The pluralist economy in Africa: A study of the relationship between economic complexity and the life ladder

Abstract

This study finds a significant correlation between economic complexity and the life ladder in Africa, using data from the World Development Indicators (2022), World Happiness Report (2023) and Observatory of Economic Complexity (2023) over the period 2000 to 2021. The FGLS estimation method shows that economic complexity has a positive impact on the life ladder of African populations. These findings underscore the importance of governments implementing economic policies that prioritise the strengthening of economic complexity, thereby promoting the life ladder of individuals in Africa. Key measures to achieve this goal include promoting economic diversification, investing in education and training, encouraging entrepreneurship and innovation, promoting regional integration, improving infrastructure and technological accessibility, and establishing robust social protection systems. The adoption and implementation of these policies will be critical to increasing the overall life ladder of Africa's population while promoting sustainable economic development.

Key words: Economic complexity; Life ladder; Solid social protection

JEL Code: O11, I31

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Introduction

One thing that unites different types of social scientists is their interest in understanding the forces that influence human happiness. What makes people happy? What leads to a happy society? These are difficult questions, but they seem important. With this in mind, individual happiness and the factors that contribute to it are subjects of great interest. Indeed, understanding the forces that influence happiness is essential to developing effective public policies and promoting sustainable economic development. Studying the relationship between economic complexity and happiness is an emerging area of research in behavioural and welfare economics (Sgroi et al., 2017). For Africa, examining the impact of economic complexity on individual well-being is crucial, given the unique challenges and opportunities facing this region.

According to research by Veenhoven (1996), happiness can be defined as an individual's overall positive evaluation of the quality of life. This evaluation can be measured through general life satisfaction or satisfaction in specific domains. These concepts are referred to as 'context-free well-being' and 'context-specific well-being' respectively. In order to fully understand what makes people happy and how to improve happiness in a society, it is essential to gather people's opinions and feelings. The pioneering studies conducted by Easterlin (1974) laid the foundations for happiness research. Easterlin (1974) demonstrated that self-reported levels of happiness did not vary significantly between rich and poor countries. He put forward the idea that happiness is relative and depends on how individuals compare with those around them. This thesis has been supported by other researchers such as Hirsch (1976), Scitovsky (1976) and Layard (1980).

Economic complexity, on the other hand, is linked to the production of diversified and complex goods, which depend on the knowledge available to individuals and companies in a

country (Hidalgo and Hausman, 2009). In other words, a country can only produce a limited number of sophisticated goods, requiring specific knowledge that is not always available everywhere. This has led to the emergence of the concept of economic complexity, which measures a country's ability to produce and export distinct and sophisticated goods, and is proving to be an important indicator of its economic competitiveness. Thus, a country with greater capacity develops faster because it can participate in social production activities with higher productivity (Felipe et al., 2012).

Using well-known theories, he manages to establish a link between economic complexity and happiness. According to Deci and Ryan's (2008) goal achievement theory, individuals need to feel competent and autonomous in order to achieve happiness. Economic complexity can provide an environment conducive to the development of specialised skills, thereby fostering creativity and innovation, which contributes to individual well-being and hence happiness. Furthermore, Hidalgo and Hausman's (2009) theory of the effects of economic diversity argues that the production of complex goods stimulates job diversity and creates economic dynamism, which can have a positive impact on individual well-being.

Yet, despite the growing importance of economic complexity, there have been few studies examining its effect on happiness in Africa. This is surprising, given the specific economic and social challenges facing the region. Therefore, this research aims to fill this gap by analysing the effects of economic complexity on happiness in Africa, building on the seminal work of Hidalgo and Hausman (2009), as well as improvements in the measurement of economic complexity by Tacchella et al, (2013) and Albeaik et al, (2017). Also, this study is of paramount importance, as it will enrich our understanding of economic and socio-economic dynamics specific to Africa, as well as their impact on individual happiness. The results of this research could have considerable practical implications, enabling policy-makers to formulate economic and social policies that are better adapted to promoting economic complexity and the happiness of African populations.

The structure of this article is as follows: the first section presents stylized facts about the scale of life and economic complexity in Africa. The second section reviews the existing literature to explore the link between economic complexity and happiness. The third section describes the methodological approach used to quantify this effect. Subsequently, empirical results are presented and their significance is discussed in the fourth section. Finally, the conclusion summarizes the main findings and identifies the political implications and recommendations.

1. Some stylized facts

1.1 Life ladder and plural economy across the African continent

To provide a comprehensive analysis of living standards and economic complexity in Africa, it is crucial to adopt a regional approach. By grouping countries based on their respective regions, we can delve into the variations and transformations that have occurred over time. This nuanced examination will allow us to gain a deeper understanding of the intricate interplay between economic complexity and the pursuit of happiness across different African nations.

In general, the countries of North Africa (Algeria, Egypt, Libya and Tunisia) saw a slight fall in the life index between 2016 and 2019, followed by an increase in 2020 and 2021. In

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Algeria, the index of living standards fell gradually between 2016 and 2020, but rose significantly in 2021; in Egypt, the index of living standards also fell between 2017 and 2019, but improved slightly in 2020 and 2021. Libya saw a slight drop in 2018, but maintained a broadly stable life index in the following years. Tunisia, for its part, has seen some volatility in the life index, with increases and decreases over the years under consideration. In West Africa, variations in the scale of living are greater and more diverse in that some countries, such as Burkina Faso and Senegal, have seen a steady improvement in the life index over the years, while countries such as Angola, Mali and Nigeria have seen significant fluctuations in the scale of living, with both rising and falling years. Some countries, such as Liberia and Mauritania, are also showing a general downward trend in the living standards index. In Southern Africa, too, variations in the life index are varied, with countries such as Mauritius maintaining a relatively high and stable life index over the years, in contrast to Zimbabwe and Lesotho, which have experienced a general downward trend in the life index. South Africa has a mixed picture, with a slight fall in the life index between 2017 and 2019, followed by a slight increase in 2020 and 2021 (see Figure 1).

