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RSEP

Economic recovery thought corporate entrepreneurship strategy: The case of Serbia

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Abstract

The main aim of the paper is to stress the role of corporate entrepreneurship strategy in the process of economic recovery. The subject of the research was the key factors of corporate entrepreneurship i.e. management support, time availability, rewards, reinforcement, and organizational boundaries which determinate strategy and recovery in observed Serbian companies. The modified CEAI questionnaire has been used to assess the key factors of corporate entrepreneurship in Serbian companies. The results showed that observed managers in private companies have been more focused on innovation, rewards as motivation factor, and responsibility, on the one side. On the another side, managers in state-owned companies had less time pressure, but in their companies there were more routines and standardized procedures than in private ones. It can be concluded that management support will be a key factor of faster economic renewal of Serbian companies thought corporate entrepreneurship strategies.

1. Introduction

Entrepreneurial behavior in the company is not exclusively tied to one person and her/his skills and experience, but relies more on teamwork. In this sense, corporate entrepreneurship emphasizes teamwork, whose members are motivated to work on achieving success and acceptance of risk. Enterprise now includes a continuous creative process, whose main objective is the implementation of innovations in the company as a function of successful business and solving problems of consumers and society. The managers would accept the concept of corporate entrepreneurship, which emphasizes the strategic approach based on the acceptance of risk, creativity, innovation and responsibility of each individual to a companies' operations.

The Covid - 19 pandemic has brought the significant changes in companies worldwide. In such circumstances, the companies have been forced to find new business strategies. For managers that operate in developing economies, such as Serbia, it is necessary to implement consider entrepreneurial behavior in their companies. In these transformation processes, the corporate entrepreneurship (CE) plays an important role. The CE strategy can be used in a manner to face with turbulent environment (Zahra, 2007).

The main aim of the study is to stress the role of corporate entrepreneurship strategy in the process of economic recovery in specific environmental and organizational context. Serbia is a case in point. According to World Bank data from official website, the rate of economic growth has been around 1.9 percent annually in the decade

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prior to the Covid-19 pandemic. The Serbian economy started to show signs of recovery in the first half of 2021.The major obstacles of the potential growth are corporate governance, a lack of infrastructure, and an unreformed education sector.

Aforementioned data have been motivated the authors to conduct this study. The research instrument was modified CEAI questionnaire (Kuratko et al., 2014), and categorical variables of respondents such as gender, age, work experience, educational level, and managerial position. First, the validity of modified CEAI has been tested in Serbian companies. Second, the correlation between the key factors of corporate entrepreneurship and managerial levels has been explored. Third, in selection companies equal number of private state and state-owned companies in Serbia have been included. Therefore, the differences in assessment the key factors of the corporate entrepreneurship and the type of ownership have been investigated, too.

2. Literature Review and Development Hypothesis

Corporate entrepreneurship occurs everywhere, regardless of the type and size of the organization, or that an acceptable level of entrepreneurial behavior defines the nature of business of the company, its environment and the current market situation (Zahra, 1995).

There is no universally accepted definition of the corporate entrepreneurship. Dess et al. (2003) argued that following four terms have been used to determinate the concept: sustainable regeneration, rejuvenation of the organization, strategic recovery and strategic turnaround. Entrepreneurship could be used for the organizational transformation (Sebora et al., 2010) as well as to implement innovation into existing companies. This process have been supported by financial and non-financial rewards for the employees who initiated ideas that created a new value (Kuratko et al., 2005). To gain and maintain competitive advantage, managers can be used the corporate entrepreneurship strategy (Dess et al., 1999; Kuratko, 1993) as well as to adopt entrepreneurship behavior into companies.

Recently, two papers have been published with the extensive review of past research in domain of corporate entrepreneurship (Burger & Blazkova, 2020; Popowska, 2020). There are many forms of the corporate entrepreneurship, such as the followed:

1. Strategic renewal that can be defined as "corporate entrepreneurial efforts that results in significant changes in a company's strategy and structure", and

2. Corporate Venturing that can be defined as "corporate entrepreneurial efforts that leads in creation of new business in existing company" (*See Figure 1*).

For the purpose of this research, the following definition has been used "Corporate entrepreneurship includes all actions characterized by novelty in resources, customers, markets, or a new combination of resources, customers and markets" (Ireland et al., 2009).

