can have a positive or negative effect on life expectancy in countries, depending on the level of their availability.

Hypothesis #5.) School enrolment might contribute to longevity in a positive or negative manner depending on the extent to which schools are accessible and affordable in African countries. Since social awareness through education can be greatly affected by the level of literacy in countries.

Hypothesis #6.) Labor market participation can have a positive or negative effect on longevity in countries depending on the level of employment present in countries. Since medical care and use of social amenities are not likely to be free.

Hypothesis #7.) GDP/capita can have a positive or negative effect on economic policy in countries, since income will affect governments ability to fulfill its social obligation to its citizens.

Empirical Analysis

Does economic policy affect life expectancy?

In this study three variants of the life expectancy equation is estimated, this is shown in equations 4 to 9 below. The assertion is based on the argument that government decisions is of two forms one that deals with its monetary and trade decisions (which is referred to as economic policy in this study) and the other that captures its public spending (which is referred to as government spending). It is reasonable that they should have an impact on life expectancy in a different manner with government consumption spending having much more capability in reducing mortality rate due to its direct focus on welfare projects while government economic policy on the other hand could either have a positive or negative result depending on institutions. If the aim of government is to make life relatively comfortable for its citizens, it is expected that government economic and social decisions will be one that mitigates risk associated with mortality rate and alleviates poverty through employment. Hausman specification test was run to choose between fixed and random effects. Results accept the null hypothesis that the fixed effects estimator is not biased (p-values are all considerably lower than .01) for the two variants of our life expectancy equation. The use of instrumental variables approach is because of the endogeneity of the economic policy and

government consumption spending variables since they are likely to suffer from measurement problems. A Hausman-Wu test rejected the null hypothesis that economic policy and government spending were exogenous, with a p-value of 0.00. Therefore, using them as independent variables could lead to biased results. An instrument was used as proxy in each case for both government policy and consumption spending which were assumed to be endogenous. The three variants of our life expectancy equation is presented below to explain how economic policy and consumption spending affects life expectancy.

Life Expectancy Model Specification with Economic Policy

In the first variant of the life expectancy, in equation 5 life expectancy depends on economic policy and our vector of exogenous $X_{i,t}$ which consist of foreign aid, access to health

$$(4.) \qquad \boldsymbol{Policy_{it} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 Z_{it} + c_i + \mu_{it}}$$

$$(5.) \qquad \boldsymbol{Life.exp_{it} = \beta_0 + \beta_1 X_{i,t} + \beta_2 \widehat{Policy}_{i,t} + c_i + \mu_{it}}$$

care, the logarithm of income (GDP per capita), the quality of institutions, access to water (which capture provision of basic social amenities), country specific population, labor market participation rate, cost of living and school enrollment rate. Life expectancy therefore is expected to be affected by the rate at which government responds to economic factors that are likely to increase mortality rate. Hyper inflation for example could mean firms closing down and laying off workers and adverse reduction in trade could result in a general shrinkage of a nation's economy leading to adverse economic circumstances such as reduced national income and lack of funds to maintain infrastructure and social services. Since we suggest that government economic policy is likely to suffer from measurement problems, so we assume that it is endogenous this is supported by results of the Hausman-Wu test for endogeity as stated earlier therefore using economic policy as an exogenous variable is likely to lead to inconsistent estimates. Equation 4 represents the reduced form of the equation for government economic policy, government economic policy depends on country specific income, and our vector of instrument Z_{it} . Therefore equation 4 and 5 are estimated

simultaneously. Exclusion restriction is achieved by assuming that certain variables (in this case a variable) are correlated with government economic policy in equation 4 but not with life expectancy in equation 5, allowing us to achieve identification by excluding some variables in equation 5. Country specific investment in stocks was used as instrument for economic policy this allows us to conduct instrumental correction for economic policy in equation 4.