In terms of the evolution of the Economic Complexity Index in Africa, there is a general trend towards an improvement in economic complexity in most North African countries. Algeria and Libya have seen a slight increase in their ECI in recent years. However, Egypt has seen a decrease in its ECI in 2021 compared to 2020. This index in the West African region varies. Countries such as Burkina Faso, Senegal and Togo have seen their ECI fall over the years, while Ghana and Mali have seen their ECI fall slightly in 2021 compared with 2020. However, Nigeria has been relatively stable, with a slight decrease in its ECI over the years. In East Africa, countries have generally seen a decrease in their ECI in recent years. However, Kenya and Tanzania have recorded a slight increase in their ECI in 2021 compared to 2020. Southern Africa is not to be outdone. Economic complexity in this region also varies. Namibia and Zambia have seen their ECI fall in recent years. On the other hand, Botswana and Zimbabwe have recorded an increase in their ECI in 2021 compared to 2020. South Africa, meanwhile, has been relatively stable, with a slight decrease in its ECI compared with previous years (see Figure 1).

In sum, the overall analysis of the evolution of the scale of life and the ECI in Africa shows significant variations both from one country to another and from one region to another. Some regions have seen an overall improvement in the life index, while others have shown more mixed trends. It is therefore essential to take account of socio-economic specificities, and economic complexity in particular, in order to understand how it can influence variations in the scale of living and to formulate appropriate policies to improve living conditions in Africa.

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Figure 1: Evolution of the scale of life and economic complexity in Africa

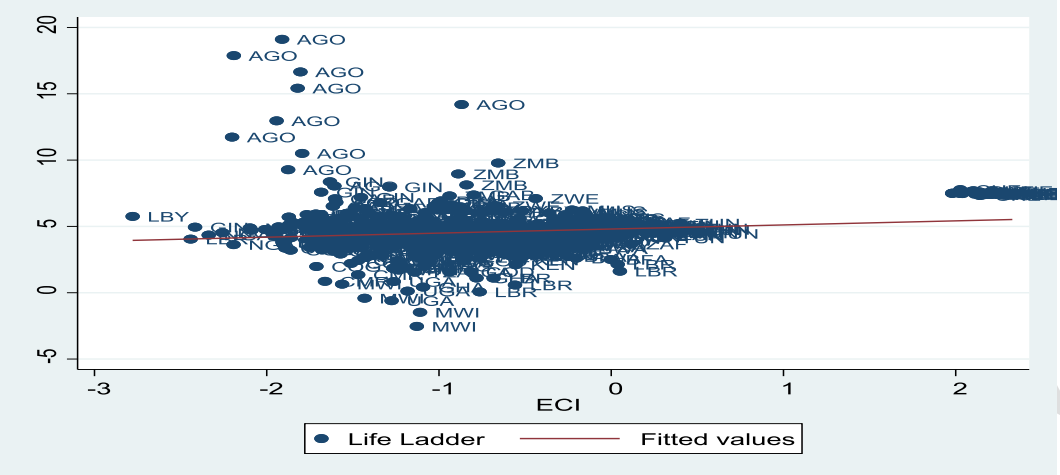
Source: Authors. Note: ECI (right axis)

1.2 Plural economy correlated with life ladder in Africa

Figure 2 shows a positive correlation between the economic complexity index and the living standards of African populations. This correlation suggests that the diversity and scope of economic activities have a positive impact on the living standards of African populations. In fact, economic complexity is one of the foundations on which a country's development rests. It offers employment opportunities, higher incomes, technological innovation, better access to education and social services, and greater economic stability, all of which have a positive impact on people's happiness and well-being.

Moreover, there is a high degree of homogeneity between countries around this trend. In addition, a few countries are concentrated at the lower end of the scale. This suggests that economic complexity is low in Africa, which is also the case for the living standards scale (see Figure 2). However, Table 2 shows a positive correlation between economic complexity and happiness. However, since correlation does not imply causation, this relationship will be investigated empirically in section 3.

Figure 2: Correlation between ECI and Life ladder



Source: Authors

2. Literature Review

Happiness research has explored many determinants, but has not taken into account economic complexity. A crucial question for happiness research concerns the calculation of well-being lost or gained by individuals when a country is able to produce different types of sophisticated and diversified goods. In this section, potential mechanisms that link economic complexity to happiness are discussed, as well as other possible explanatory factors. The theoretical mechanisms presented here will serve as a basis for specifications that will then be empirically tested in the next sections of the paper.

2.1 Theoretical deduction of the effects of plural economy on Life ladder

Economic complexity is a new concept that has appeared in economic literature in recent years. It generally refers to the variety and complexity of economic activities present in a country or region (Hidalgo and Hausman, 2009). The basic idea is that the more economically complex a country or region is, the more likely it is to generate sustainable long-term economic growth (Layard, 1980; Clarke et al., 2008).