The precondition of implementation of the corporate entrepreneurship strategy is the evaluation of an internal and external environment, and then to measure corporate entrepreneurship levels (Hornsby et al., 2002). The majority of previous studies have been used the Corporate Entrepreneurship Assessment Instrument (CEAI), which validity had been widely tested.
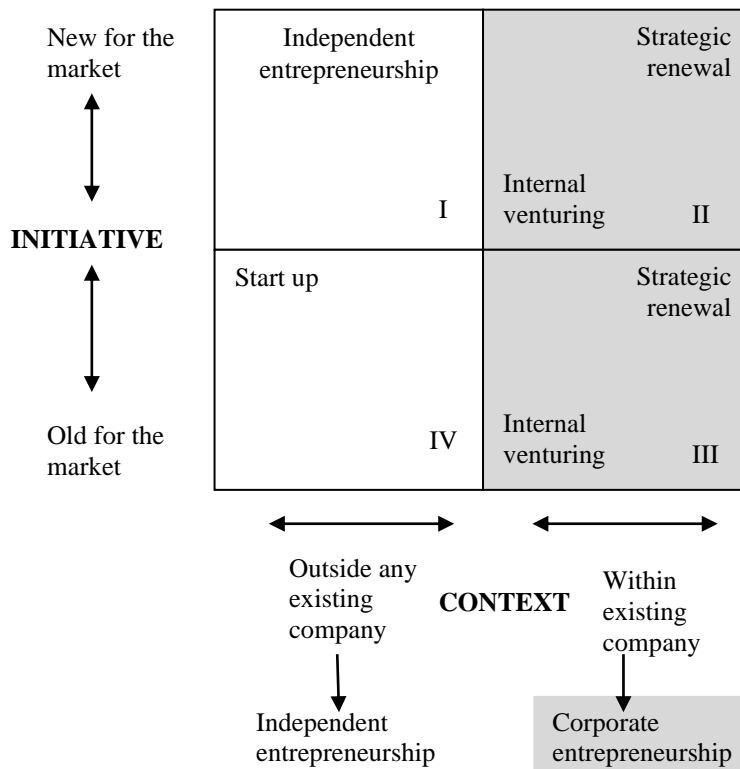
Figure 1. The concept of the corporate entrepreneurship

Source: Miles & Covin (2002)

The essence and nature of the organizational determinants of corporate entrepreneurship factors is as follows (Kuratko et al., 2014):

1. *Top management support* can be explained as "*the extent to which one perceives that top managers support, facilitate, and promote entrepreneurial behavior, including the championing of innovative ideas and providing the resources people require to take entrepreneurial actions*" (Kuratko, et al., 2014, p. 39). Like the other authors, in addition to motivation, encouragement and support, he includes various elements of the organizational context in the management support, such as rewards, structural arrangements, and resources.

2. *Work discretion* is also a complex factor, in which Kuratko and his associates (2014)include not only autonomy in the workplace, but also delegation of authority as well as error tolerance: "*The extent to which one perceives that the organization tolerates failure, provides decision-making latitude and freedom from excessive oversight, and delegates authority and responsibility to lower-level managers and workers* (Kuratko et al., 2014, p. 39).

3. *Reward and reinforcement* include not only rewards for entrepreneurial behavior, but also the reinforcement of behavioral activities through appreciation and encouragement and the provision of resources needed for its implementation (Kuratko et al., 2014). For this reason, this factor includes a factor that other authors call resource availability.

4. *Time availability* can be defined as "*the availability of unstructured or free time can enable would-be corporate innovators to consider opportunities for innovation… the workload schedules ensure extra time for individuals and groups to pursue innovations*" (Kuratko et al., 2014, p. 39). This factor completely coincides with the same factor that other authors have identified under the same name.

5. *Organizational boundaries*. Some other authors call this factor the organizational structure. However, most authors consider that entrepreneurial organization should contain "*flexible organizational boundaries that are useful in promoting entrepreneurial activity because they enhance the flow of information between the external environment and the organization, as well as between departments/divisions within the organization* (Kuratko et

al., 2014, p. 39). This factor also includes reducing the uncertainty faced by employees in performing their tasks in the organization. The assumption is that the process of creating a new venture will be most effective when the uncertainty in the organization is kept under control (Kuratko et al., 2014).

Hornsby et al. (2009) concluded that there was positive correlation between top and middle managers and management support and work discretion. The results of pilot testing of CEAI in four Serbian organizations indicated possibility of implementation of questionnaire in such environment, but some modifications (Kontic, 2011). Then, the study expanded to 12 organizations with modified CEAI has been gain the same five factors (Kontic, 2012). Another study embodied only public organizations in Vojvodina, Serbian economic region (Kontic&Vidicki, 2016), but became longitude study financed by Government of Vojvodina aimed to faster public sector transformation (Kontic et al., 2017).