Life Expectancy Model Specification with Government Consumption Spending

The second variant of the life expectancy specification is shown below, government consumption spending is assumed to be endogenous in equation 7, so the instrumental correction

$$(6.) \qquad \boldsymbol{Gov.Spending}_{it} = \boldsymbol{\alpha_0} + \boldsymbol{\alpha_1 X_{it}} + \boldsymbol{\alpha_2 Z_{it}} + \boldsymbol{c_i} + \mu_{it}$$

$$(7.) \qquad \boldsymbol{Life.exp_{it}} = \boldsymbol{\beta_0} + \boldsymbol{\beta_1 X_{i,t}} + \boldsymbol{\beta_2}\, \widehat{\boldsymbol{Gov.Spending}}_{i,t} + \boldsymbol{c_i} + \mu_{it}$$

was conducted in equation 6. Life expectancy depends on government consumption spending and our vector of exogenous variables. Our vectors of exogenous variables($X_{i,t}$) are the logarithm of population, income (GDP per capita) labor market participation, market capitalization rate, foreign direct investment inflow, school enrollment rate, electoral self determination (political stability) exchange rate, inflation and openness. The disposition for increased government consumption spending will depend on a host of factors, its income, and the condition of its economy as well as its political disposition. Therefore if a government sees it citizens as some form of assets that will bring some meaningful economic gains to it on the long-run it will embark on social spending with the aim of getting returns. It is expected that government spending will have a positive effect on life expectancy. It was also assumed that government consumption spending is endogenous since it suffers from measurement problems since short term payouts such as salary increases and social benefits e.g. subsidies make up government consumption spending and affect life expectancy on the short run this was also supported by the Hausman-Wu test for for endogeneity. In equation 6, government consumption spending depends on the logarithm of country specific income, and our vectors of instruments Z_{it} . In this health access was used as instrument for government

consumption spending, this allows the instrumental correction to be done in equation 6, using health access since we assume that government spending is endogenous as stated earlier.

*Economic policy and interaction variable institution (policy*institutions*

The third variant of the life expectancy equation is presented in equations 8 and 9. Including an interactive variable (interact) policy*institutions offers additional opportunity to study the effect institution has on policy effectiveness. Using predictive variables that capture economic policy in our first stage we regressed economic policy on income and stocks of investment and obtain the residuals since economic policy is endogenous, we multiplied the residuals with institutions to get our interaction variable (interact) and use the interaction variable in our second stage this method is known as general least square (GLS).

$$(8.) \qquad \boldsymbol{policy}_{it} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 Z_{it} + \varepsilon_{it}$$

$$(9.) \qquad \boldsymbol{Life.exp}_{it} = \beta_0 + \beta_1 X_{i,t} + \beta_2 \widehat{policy}_{i,t} + \beta_3 interact_{i,t} + \varepsilon_{it}$$

Our interaction variable will depend on institutional quality's effect on economic policy this allows us to depict how institutions affect economic policy effectiveness using GLS random effects.

Instruments

A careful explanation of why our exclusion restriction will hold for our different model specifications is offered here to depict the validity and relevance of utilized instruments. The exclusion restriction that is imposed on the life expectancy equation is that the instrument should be correlated with economic policy in the first set of equations (equations 4 and 5), government consumption spending in the second set of equations (equation 6 and 7), and economic policy again in the third set of equations where we used two stage GLS (equation 8 and 9) but not with life expectancy. Theoretically this will hold based on the following conditions, if the coefficient for the endogenous variable in the structural equation after imposing the restriction (where the instrument

is used as a proxy for the endogenous variable) tends to that in the reduced form equation and secondly, if the correlation between the instrument Z and the error term $\varepsilon_{i,t}$ is identically equal to zero as shown below in equation 10.

(10) $E[Z_{i,t}.\ \varepsilon_{i,t}] = 0.$

This shows that the instrument $Z_{i,t}$ is uncorrelated with the disturbances $\varepsilon_{i,t}$ and this therefore stipulates that the only way the instrument is related with life expectancy is only through the endogenous variable and finally, if the exogenous component of the instrument, (the fitted value of the endogenous variable for economic policy and government spending as the case maybe) is uncorrelated with the error term, the variation in the dependent variable life expectancy (in years) can be identified as the slope of coefficient β_2 (see Kraay (2008) for further discussion on exclusion restriction) we depict this in equation 11 below.