As far as theories of happiness are concerned, the economic literature proposes several theoretical frameworks. The theory of hedonism, which focuses on pleasure seeking, is one of the most commonly mentioned theories in the literature (Fenouillet, 2012). However, there are also other perspectives, such as asceticism, which focuses on the rejection of pleasure and altruistic behaviours (Veenhoven, 2003). Similarly, the theory of desire, which focuses on the desire to possess something (Dewey, 2008). This theory highlights the fact that individuals have desires and seek to satisfy them, which can lead to either satisfaction or frustration. The objective theory of happiness proposes a list of things and activities considered beneficial to a person (Schroeder et al., 2006; Aït Saïd, 2011). This approach emphasises moral goodness, rational activity, and the development of personal capabilities and other aspects of life that are generally considered to be positive. Finally, authentic happiness theory integrates the three theories mentioned above, emphasising a full, enjoyable, good and meaningful life (Seligman and Royzman, 2003).

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These few theories of happiness highlight the importance of variables such as individual consumption, income relative to average income, expected future income and leisure for individual happiness. Different theories of happiness, such as hedonism, desire, objective perspective and authentic happiness, are also discussed. These theoretical frameworks offer an interesting perspective on the relationship between economic complexity and individual happiness.

2.2 Empirical Review of plural economy on Life ladder

A number of empirical studies have been carried out on the factors that influence the level of happiness in Africa. However, the empirical literature remains silent on the effects of economic complexity on happiness. In order to emphasize the importance of this research, the determinants of happiness as presented in the literature are presented.

Numerous empirical studies demonstrate that increased income does indeed contribute to happiness, although this relationship shows a decreasing rate. Authors such as Blanchflower and Oswald (2004), Di Tella and MacCulloch (2008) and Easterlin and Angelescu (2011) have all found a positive but concave relationship between happiness indicators and average income levels. This finding is consistent with Easterlin's Paradox (1974), which suggests that the relationship between happiness and average income stabilises above a certain level of economic development.

Furthermore, in one study, Blanchflower et al, (2014) examined happiness arithmetic controlling for unemployment and inflation. They used happiness equations where individual subjective life satisfaction was regressed against unemployment and inflation, while controlling for personal characteristics, country and annual fixed effects. Results based on European data revealed that a one percentage point increase in the unemployment rate reduces well-being five times more than a one percentage point increase in the inflation rate. Similarly, other research suggests that inflation has the potential to negatively affect people's happiness, mainly because of the uncertainty it creates about changes in living costs and real incomes (Shiller, 1997). In general, studies indicate that unemployment has a much more detrimental impact on happiness than inflation (Di Tella et al., 2001). However, when aggregated data at national level is used, the results are not significant (Bjørnskov, 2003 and Ovaska and Takashima, 2006). Lelkes (2006) has argued that religious involvement contributes positively to individuals' subjective well-being, while economic transition varies considerably between different groups. Furthermore, there is evidence that unemployment has a persistent effect on happiness. In other words, happiness does not decrease with the duration of unemployment (Knabe and Rätzel, 2011).

Similarly, several studies have addressed the correlation between education and happiness. Blanchflower and Oswald (2004), Cuñado and de Gracia (2012), and Graham and Pettinato (2001) found preliminary evidence suggesting a positive correlation between education and happiness. However, some studies have concluded that education has no significant impact on happiness, or even a negative impact (Flouri, 2004; Caner, 2016). This divergence in results can be explained by the frequent link between education and income levels. By controlling for income levels, any statistically significant positive relationship between education and happiness may dissipate (Graham and Pettinato, 2001). Furthermore, ambiguity persists regarding the relationship between trade and happiness. Although the expansion of trade has the potential to create jobs and reduce prices, efforts towards freer global trade are often met

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with strong opposition due to fears of foreign competition and the closure of local industries. As a result, many studies find a negative relationship between trade opening measures and changes in happiness (Di Tella and MacCulloch, 2008).

In addition, many researchers argue that environmental problems have a detrimental impact on happiness. Individuals tend to value the local and global ecosystem services provided by natural habitats (Ferrer-i-Carbonell and Gowdy, 2007; Li et al., 2014). Consequently, those residing in contaminated areas are likely to experience a decrease in their level of happiness. Finally, studies have also found positive relationships between happiness and other factors such as health (Diener et al., 2009) and social relationships (Helliwell and Putnam, 2004). Blanchflower and Oswald (2004) found that separation or divorce had significant negative effects on happiness, while Helliwell and Putnam (2004) showed that high levels of trust in others were associated with greater happiness.

The existing literature review reveals that the analysis of the effects of economic complexity on happiness remains rather neglected, particularly in the context of African countries. Most studies have focused on traditional determinants such as income, education, health and social relations, without taking full account of economic complexity and its implications for people's subjective well-being. Economic complexity influences economic opportunities, economic stability, innovation and development, as well as socio-economic inequalities. These factors are crucial for the well-being of individuals in Africa. Analysing the effects of economic complexity on happiness in Africa can therefore provide valuable information for guiding public policies to improve the happiness of African populations. It is therefore essential to pay particular attention to this dimension in research on happiness in Africa.

3. Methodology

In this section, the different stages of the applied empirical strategy are briefly described. First, the basic empirical model and its different specifications are presented. Second, the sample, time period and data are presented.