Based on previous researches, the main proposition of this study can be formulized as follows:

H_o: The five factors that indicate the existence of corporate entrepreneurship significantly increased the ability of companies to implement innovation which have been internally initiated as a precondition of economic renewal.

Other propositions were the followed:

H_1: There are significant differences between the private and state-owned companies in domain of factors of corporate entrepreneurship.

H_2: Top and middle managers have similar assessment of each factor of the corporate entrepreneurship.

H_3: The employees differently assess the key factors of the corporate entrepreneurship than top and middle managers.

3. Research Methodology

The research instrument was the original CEAI translated into Serbian language according to written permission gave by authors (Kuratko et al., 2014). The results of the pilot testing revealed that 41 items from original questionnaire described key factors of the corporate entrepreneurship in Serbian companies (Kontic, 2012). Respondents were asked to indicate their current views of their companies on the Likert scale from 1 - disagree strongly to 5- agree strongly.

The survey was conducted during February to June 2021. Considering the general indifference, regarding participation in the study in Serbia, as well as world pandemic caused by Covid - 19, the following steps were undertaken:

The electronic and hard-copy questionnaire has been made.

The selected companies were diverse with regard to ownership structure (i.e. public/private; domestic/foreign), and geographic location (i.e. Belgrade, Novi Sad, Kragujevac, Nis, Prokuplje, Kosovska Mitrovica).

"Survey insiders" have been friends or business partners of the members of research team, who are on top management positions. Therefore, the response rate was 92%.

3.1. Sample Selection and Data Collection

A sample consisted from 365 respondents from Serbian companies. The gender structure is balanced: 50.9% female, and 49.1% male. It is worth to point that there are valid percent, because the respondents who were filled gender have been abstracted. The majority of the respondents that were not filled gender have been middle managers. Are they want to hide their identity?

The majority of respondents had between 41 and 50 years of life (35.2%), followed by 27.3% between 31 and 40 years. Similar percents were another age group i.e. 51-60 years 18.9%, and 14.6% 21-30 years of life. The minority respondents had over 60 years, only 5.4%.

The majority of respondents had over 20 years of work experience - 33%, followed by 31.5% of respondents who had between 11 and 20 years of work experience. In observed sample, the percent of respondents decreased to 17.9% with 6 to 11 years of work experience, with the tendency of failing.

Regarding educational level, the majority of respondents had university degree (40.3%), followed by high school degree (28.4%), and master degree had 14.4% of respondents. Only 1.1% of respondents had Ph.D.

Regarding management position, the majority of respondents were middle managers 70.2%, top managers 22%, and 7.8% were not managers.

The sample is representative for researching the phenomena of the corporate entrepreneurship in Serbian environment because the following facts:

• Gender balance,

• Majority of respondents had over 20 years of experience,

• Majority of respondents had university degree,

• Majority of respondents were managers, and

• Correlation between management position and educational level was statistical significant (r=0.431).

3.2. Variables

Factor I Management support for corporate entrepreneurship has been included following items i.e. same 19 items from original questionnaire (Kuratko et al., 2014):

"1. My organization is quick to use improved work methods.

2. My organization is quick to use improved work methods that are developed by workers.

3. In my organization, developing one's own ideas is encouraged for the improvement of the corporation.

4. Upper management is aware and very receptive to my ideas and suggestions.

5. A promotion usually follows from the development of new and innovative ideas.

6. Those employees who come up with innovative ideas on their own often receive management encouragement for their activities.

7. The "doers on projects" are allowed to make decisions without going through elaborate justification and approval procedures.

8. Senior managers encourage innovators to bend rules and rigid procedures in order to keep promising ideas on track.

9. Many top managers have been known for their experience with the innovation process.

10. Money is often available to get new project ideas off the ground.

11. Individuals with successful innovative projects receive additional rewards and compensation beyond the standard reward system for their ideas and efforts.

12. There are several options within the organization for individuals to get financial support for their innovative projects and ideas.

13. People are often encouraged to take calculated risks with ideas around here.

14. Individual risk takers are often recognized for their willingness to champion new projects, whether eventually successful or not.