(11) $Cov(policy_{i,t}\ .\ \varepsilon_{i,t}) \neq 0$ *and* $Cov(gov.spending_{i,t}\ .\ \varepsilon_{i,t}) \neq 0$

This means that α_2 in not zero therefore life expectancy will vary with changes in economic policy and government spending as the case may be. The instruments should fulfill the above conditions for our exclusion restriction to hold, this can be explained further below in a nut shell econometrically as follows. First, the instruments should have a significant impact on the variable they predict. Secondly the instrument should not have an impact on the dependent variable (life expectancy in this case) in the second equation. While often this is tested empirically, Wooldridge (2010) and others have pointed out that this also needs to be done on the theoretical level as testing the impact of the instrument on the dependent variable in the second equation (life expectancy) with a full model could be biased as the instrumental correction has not been made for in the endogenous variable (i.e. economic policy or government consumption spending as the case maybe). Stock of investment was used as instrument for economic policy, while health access was used as instrument for government consumption spending. Investment in stocks reflects the value that investors place on a country stocks and the value of stocks at any point in time reflects the quality of government economic policy. It is expected that stock of investment will be correlated with government

economic policy but not with life expectancy for our exclusion restriction to hold for our first set of equations (i.e. equations 4 and 5). One way to view this is that investors will hold a country's stocks as long as the government maintains stable, sound and consistent economic policies and in cases where a government economic policy is weak, investors are likely to dump such stocks or not invest in such economies. It is also expected that a country specific stock of investment will have no direct effect on life expectancy since if government does not have good economic and social policy to reduce factors that are a risk to longevity, gains from investment might not affect life expectancy. Therefore the only way through which stock of investment will be related to life expectancy is through government economic policy. It is also expected that for the exclusion restriction to hold (in the second set of equations i.e. 6 and 7), that health care access should be correlated with government spending in equation 6, but not directly with life expectancy in our second in equation 7.This will be based on the fact that access to medical care even though if available, is not likely to be free nor easily afforded in many African countries which are characterized with high a population of poor people, so we do not expect that the availability of medical care will lead automatically to increase in life expectancy. The only way through which health access will be related to life expectancy is through government spending, by creating enabling environment (through its spending) in which people can develop skills at subsidized rate Based on these two assumptions we are able to impose the exclusion restriction on the two different model specifications (i.e. the life expectancy models with economic policy and government spending) and argue that the restrictions will hold. Only one instrument is used in each case so our model specifications are exactly identified since the number of instrument is the same as endogenous regressor. The instruments we use are highly correlated with our endogenous variables and quite relevant (see first stage regressions results in Tables 1 and 2).

Results

Fixed effect regression was used , for the first two specification of the life expectancy equations, since the result of the Hausman test with p-value 0.000 suggest that fixed effect

estimation is more appropriate for our model, see Baltagi (2005), Baltagi and Wu (2010) and Wooldridge (2010) for further discussion. . Time effect (year dummies) was included to capture the differences in life expectancy over years. The results are shown in Tables 3 to 4. We controlled for time effect using year dummies for the specification for economic policy and government consumption spending but this did not hold for the model with the "interact" effect instead year effect was used because our results did not follow a chi square distribution with year dummies. The results of the F-test in Tables 1 and 1 shows that our instruments are highly correlated with the first stage dependent variables respectively. The results in Table 3 show that economic policy has no effect on life expectancy using OLS (with p-value 0.914) and has a negative significant effect on life expectancy using 2SLS after controlling for endogeneity, using investment in stock as instrumental correction for economic policy (with p-value 0.016). This shows the importance of controlling for endogeneity since economic policy might suffer from measurement problems. The results in Table 4 show that government consumption spending has an effect (with p-value 0.014) on life expectancy using OLS and has a stronger effect (with p-value 0.000) on life expectancy using 2SLS. This shows the relevance once more of using health access as instrumental correction for government consumption spending, since we assume that government consumption is endogenous. The results in Table 5 show that government economic policy has a negative effect (p-value 0.019) on life expectancy without interacting economic policy with institution. After interacting economic policy with institutions the interactive variable (interact) becomes weakly statistically significant (p-value 0.061). This shows that economic policy contributes to a reduction in life expectancy, without the appropriate institutions to execute policies.