3.1 Empirical Model

To analyse the effect of economic complexity on happiness, the following regression model is developed based on a literature review on the determinants of well-being (Mikucka et al., 2017; Sarracino and O'Connor, 2021) and it is included the ICE as a new predictor of happiness among other explanatory variables:

$$Life\ Ladder_i = \alpha_i + \delta_1 ECI_i + \delta_2 AEP_i + \delta_3 BMG_i + \delta_4 CO2_i + \delta_5 DIR_i + \delta_6 DPHE_i + \delta_7 EHEC_i + \delta_8 FDI_i + \delta_9 FR_i + \delta_{10} Umploy_i + \delta_{11} PopT_i + \varepsilon_i \quad (1)$$

3.2 Technical estimates

The use of two-stage least squares to analyse the effect of economic complexity on happiness in Africa is justified for several reasons. As Rodrik (2002) and Wooldridge (2013) point out, two-stage least squares can deal with problems of simultaneity and omitted variables common in economic studies. In the case of analysing the effect of economic complexity on happiness in Africa, both of these problems are likely to be present. Indeed, it is possible that the level of happiness also influences economic complexity, and unobserved variables could influence both economic complexity and happiness. Double least squares effectively controls for these problems by creating one equation to explain economic complexity and another to explain

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happiness, while estimating the coefficients of each equation simultaneously. Moreover, double least squares provides estimates that are unbiased and efficient (Davidson, 2000). This method minimizes the sum of the squares of the errors in the two equations, which makes it possible to obtain precise estimates of the coefficients. Using two-stage least squares, it is assumed that the errors in the two equations are independent and identically distributed, which is often a reasonable assumption in economic models.

3.3 Data

Most of the data is taken from the World Development Indicators (WDI, 2020). The data on economic complexity comes from the Observatory of Economic Complexity (2023) and the data on the scale of life variable comes from the World Happiness Report (2023).

Given the need for data availability for all variables, the study covers 31 African countries, over the period 2000-2021. Table 1 summarizes the descriptive statistics for the different variables, which are described in Table 3, showing little variation and suggesting unbiased results.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Life Ladder	682	4.565	1.766	-2.537	19.105
ECI	682	-.776	.769	-2.778	2.329
AEP	675	72.631	22.646	3.5	100
BMG	653	18.601	30.311	-58.172	485.547
CO2	527	66.3	23.974	6.779	123.628
DIR	553	8.711	13.356	-.419	203.375
DPHE	632	48.571	17.493	8.347	86.358
EHEC	629	17.091	16.94	0	70.788
FDI	681	4.195	8.75	-32.729	103.337
FR	682	4.347	5.013	.001	34.174
Umploy	682	9604157.4	11296639	375808	70620043
PopT	682	25899818	33346202	1186873	2.134e+08

Source: Authors

Table 2: Matrix of correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Life Ladder	1.000											
(2) ECI	0.016	1.000										
(3) AEP	0.156	0.228	1.000									
(4) BMG	0.521	-0.254	-0.202	1.000								
(5) CO2	-0.247	-0.005	-0.362	-0.072	1.000							
(6) DIR	0.327	-0.185	-0.275	0.577	0.125	1.000						
(7) DPHE	-0.023	0.020	0.239	-0.013	-0.026	-0.017	1.000					
(8) EHEC	-0.267	-0.103	-0.656	0.002	0.454	0.153	-0.429	1.000				
(9) FDI	0.063	-0.027	-0.326	0.088	0.170	0.020	-0.074	0.268	1.000			
(10) EN	-0.253	-0.202	-0.642	0.071	0.499	0.192	0.003	0.620	0.328	1.000		
(11) Umploy	-0.055	-0.147	0.071	0.069	-0.201	0.137	0.199	0.051	-0.127	-0.027	1.000	
(12) PopT	-0.035	-0.175	0.123	0.062	-0.216	0.115	0.242	-0.004	-0.129	-0.046	0.987	1.000

Source: Authors

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Table 3: Description of variables

Variable	**Descriptions**	Source
Life Ladder	Life ladder score or subjective well-being (Neveu et al., 2018)	WHR[1] (2023)
ECI	Economic Complexity Index (Albeaik et al., 2017)	CAB[2] (2023)
AEP	Access to electricity (% of population) (Rehman et al., 2018)	WDI[3] (2020)
BMG	Broad money (% of GDP) (Tegegne, 2021)	
CO2	CO2 emissions (kt) (Kalaycı and Hayaloğlu, 2019)	
DIR	Deposit interest rate (%) (Koch, 2015)	
DPHE	Domestic private health expenditure[4] (Keehan et al., 2017)	
EHEC	External health expenditure (Ganda, 2021)	
FDI	Foreign direct investment (Tag, 2021)	
FR	Forest rents (% of GDP) (Zhang and Zhang, 2023)	
Umploy	Unemployment, total (% of total labor force) (Banka, 2020)	
PopT	Population, total (McGurnaghan et al., 2021)	

Source: Authors

4. Results and Discussion

This section presents and discusses the results of the basic model and the robustness analysis.

4.1 Baseline Results

The direct effects of economic complexity on happiness are discussed and analysed in this section. It is important to emphasize that our study uses the generalized least squares method to assess the effect of economic complexity on the happiness of people in Africa. It should be noted that Africa faces many challenges, such as the need to produce and export a variety of sophisticated goods. In this context, it is plausible to say that economic complexity has a positive impact on people's living conditions and well-being, which translates into an increase in individual happiness. Consequently, our results show that economic complexity has a positive and significant effect on people's happiness in Africa (see Table 4).