15. The term "risk taker" is considered a positive attribute for people in my work area.

16. This organization supports many small and experimental projects, realizing that some will undoubtedly fail.

17. An employee with a good idea is often given free time to develop that idea.

18. There is considerable desire among people in the organization for generating new ideas without regard for crossing departmental or functional boundaries.

19. People are encouraged to talk to employees in other departments of this organization about ideas for new projects".

Factor II Work discretion has been included following 8 items (Kuratko et al., 2014):

"I feel that I am my own boss and do not have to double check all of my decisions with someone else.

This organization provides the chance to be creative and try my own methods of doing the job.

This organization provides the freedom to use my own judgment.

This organization provides the chance to do something that makes use of my abilities.

I have the freedom to decide what I do on my job.

It is basically my own responsibility to decide how my job gets done.

I almost always get to decide what I do on my job.

I have much autonomy on my job and am left on my own to do my own work".

Factor III Rewards/Reinforcement has been included following 6 items (Kuratko et al., 2014):

"My manager helps me get my work done by removing obstacles and roadblocks.

The rewards I receive are dependent upon my innovation on the job.

My supervisor will increase my job responsibilities if I am performing well in my job.

My supervisor will give me special recognition if my work performance is especially good.

My manager would tell his/her boss if my work was outstanding.

There is a lot of challenge in my job".

Factor IV Time availability has been included following 4 items (Kuratko et al., 2014):

"During the past three months, my workload kept me from spending time on developing new ideas.

I always seem to have plenty of time to get everything done.

I feel that I am always working with time constraints on my job.

My co-workers and I always find time for long-term problem solving".

Factor V Organizational boundaries has been included following 4 items (Kuratko et al., 2014):

"On my job I have no doubt of what is expected of me.

During the past year, my immediate supervisor discussed my work performance with me frequently.

My job description clearly specifies the standards of performance on which my job is evaluated.

I clearly know what level of work performance is expected from me in terms of amount, quality, and timelines of output".

Dependent variable: My company quickly implement innovation which have been internally initiated as a precondition of economic renewal.

3.3. Method

Data were processed by appropriate statistical procedures using SPSS Statistics V25. Data analysis included descriptive statistics (i.e. Arithmetic mean (X), Standard deviation (SD), and Variance (SD^2)). Moreover, various methods have been used, such as Analysis of variance (ANOVA), Coefficient of determination (r^2), Correlation coefficient (r), Cronbach's Alpha coefficient, Cumulative frequency distribution, The exploratory (EFA) and confirmatory factor analysis (CFA), Multivariate analysis of variance (MANOVA), One-way analysis of variance (ANOVA), and Regression analysis (Klein, 2013).

4. Findings and Discussion

The results of descriptive statistics showed that respondents similarly assessed the majority of items in CEAI. However, arithmetic mean higher than 3.5 had items that indicated to work discretion, rewards, and management support as well as high standardization of procedures.

The reliability of the CEIA questionnaire has been tested. The Cronbach's Alpha of the modified questionnaire was 0.89, along with key factors Cronbach's Alpha's presented in Table 1.

Table 1. The reliability of the key factors

The key factor	The Cronbach's Alpha
Management support	0.930
Work discretion	0.823
Rewards/Reinforcement	0.738
Time availability	0.816
Organizational boundaries	0.741

Source: Authors' elaboration

The results of explanatory factor analysis revealed that 54.93% of the total variance was explained by the modified questionnaire.

The hypotheses H_1, H_2, H_3 have been tested by MANOVA. The results indicated that the ownership significantly affected the assessment of four of five factors of the corporate entrepreneurship. The management support, rewards, and organizational boundaries have been more important for respondents in private owned companies. However, the time availability have been more important in state-owned companies. The work discretion had been similarly assessed by all respondents, regardless the ownership . It can be concluded that observed managers in private companies have been more focused on innovation, rewards as motivation factor, and responsibility, on the one side. On the another side, managers in state-owned companies had less time pressure, but in their companies there were more routines and standardized procedures than in private ones.

Regarding managerial position, the research sample divided into respondents who were not managers, middle level managers, and top managers. There were significant differences between top and middle managers regarding three of five factors i.e. management support, rewards, and reinforcement. Top managers had higher scores in innovativeness, and work discretion as well as they have wider picture of companies than middle level managers.