Robustness Check: Alternative measure of economic policy and institutional quality indexes were used, this was constructed using regression component approach previously used by Burnside and Dollar (2000) to determine how robust our regression estimates are. The economic policy index developed with regression component approach (RCA) weighs the effect that economic policy has on life expectancy therefore this index depends on life expectancy. Using another set of index allows us to know if indeed the economic policy results obtained using the PCA index are robust.

The results are presented in the appendix see Tables 6 to 8. Appendix A. Table 6 Columns 1 and 2 shows the first stage results where a comparison is made in the results where PCA and RCA were used as controls in the model specification for economic policy. The result shows that investment in stocks is highly correlated with economic policy. Appendix B. Table 7 Columns 1 and 2 show that economic policy was contributing in a negative manner to life expectancy in the countries in our sample using 2SLS, although the results where RCA index was used as control for economic policy contributed significantly in a negative manner in reducing life expectancy (see regression estimates in Table 7 Columns 1 and 2 for economic policy of -2.13 and -4.19 for PCA and RCA values respectively). Appendix C. Table 8 Columns 1 and 2 show the results of the interaction variable economic policy*institutions used to determine how effective economic policy will be on life expectancy if channeled through appropriate institutions. The results do not differ significantly from those where the PCA indexes was used as controls. The interaction variable showed that economic policy contributed in a significant manner to life expectancy (see regression estimates of 3.08 and 0.23 in Table 8 Columns 1 and 2 respectively) although the result where we used the economic policy index constructed using the RCA index was more significant than using that obtained using PCA. However the RCA measure of institutional quality contributed in a positive significant manner to life expectancy whereas the PCA measure had a negative effect on life expectancy but was not significant (see Appendix B Table 7 Columns 1 and 2 regression estimates for institutions of -2.4 and 2.82 for PCA and RCA indexes). The institutional measure using RCA was obtained from weights that our variables that capture institution have on life expectancy using OLS, institutions are likely to exert either a positive or negative effect on any dependent variable. The use of interaction variables allows us to determine how effective they are in the presence of a policy that can affect life expectancy. This was found does not affect the quality of the index since as stated earlier that the interaction variable economic policy*institutions show that institutions improve the effectiveness of economic policy for both results (see Appendix C. Table 8).

Based on the above results we answer the hypothesis that were posed earlier below

Hypothesis #1.) Government Economic policy (governments monetary and trade policy) had a negative significant effect on life expectancy. It was likely that economic policy was contributing negatively to longevity in the countries in our sample.

Hypothesis #2.) Government Consumption spending (government fiscal policy) had a positive effect on life expectancy. This shows that government consumption spending was likely contributing to increase in longevity since it consisted of welfare spending used in cushioning risk factors to longevity through the establishment of social infrastructure.

Hypothesis #3.) Economic policy was found to contribute to longevity in a significant manner when institutional quality was interacted with economic policy. It was likely that institutions were not taken into consideration or bypassed in economic policy implementation. Implementing economic policies through appropriate channels such as a credible civil service and following due process could lead to a substantial improvement in economic policy effectiveness.

Hypothesis #4.) Social amenities had a negative effect on life expectancy in countries, it was likely that lack of basic amenities such as portable drinking water, and electricity etc was contributing in a negative manner to longevity.

Hypothesis #5.) School enrolment had a positive effect on longevity. This shows that provision of means to accessible and affordable education in African countries was likely promoting longevity.

Hypothesis #6.) Labor market participation had a negative effect on longevity in countries. This shows that it was likely that the level of employment present in countries can make medical care and use of social amenities which are not free less accessible to a greater percentage of the populace due to their poor earning power.