Indeed, when we analyse the data in Table 4, it is possible to see that all the coefficients associated with the different measures of economic complexity are positive and statistically significant at the 1% threshold. This finding confirms our main hypothesis that economic complexity contributes to increasing people's happiness in African countries. Indeed, the coefficient related to the ECI variable is positive, suggesting that a one percentage point increase in economic complexity would lead to a 0.33% increase in people's happiness (see column 11 of Table 4). This can be explained by the fact that economic complexity has a positive effect on people's happiness by combining social, economic and cultural factors such as increased wealth. When the economy develops and wealth increases, people generally have access to more resources and opportunities. This increase in income often enables people to access better quality goods and services, which can include better jobs, higher wages, better education and improved infrastructure. Indeed, a complex economy generally requires highly skilled workers, which can be personally and professionally rewarding, open up new perspectives and opportunities, and encourage individuals to develop their skills and capabilities. In addition, economic complexity generally offers a greater number of job and career opportunities, allowing individuals to express their career aspirations more fully, which

[1] World Happiness Report
[2] The Observatory of Economic Complexity
[3] World Development Indicators
[4] (% of current health expenditure)

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can lead to a greater sense of personal satisfaction and achievement. This can also be explained by access to cutting-edge technology and innovation, suggesting that the economy of a complex country is often associated with significant technological advances. These technological advances can lead to improvements in communication, transport, health, energy, etc., which can improve people's quality of life by offering them new opportunities and making certain tasks easier, thus having a positive impact on their well-being. In addition, a complex economy can foster social and cultural diversity, as well as opportunities for collaboration and cooperation, all of which contribute to social cohesion. Economically complex societies often offer opportunities for upward social mobility, enabling individuals to move from a lower socio-economic position to a higher one, thereby reducing job-related stress, providing financial stability and guaranteeing greater social security. This prospect of moving up the social hierarchy may contribute to greater satisfaction and happiness. Overall, our results are consistent with studies by Stevenson and Wolfers (2008) who demonstrated the relationship between economic growth and subjective well-being. Their research suggested that economic diversification is linked to greater life satisfaction. Other authors such as Easterlin (1995), Carol Graham (2005) and Di Tella and MacCulloch (2007) share the same view.

Control variables such as access to energy, money supply, bank interest rates, foreign direct investment and total population all have a positive and significant effect on the living standards of African populations.

The positive effects of these control variables on happiness can be explained by the fact that access to energy is crucial for economic and social development. Electricity helps to improve living conditions by providing access to education, health and communication, and by facilitating economic activities. Better access to energy also improves quality of life by providing better lighting, cleaner cooking technologies and increased safety. A stable money supply also fosters investor confidence and economic development. A strong and stable monetary system allows low inflation and access to credit, which encourages investment in productive sectors. This economic growth leads to higher incomes and, consequently, an improvement in people's quality of life. Similarly, low bank interest rates promote access to credit and encourage investment. This stimulates economic growth and job creation, resulting in higher household incomes and improved living standards. In addition, foreign direct investment (FDI) is essential for stimulating economic growth by providing financial resources, technology, skills and creating jobs. FDI can also promote the transfer of knowledge and the development of local capabilities, leading to an improved quality of life. To conclude on the positive effects of the control variables, it should be noted that the total population can also have a positive effect on the standard of living of African populations. A young and growing population can be seen as an asset, as it represents a potential workforce, consumption and innovation. However, it is crucial to accompany this demographic growth with appropriate policies and investments to guarantee access to education, health and other essential services to ensure sustainable development.

On the other hand, other control variables such as greenhouse gas emissions, national private health expenditure, foreign health expenditure, forestry income and the overall unemployment rate have a negative and significant effect on the standard of living of African populations.

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The explanation that can be put forward is that greenhouse gas emissions have harmful consequences for the environment and public health. Air pollution caused by greenhouse gas emissions contributes to a deterioration in air quality and an increase in respiratory diseases. In addition, climate change caused by these emissions can lead to natural disasters, droughts, floods and a loss of biodiversity, all of which have a direct impact on the lives of the people of Africa. Also, high national private health expenditure can limit access to healthcare for the most vulnerable populations. Heavy reliance on private healthcare services can create inequalities in access to care and have a negative impact on the health and quality of life of African populations. In addition, foreign spending on healthcare can also have a negative effect. Although international aid in the health sector can be beneficial, excessive dependence on this aid can weaken national health systems and reduce the efforts of African countries to develop solid, sustainable health systems. Similarly, forestry revenues can have a negative impact on the living standards of African populations if forestry management is unsustainable. Excessive deforestation and the destruction of forest ecosystems can lead to the loss of essential natural resources for local populations, such as water, food and building materials. These losses can compromise people's livelihoods and have a negative impact on their quality of life. Finally, high unemployment in the country can lead to increased poverty, food insecurity and social exclusion, resulting in a deterioration in the living standards of African populations. Unemployment limits employment opportunities, income and access to essential resources and services.

4.2 Robustness Check

For the sensitivity analysis of our results, an alternative analysis method was used. Table 5 shows the results of using Driscoll and Kraay's method to estimate the effect of economic complexity on happiness in Africa. Table 5 shows that the previous results hold even with the use of an alternative analysis method. Similarly, identical results for all the control variables show that they retain their sign and significance (see Table 5).