There were significant differences between non managers and top and middle managers regarding four of five factor i.e. management support, time availability, rewards, and organizational boundaries. Only work discretion has been similar evaluated by all respondents. Managers had higher scores in assessment of management support, rewards, and organizational boundaries, therefore, non managers had higher scores in assessment of time availability. It can be concluded that managerial position had positive effect on assessment of observed Serbian companies. Do social accepted answers play an important role in this study? During the input data from questionnaire, we noticed very different, but sincere answers that have been given by one middle level manager.

The results of Regression analysis, with all five key factors of the corporate entrepreneurship as predictors, indicated R=0.732 (R^2 = 0.54). ANOVA results showed statistical significant correlation between same predictors and dependent variable defined as *My company quickly implement innovation which have been internal initiated as a precondition of economic renewal.* Other results are presented in Table 2.

Table 2. Coefficients*

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	β	Std. Error	β		
Management Support	**0.07**	**0.01**	**0.81**	**10.85**	**0.00**
Work discretion	-0.01	0.01	-0.06	-0.75	0.45
Rewards	-0.03	0.02	-0.11	-1.43	0.15
Time Availability	0.03	0.02	0.08	1.20	0.23
Organizational boundaries	0.00	0.02	-0.02	-0.24	0.81

Dependent variable: My company quickly implement innovation which have been internal initiated as a precondition of economic renewal.
Source: Authors' elaboration

The results of the Regression analysis showed that the predictor of quickly implement innovation which have been internally initiated has been Management Support. It can be concluded that managers will be a key factor of faster economic renewal of Serbian companies thought corporate entrepreneurship strategies. It goes in line with other studies conducted both in developed and developing countries (Antoncic & Hisrich, 2001; Bau & Wagner, 2010; Dyduch, 2008; de Araújo Castro et al., 2020; Govindarajan & Trimble, 2005; Sharma & Chrisman, 1999).

5. Conclusions

All key factors of corporate entrepreneurship defined by Kuratko et al. (2014) will have positive impacts on faster implementation of innovation and economic renewal. There are cross-cultural differences in the process of validation of research instrument constructed in one national culture investigating phenomena in different national culture. The characteristics of Anglo-Saxon culture are different from organizational culture in Serbian organizations.

The results of validity testing, measured by Cronbach's Alpha, showed high degree of reliability (0.89 in Serbian sample). CEAI can be used in Serbian companies, regardless the cross-cultural difference. Although, all five key factors of the corporate entrepreneurship have been revealed in Serbian companies. Therefore, the CEAI instrument can be used for accelerating innovation and economic renewal in future.

From a theoretical perspective, the study represents a significant advance in understanding the internal factors of the corporate entrepreneurship in Serbia. The results of this study reveals existing problems in society regarding innovation and entrepreneurship in Serbian companies. It can be used in the process of formulation and implementation of Entrepreneurship and Renewal Strategy by Serbian policy-makers.

From the perspective of management, the results show that the modified questionnaire is a valuable tool in the diagnosis of entrepreneurship organizational culture because it helps in identifying the elements of improvement and development of corporate entrepreneurship strategies in observed companies in Serbia.

Although, research sample included organizations from various sector of Serbian economy, the research focused on one specific environment.

Future study will extended to other countries i.e. Montenegro, Croatia, The North Macedonia, and Bosnia and Herzegovina.

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The double whammy of COVID-19 and oil price collapse: Spillover effects on inflation and exchange rates

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Abstract

The paper addresses two main issues. What is the response of the Algerian exchange rate (REER) to the double whammy of COVID-19 and oil price collapse? To what extent can the previous combination spill over into the inflation rate? For this purpose, we use monthly data covering the period January 2010 to June 2021, and we run both ARDL and NARDL models. The results show that the oil price and its shocks have a clear effect on inflation in both linear and non-linear modeling, especially in the short term. While there seems to be some inconsistencies concerning the influence of oil prices on REER and REER on inflation, owing mainly to the dinar devaluation policy, lower import bills, and the phase-out of basic commodities subsidies. The evidence also clearly reveals that the COVID-19 pandemic has a substantial negative effect on the REER and a positive effect on the inflation rate in the short term linear estimation.

1. Introduction

Late in 2019, coronavirus disease, 19 (COVID-19)[1] was just seen as a China shock, before spreading abroad in January and February. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 a global pandemic. Thus, social distancing policies have become the best way to confront the contagion through a number of measures, including home confinement, travel and business restrictions, the closure of schools and public transportation networks, the suspension of sporting events, and so on. Furthermore, given the high level of economic uncertainty, individual and corporate economic activity was characterized by panic and irrationality.