Hypothesis #7.) GDP/capita had a negative effect on economic policy, therefore it was possible that poor income led to government's inability to fulfill its social obligation in countries.

Conclusion

It was found that government economic policy has a negative effect on life expectancy in Africa. This showed that economic policy was not contributing positively to longevity. Government consumption spending had a positive significant effect on life expectancy, and therefore cushions factors that militate against longevity. We also found that the variable "interact" has a positive effect and significantly improves the effect of economic policy on life expectancy thereby making it contribute to positively longevity. This showed that channeling policies through appropriate institutions makes economic policies to have an effect on life expectancy. The policy implication of

our results is that improving government economic policy (i.e. it's monetary and trade policy) could significantly improve life expectancy in African countries, since economic policy is currently contributing negatively to longevity among African countries. Sound and consistent policies could help create employment and can play a role in the effective execution of public projects that can affect the lives of people living in many poor countries significantly. Reducing inflation and allowing strong private participation in business could rapidly transform many African countries and help reduce mortality rates by economically empowering its indigenous population. The results are consistent with past literature such as Karl (1997) and Ross (2001), which states that corruption significantly, weakens economic policy in many African countries making such policies to be ineffective in alleviating poverty among their indigenous population. Government consumption spending was contributing positively to longevity, this implies by our results that governments in Africa are likely to continue to spend heavily on consumption. Executing sound policies that could reduce government consumption spending to a sustainable level should be a top priority for many African countries. Our results also support reports by World Health Organization 2010 and UNICEF report 2011, that a host of factors are responsible for low life expectancy in Africa this makes government to be overwhelmed with numerous risk factors that reduce longevity leading to huge spending to mitigate such risks which are the causes of high death rate plaguing the African continent.

Table 1. First Stage: Economic Policy Regressions

Method of Estimation	OLS
GDP/capita	-0.73
	(.75)
Institutional quality	-0.31
	(.21)
Foreign aid	-0.008
	(.05)
Access to medical care	-0.008
	(.05)
Provision of social amenities	-0.01
	(.01)
Population	1.59
	(1.21)
Exchange rate	0.19
	(.14)*
FDI	0.05
	(.04)
Labor market labor participation	0.14
	(.23)
School enrollment	0.07
	(.05)
Cost of living	0.30
	(.06)
Stock of investment	-0.003
	(.001)***
F-Test	8.55
Chi^2 (p-value)	0.03
# of observations	70
R-Squared	0.50

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Table 2. First Stage: Government Consumption Spending Regressions

Method of Estimation	OLS
GDP/capita	-1.17
	(.63)*
Population	0.33
	(1.21)
Labor market participation rate	-0.68
	(.35)
FDI	-0.04
	(.04)
Market capitalization	0.01
	(.01)
School enrollment	0.003
	(.02)
Exchange rate	0.02
	(.01)**
Inflation	-0.001
	(.01)
Openness	-0.04
	(.01)
Political stability	-0.12
	(.14)
Health access	0.04
	(.01)***
F-Test	17.99
Chi^2 (p-value)	0.00
# of observations	52
R-Squared	0.99

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Table 3. Economic Policy Regressions

Method of Estimation	OLS	2SLS
Economic policy	0.04	-2.13
	(.32)	(.89)**
GDP/capita	1.32	-2.56
	(1.61)	(1.77)
Institution index	-0.11	-0.24
	(0.35)	(0.40)
Foreign aid	0.33	0.06
	(.12)**	(.12)
Access to medical care	0.03	0.04
	(.03)	(.04)
Provision of social amenities	-0.03	-0.07
	(.03)	(.03)***
Population	0.15	-0.79
	(.71)	(2.06)
Exchange rate	-1.33	0.48
	(.30)***	(.32)
FDI	0.23	0.20
	(.14)	(.16)
Labor market participation	-0.19	-0.73
	(.12)	(.73)
School enrollment	0.11	0.21
	(.05)**	(.04)***
Cost of living	-0.04	0.31
	(.02)	(1.25)
Instrument	-	Investment in stocks
Chi^2 (p-value)	0.00	0.00
# of observations	70	70
R-Squared	0.90	0.57