5. Conclusion

In conclusion, this study demonstrated that economic complexity plays a significant role in the happiness of populations in Africa, in agreement with theories such as that of hedonism. The results obtained through the generalized least squares analysis demonstrate a positive relationship between economic complexity and happiness. Thus, it is essential that African governments put in place economic policies aimed at reinforcing this complexity, in order to promote the happiness of the populations. This research offers interesting insights for policy makers, enabling them to take concrete steps to improve the quality of life of African citizens. To achieve this objective, two economic policy recommendations applicable in the context of African countries can be proposed:

- Encourage economic diversification: African countries should promote diversification of their economic sectors by investing in non-traditional industries. This will reduce dependence on raw materials and create new opportunities for employment and economic growth;
- Investing in education and training: Strengthening human capital is essential to fostering economic complexity. African governments must pay particular attention to improving access to quality education, with an emphasis on the technical and technological skills needed to support a diversified and innovative economy.

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By adopting these recommendations, African governments will be able to create an environment conducive to economic complexity, which will help to increase people's happiness and promote sustainable economic development in Africa.

The originality of this article lies in the study of the relationship between economic complexity and population happiness in Africa. The existing literature does not sufficiently address this specific issue in the African context, and thus this study fills an important gap. Future research could further explore this relationship and examine in detail the specific economic policies that can promote economic complexity and happiness in Africa. It should also be noted that this study has certain limitations, such as the generalisation of the results to the entire African continent without taking into account national and regional specificities. It would therefore be important to conduct further studies to better understand these specificities and refine policy recommendations.

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Table 4: Basic results

VARIABLES	Life Ladder										
	1	2	3	4	5	6	7	8	9	10	11
ECI	0.308***	0.160*	0.183**	0.358***	0.227**	0.328***	0.331***	0.310***	0.282**	0.244**	0.332***
	(0.0871)	(0.0879)	(0.0921)	(0.0991)	(0.114)	(0.113)	(0.112)	(0.110)	(0.111)	(0.111)	(0.115)
AEP		0.0184***	0.0202***	0.0225***	0.0174***	0.0207***	0.0113**	0.0147***	0.0116**	0.0131***	0.00981*
		(0.00300)	(0.00297)	(0.00356)	(0.00392)	(0.00398)	(0.00472)	(0.00474)	(0.00501)	(0.00503)	(0.00515)
BMG			0.0161***	0.0388***	0.0388***	0.0436***	0.0415***	0.0398***	0.0396***	0.0394***	0.0396***
			(0.00214)	(0.00316)	(0.00334)	(0.00415)	(0.00414)	(0.00410)	(0.00408)	(0.00406)	(0.00403)
CO2				-0.00878***	-0.0104***	-0.0118***	-0.00739**	-0.00798**	-0.00629*	-0.00868**	-0.00879**
				(0.00335)	(0.00344)	(0.00342)	(0.00359)	(0.00354)	(0.00363)	(0.00377)	(0.00374)
DIR					0.0232**	0.0489***	0.0532***	0.0607***	0.0613***	0.0668***	0.0691***
					(0.00949)	(0.0174)	(0.0172)	(0.0171)	(0.0170)	(0.0171)	(0.0170)
DPHE						-0.00955**	-0.0172***	-0.0179***	-0.0143***	-0.0102*	-0.0122**
						(0.00477)	(0.00517)	(0.00510)	(0.00542)	(0.00570)	(0.00571)
EHEC							-0.0270***	-0.0291***	-0.0235***	-0.0174**	-0.0151*
							(0.00730)	(0.00721)	(0.00776)	(0.00820)	(0.00818)
FDI								0.0296***	0.0319***	0.0301***	0.0281***
								(0.00819)	(0.00825)	(0.00824)	(0.00821)
FR									-0.0447*	-0.0485**	-0.0536**
									(0.0237)	(0.0236)	(0.0235)
Umploy										-1.60e-08**	-1.31e-07***
										(7.29e-09)	(4.46e-08)
PopT											4.00e-08***
											(1.52e-08)
Constant	4.804***	3.384***	2.967***	3.160***	3.421***	3.551***	4.747***	4.421***	4.424***	4.287***	4.748***
	(0.0951)	(0.255)	(0.258)	(0.436)	(0.478)	(0.486)	(0.584)	(0.582)	(0.579)	(0.579)	(0.601)
Comments	682	675	646	508	432	423	420	420	420	420	420
Number of id	31	31	31	31	29	29	29	29	29	29	29
chi2	12.51	52.49	102.1	219.2	211.8	264.4	286.0	308.0	314.1	322.6	334.8
Prob > chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source : Authors; Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

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Table 5: Robustness results

VARIABLES	Life Ladder										
	1	2	3	4	5	6	7	8	9	10	11
ECI	0.308***	0.160	0.183**	0.358***	0.227	0.328**	0.331**	0.310**	0.282**	0.244	0.332*
	(0.0774)	(0.104)	(0.0876)	(0.0626)	(0.139)	(0.114)	(0.119)	(0.123)	(0.132)	(0.155)	(0.162)
AEP		0.0184***	0.0202***	0.0225***	0.0174***	0.0207***	0.0113**	0.0147**	0.0116*	0.0131**	0.00981*
		(0.00267)	(0.00455)	(0.00350)	(0.00228)	(0.00388)	(0.00444)	(0.00544)	(0.00587)	(0.00608)	(0.00536)
BMG			0.0161	0.0388***	0.0388***	0.0436***	0.0415***	0.0398***	0.0396***	0.0394***	0.0396***
			(0.0133)	(0.00556)	(0.00427)	(0.00362)	(0.00357)	(0.00302)	(0.00285)	(0.00265)	(0.00275)
CO2				-0.00878**	-0.0104***	-0.0118***	-0.00739**	-0.00798**	-0.00629**	-0.00868**	-0.00879**
				(0.00351)	(0.00215)	(0.00343)	(0.00316)	(0.00282)	(0.00242)	(0.00352)	(0.00362)
DIR					0.0232	0.0489	0.0532	0.0607*	0.0613*	0.0668*	0.0691**
					(0.0200)	(0.0366)	(0.0317)	(0.0299)	(0.0306)	(0.0332)	(0.0320)
DPHE						-0.00955*	-0.0172***	-0.0179***	-0.0143**	-0.0102**	-0.0122***
						(0.00523)	(0.00571)	(0.00590)	(0.00491)	(0.00436)	(0.00412)
EHEC							-0.0270***	-0.0291***	-0.0235***	-0.0174***	-0.0151**
							(0.00708)	(0.00715)	(0.00613)	(0.00521)	(0.00609)
FDI								0.0296*	0.0319**	0.0301**	0.0281**
								(0.0149)	(0.0148)	(0.0134)	(0.0127)
FR									-0.0447**	-0.0485**	-0.0536**
									(0.0179)	(0.0197)	(0.0206)
Umploy										-1.60e-08	-1.31e-07**
										(1.22e-08)	(4.75e-08)
PopT											4.00e-08**
											(1.42e-08)
Constant	4.804***	3.384***	2.967***	3.160***	3.421***	3.551***	4.747***	4.421***	4.424***	4.287***	4.748***
	(0.0858)	(0.254)	(0.525)	(0.437)	(0.386)	(0.329)	(0.521)	(0.621)	(0.623)	(0.644)	(0.563)
Comments	682	675	646	508	432	423	420	420	420	420	420
R-squared	0.018	0.072	0.136	0.301	0.329	0.385	0.405	0.423	0.428	0.434	0.444
F	15.83	97.36	76.43	14.69	29.63	40.13	134.7	158.3	134.7	171.6	158.5
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Authors; Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

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References

Aït Saïd, F. (2011). Le bonheur en économie. *Idées économiques et sociales*, (4), 67-74.

Albeaik, S., Kaltenberg, M., Alsaleh, M., & Hidalgo, C. A. (2017). Improving the economic complexity index. *arXiv preprint arXiv:1707.05826*.

Albeaik, S., Kaltenberg, M., Alsaleh, M., & Hidalgo, C. A. (2017). Improving the economic complexity index. *arXiv preprint arXiv:1707.05826*.

Banka, S. (2020). Unemployment, total (% of total labor force)(national estimate). *Dostupno na: https://data. worldbank. org/indicator/SL. UEM. TOTL. NE. ZS*.

Bjørnskov, C. (2003). The happy few: Cross-country evidence on social capital and life satisfaction. *Available at SSRN 381640*.

Blanchflower, D. G., & Oswald, A. J. (2004). Well-being over time in Britain and the USA. *Journal of public economics*, *88*(7-8), 1359-1386.

Blanchflower, D. G., Bell, D. N., Montagnoli, A., & Moro, M. (2014). The happiness trade- off between unemployment and inflation. *Journal of Money, Credit and Banking*, *46*(S2), 117-141.

Caner, A. (2016). Bonheur et satisfaction de vivre en Turquie ces dernières années. *Recherche sur les indicateurs sociaux , 127* , 361-399.

Cuñado, J. et De Gracia, FP (2012). L'éducation affecte-t-elle le bonheur ? Preuve pour l'Espagne. *Recherche sur les indicateurs sociaux , 108* , 185-196.

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian psychology/Psychologie canadienne*, *49*(3), 182.

Dewey, J. (2008). La théorie de la valuation. *Tracés. Revue de sciences humaines*, (15), 217-228.

Di Tella, R. et MacCulloch, R. (2008). Le bonheur national brut comme réponse au paradoxe d'Easterlin ?. *Journal of Development Economics , 86* (1), 22-42.

Di Tella, R., MacCulloch, R. J., & Oswald, A. J. (2001). Preferences over inflation and unemployment: Evidence from surveys of happiness. *American economic review*, *91*(1), 335-341.

Diener, E., Napa Scollon, C., & Lucas, R. E. (2009). The evolving concept of subjective well-being: The multifaceted nature of happiness. *Assessing well-being: The collected works of Ed Diener*, 67-100.

Easterlin, R. A. (1974). Does economic growth improve the human lot? Some empirical evidence. In *Nations and households in economic growth* (pp. 89-125). Academic press.

Easterlin, R. A., & Angelescu, L. (2011). Modern economic growth and quality of life: Cross-sectional and time series evidence. In *Handbook of social indicators and quality of life research* (pp. 113-136). Dordrecht: Springer Netherlands.

Easterlin, RA (1974). La croissance économique améliore-t-elle le sort humain ? Quelques preuves empiriques. Dans *Nations et ménages en croissance économique* (pp. 89-125). Presse académique.

Easterlin, RA (1995). L'augmentation des revenus de tous augmentera-t-elle le bonheur de tous ? *Journal du comportement et de l'organisation économiques , 27* (1), 35-47.

Felipe, J., Kumar, U., Abdon, A., & Bacate, M. (2012). Product complexity and economic development. *Structural Change and Economic Dynamics*, *23*(1), 36-68.

Fenouillet, F. (2012). Les conceptions hédoniques de la motivation. *Pratiques psychologiques*, *18*(2), 121-131.