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Table 4. Government Consumption Spending Regressions

Method of Estimation	OLS	2SLS
Government Consumption Spending	2.89	3.02
	(1.08)**	(.62)***
GDP/capita	1.36	6.08
	(3.24)	(1.34)***
Population	1.33	-2.29
	(2.24)	(3.13)
Labor market participation	1.0	-1.70
	(.54)*	(.60)***
FDI	-0.45	0.04
	(.27)	(.07)
Market capitalization	0.08	-0.06
	(.06)	(.02)***
School enrollment	-0.12	0.05
	(.13)	(.03)
Exchange rate	-0.13	0.003
	(.05)**	(.03)
Inflation	0.09	-0.01
	(.08)	(.02)
Openness	-0.02	0.03
	(.06)	(.05)
Political stability	0.49	0.66
	(1.14)	(.32)**
Instrument	-	Health access
Chi^2 (p-value)	0.00	0.00
# of observations	52	51
R-Squared	0.95	0.97

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Table 5. Economic Policy and interaction with institutions Regressions

Method of Estimation	GLS
Economic Policy	-14.23
	(5.96)**
Economic policy*institutions	3.08
	(1.64)*
GDP/capita	0.70
	(1.22)
Foreign aid	0.28
	(.10)***
Access to medical care	0.06
	(.02)
Provision of social amenities	-0.03
	(.02)
Population	-0.61
	(.45)
Exchange rate	-0.93
	(.20)***
FDI	0.11
	(.11)
Labor market participation	-0.09
	(.09)
School enrollment	0.04
	(.04)**
Cost of living	-0.01
	(.02)
Chi^2 (p-value)	0.00
# of observations	70
R-Squared	0.94

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Appendix

The robustness check results are shown in the appendix. All of the other results are shown in the body of the paper

Appendix A. Table 6 First Stage Robustness Check

	PCA Index	RCA Index
	(1)	(2)
Method of Estimation	OLS	OLS
Investment in Stocks	-0.003	-0.0002
	(.001)***	(.0001)***
GDP/capita	-0.73	-0.73
	(.75)	(.26)***
Institution index	-0.31	0.36
	(0.21)	(0.14)***
Foreign aid	-0.01	0.003
	(.05)	(.02)
Access to medical care	0.01	-0.004
	(.01)	(.03)
Provision of social amenities	-0.01	-0.01
	(.01)***	(.01)
Population	1.59	0.76
	(1.21)	(.49)
Exchange rate	0.19	0.02
	(.14)	(.06)
FDI	0.05	0.02
	(.04)	(.03)
Labor market participation	0.14	0.26
	(.23)	(.11)**
School enrollment	0.07	0.03
	(.05)	(.01)**
Cost of living	0.30	-0.05
	(.06)	(.05)
F-Test	8.55	13.09
Chi^2 (p-value)	0.03	0.00
# of observations	70	66
R-Squared	0.50	0.74

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Appendix B. Table 7 Robustness Check

	PCA Index	RCA Index
	(1)	(2)
Method of Estimation	2SLS	2SLS
Economic Policy	-2.13	-4.19
	(.87)**	(1.22)***
GDP/capita	-2.56	-4.77
	(1.77)	(1.44)***
Institution index	-0.24	2.82
	(0.40)	(0.82)***
Foreign aid	0.06	0.07
	(.12)	(.07)
Access to medical care	0.04	0.05
	(.04)	(.03)
Provision of social amenities	-0.07	-0.05
	(.03)***	(.02)**
Population	-0.79	-4.37
	(2.06)	(1.70)**
Exchange rate	0.48	-0.33
	(.32)	(.25)
FDI	0.20	0.30
	(.16)	(.10)***
Labor market participation	-0.73	-0.92
	(.73)	(.52)***
School enrollment	0.21	0.20
	(.04)***	(.03)***
Cost of living	0.31	0.18
	(1.25)	(.36)
Instrument	Investment in stocks	Investment in stocks
Chi^2 (p-value)	0.00	0.00
# of observations	70	66
R-Squared	0.57	0.63