Ferrer-i-Carbonell, A. et Gowdy, JM (2007). Dégradation de l'environnement et bonheur. *Économie écologique* , *60* (3), 509-516.

Flouri, E. (2004). Subjective well-being in midlife: The role of involvement of and closeness to parents in childhood. *Journal of Happiness Studies*, *5*, 335-358.

Ganda, F. (2021). The impact of health expenditure on environmental quality: the case of BRICS. *Development Studies Research*, *8*(1), 199-217.

Graham, C. (2005). L'économie du bonheur. *Économie mondiale* , *6* (3), 41-55.

Graham, C., & Pettinato, S. (2001). Happiness, markets, and democracy: Latin America in comparative perspective. *Journal of happiness studies*, *2*, 237-268.

Helliwell, J. F., & Putnam, R. D. (2004). The social context of well–being. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, *359*(1449), 1435-1446.

Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the national academy of sciences*, *106*(26), 10570-10575.

Hirsch, F. (1976). *Social limits to growth*. Harvard University Press.

Kalaycı, C., & Hayaloğlu, P. (2019). The impact of economic globalization on CO2 emissions. In *The impact of economic globalization on CO2 emissions: Kalaycı, Cemalettin| uHayaloğlu, Pınar*.

Keehan, S. P., Stone, D. A., Poisal, J. A., Cuckler, G. A., Sisko, A. M., Smith, S. D., ... & Lizonitz, J. M. (2017). National health expenditure projections, 2016–25: price increases, aging push sector to 20 percent of economy. *Health Affairs*, *36*(3), 553-563.

Knabe, A. et Rätzel, S. (2011). Cicatrice ou effrayante ? L'impact psychologique du chômage passé et du risque de chômage futur. *Economica , 78* (310), 283-293.

Koch, C. (2015). Deposit interest rate ceilings as credit supply shifters: Bank level evidence on the effects of Regulation Q. *Journal of Banking & Finance*, *61*, 316-326.

Layard, R. (1980). Human satisfactions and public policy. *The Economic Journal*, *90*(360), 737-750.

Lelkes, O. (2006). Tasting freedom: Happiness, religion and economic transition. *Journal of Economic Behavior & Organization*, *59*(2), 173-194.

Li, Z., Folmer, H. et Xue, J. (2014). Dans quelle mesure la pollution de l'air affecte-t-elle le bonheur ? Le cas de la zone minière de Jinchuan, Chine. *Économie écologique , 99* , 88-99.

McGurnaghan, S. J., Weir, A., Bishop, J., Kennedy, S., Blackbourn, L. A., McAllister, D. A., ... & McCoubrey, J. (2021). Risks of and risk factors for COVID-19 disease in people with diabetes: a cohort study of the total population of Scotland. *The lancet Diabetes & endocrinology*, *9*(2), 82-93.

Mikucka, M., Sarracino, F., & Dubrow, J. K. (2017). When does economic growth improve life satisfaction? Multilevel analysis of the roles of social trust and income inequality in 46 countries, 1981–2012. *World Development*, *93*, 447-459.

Ovaska, T. et Takashima, R. (2006). Politique économique et niveau de bien-être perçu : une comparaison internationale. *Le Journal de socio-économie , 35* (2), 308-325.

Rehman, A., Deyuan, Z., Chandio, A. A., & Hussain, I. (2018). An empirical analysis of rural and urban populations' access to electricity: evidence from Pakistan. *Energy, Sustainability and Society*, *8*(1), 1-9.

Sarracino, F., & O'Connor, K. J. (2021). Economic growth and well-being beyond the Easterlin paradox. *A Modern Guide to the Economics of Happiness*, 162-188.

Schroeder, L. M., Ranius, T., Ekbom, B., & Larsson, S. (2006). Recruitment of saproxylic beetles in high stumps created for maintaining biodiversity in a boreal forest landscape. *Canadian Journal of Forest Research*, *36*(9), 2168-2178.

Scitovsky, T. (1976). The joyless economy: An inquiry into human satisfaction and consumer dissatisfaction.

Seligman, M. E., & Royzman, E. (2003). Happiness: The three traditional theories. *Authentic happiness newsletter*, (July).

Sgroi, D., Hills, T. T., O'Donnell, G., Oswald, A. J., & Proto, E. (2017). *Understanding happiness: A cage policy report*. Centre for Competitive Advantage in the Global Economy.

Shiller, R. J. (1997). Why do people dislike inflation?. In *Reducing inflation: Motivation and strategy* (pp. 13-70). University of Chicago Press.

Stevenson, B. et Wolfers, J. (2008). *Croissance économique et bien-être subjectif : réévaluer le paradoxe d'Easterlin* (n° w14282). Bureau Nationale de la Recherche Economique.

Tacchella, A., Cristelli, M., Caldarelli, G., Gabrielli, A., & Pietronero, L. (2013). Economic complexity: conceptual grounding of a new metrics for global competitiveness. *Journal of Economic Dynamics and Control*, *37*(8), 1683-1691.

Tegegne, Y. E. (2021). Impact of broad money supply on economic growth of Ethiopia. *Research Journal of Finance and Accounting*, *12*(5), 20-45.

Veenhoven, R. (1996). The study of life-satisfaction.

Zhang, Z., & Zhang, C. (2023). Revisiting the importance of forest rents, oil rents, green growth in economic performance of China: Employing time series methods. *Resources Policy*, *80*, 103140.

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