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Appendix C. Table 8 Robustness Check

	PCA Index	RCA Index
	(1)	(2)
Method of Estimation	GLS	GLS
Economic Policy	-14.23	-4.70
	(5.96)**	(.23)**
Economic policy*institutions	3.08	0.23
	(1.64)*	(0.02)***
GDP/capita	0.70	0.57
	(.22)	(.88)***
Foreign aid	0.28	0.18
	(.10)***	(.07)***
Access to medical care	0.06	0.05
	(.02)***	(.02)***
Provision of social amenities	-0.03	-0.03
	(.02)***	(.02)***
Population	-0.61	-0.71
	(.45)	(.34)**
Exchange rate	-0.93	-0.83
	(.20)***	(.16)***
FDI	0.11	0.06
	(.11)	(.08)
Labor market participation	-0.09	-0.12
	(.09)	(.07)*
School enrollment	0.04	0.09
	(.03)	(.03)***
Cost of living	-0.01	0.002
	(.02)	(.02)
Chi^2 (p-value)	0.00	0.00
# of observations	70	70
R-Squared	0.94	0.96

Notes: Coefficients listed with standard errors in parentheses. *, ** and *** refers to significance at the 1%, 5% and 10% levels, respectively.

Appendix D. Data and Sources

i. Dependent Variable: Life Expectancy, this is the average life span of men and women living in a geographical location. This obtained from World Bank data.

ii. Explanatory Variables:

a. Economic Policy, this was obtained using PCA from variables such as inflation and trade openness which we obtain from World Bank data. The PCA measure captures the average variation in the two variables to obtain a single index for economic policy using Eigen value transformation. To test for robustness of our estimates we also use another method RCA to construct a measure of policy by regressing life expectancy on inflation, trade openness and other exogenous variables. The RCA index allows us to derive another economic policy index using the weight that inflation and openness exert on life expectancy. RCA Index is given by Economic Policy = Constant + (inflation*coefficient) + (openness*coefficient)

b. Institutional Quality: We also construct two measures of institutions using PCA and RCA. The PCA index captures the average variation in three variables electoral self determination rate, torture rate and freedom of movement. While the RCA variables were obtained by regressing life expectancy on the three aforementioned variables plus other exogenous variables. It is given as Life Expectancy=Constant+(electoral self determination rate* coefficient) + (Torture*coefficient)+(freedom of movement*coefficient) .We obtain these political variables from Brigham University CIRI data .

c. Government Consumption Spending is amount in USD that government spends on welfare and social infrastructure. It is obtained from data market of Iceland for a period of 1980 to 2008.

d. Exchange Rate: This is the fluctuation in the value of the local currency with respect to the dollar we obtain this from World Bank data. We used this to economic capture fluctuations globally.

e. GDP/Capita: This is the total amount of goods produced by country we divide this by population to obtain GDP/Capita and this represents country specific income. This was obtained from World Bank data.

f. FDI: This is the total inflow of all foreign investment to a country in constant USD. We obtain this from World Bank Data.

g. School Enrollment Rate: This represent the average primary school enrollment rate for boys and girls between the ages of 1-15 years of age. It represents human capita development rate (level of literacy by country and skill) we obtained this from World Bank data.

h. Cost of Living, we used crude oil price to capture cost of living

i. Health Care Access is the percentage of the population of children of ages 0-10 years who are immunized.

j. Provision of Social Amenities, was measured using percentage access to clean drinking water

k. Population is the total number of people living in a geography area; this was used to capture budget constraints to government planning.

l. Labor Market Participation Rate percentage of employed among workforce

m. Investment in Stocks this is the total value of countries stock of investment in USD.

n. Foreign Aid/GDP this was measured using effective aid per GDP.

All data are for a period of 1980 to 2008 and obtained from World Bank data except otherwise stated.

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