The COVID-19 pandemic has had far-reaching implications that go far beyond catastrophic health concerns; it has also been obvious for a while that the global economy has been brought to its knees. In a sufficiently large sample (64 countries), Ashraf (2020) finds that as the number of confirmed cases rises, so do stock markets, and business sectors in G7 countries have suffered during the COVID-19 pandemic period (Izzeldin, Muradoglu, Pappas, and Sivaprasad 2021). Therefore, the world has been struck by a magical wand, which has wreaked havoc on health and the economy, as well as creating a crucial dilemma over whether to safeguard livelihoods or lives. However, the impact of this pandemic on individuals and the economy has already surpassed what the 2007-8 global recession did (Georgieva, 2020).

Algeria is a mono-export economy that depends entirely on hydrocarbon revenues (oil and gas accounted for more than 95 per cent of total exports, two thirds of state revenues, and one third of GDP), and largely on food imports. Even after several decades, it has been unable to diversify its economy. Thus, in early 2020, it has faced a dual shock from the coronavirus pandemic and a collapse in oil prices. It was expected to be short-lived at

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[1].On 11 February 2020, WHO officially renamed "2019-nCoV" as "COVID-19", with 'CO' meaning 'corona'.

initially, but it has lasted, causing severe fluctuations in macroeconomic indicators, the most important of which are inflation and the exchange rate, which act as direct receivers of the twin shock spillovers. Several studies have recently focused on the impact of oil prices on inflation (LeBlanc and Chinn, 2004; Blanchard and Galí, 2007; Ozturk, 2015; Malik, 2017; Cerra, 2019) and on exchange rate (Mohammadi and Jahan-Parvar, 2012; Beckmann et al. 2017; Delgado et al. 2018; Chkir et al. 2020). A common finding of these studies is that oil price changes have a crucial role in determining the behavior of both indicators, irrespective of the nature of the relationship (short or long term, symmetrical or not...). Even though it was difficult to immediately identify the impact of the COVID-19 pandemic on previous indicators, a few studies, however, have concluded that COVID-19 has notable influence on oil prices (Devpura and Narayan, 2020), exchange rates (Iyke, 2020; Rai and Garg, 2021) and on inflation rate (Binder, 2020; Dietrich et al. 2022).

At present, most of the existing literature mainly focuses on either the impact of the pandemic on oil prices (Narayan, 2020; Gil-Alana and Monge, 2020; Kartal, 2020; Albulescu, 2020; Devpura and Narayan, 2020), or the performance of capital markets in conjunction with the rapid spread of coronavirus and uncertainty, some studies, moreover, included low oil prices (Dietrich et al. 2022; Baker et al. 2020; Altig et al. 2020; Sharif et al. 2020; Zhang and Hamori, 2021). However, there is little evidence available on the effect of the COVID-19 pandemic on oil prices and exchange rates (Prabheesh and Kumar, 2021), while other evidence focuses either only on the inflation rate (Binder, 2020; Dietrich et al. 2022), or only on the exchange rate (Iyke, 2020; Feng et al., 2021). These research efforts have neglected to check the triangular relationships among oil prices, inflation and exchange rates during the pandemic period. Hence, our paper attempts to bridge this gap through two main contributions. First, we investigate the impact of oil price fluctuations on the real effective exchange rate (REER), taking the impact of the coronavirus disease into account. Second, we analyze the repercussions of previous relationships (OIL, REER and COVID-19) on inflation. As for the selection of Algeria is made, on the one hand, because it is one of the world's largest oil exporting countries, and it is currently facing a double whammy of COVID-19 and oil price collapse as never before and, on the other hand, Algeria has not yet been fully studied, as is the case with other oil-exporting countries, and this analysis paves the way for future studies to better understand similar countries.

The remainder of the paper is structured as follows: Section 2 discusses Algeria's twin shocks; Section 3 presents the review of the literature; Section 4 describes our data and methodology; Section 5 discusses empirical results, and finally, Section 6 concludes the paper.

2. Algeria's Twin Shock

On February 25, 2020, Algeria reported the first confirmed case of COVID-19, and the first death on March 12, 2020; by the end of the year, there had been a total of 80,000 confirmed cases and 2,666 deaths[2]. The government imposed a stringent containment policy that included the closing of schools, universities, restaurants, and businesses, as well as the cancellation of flights and the suspension of public transit. Half of government servants and workers in the economic public sector were given a mandatory leave with full compensation.
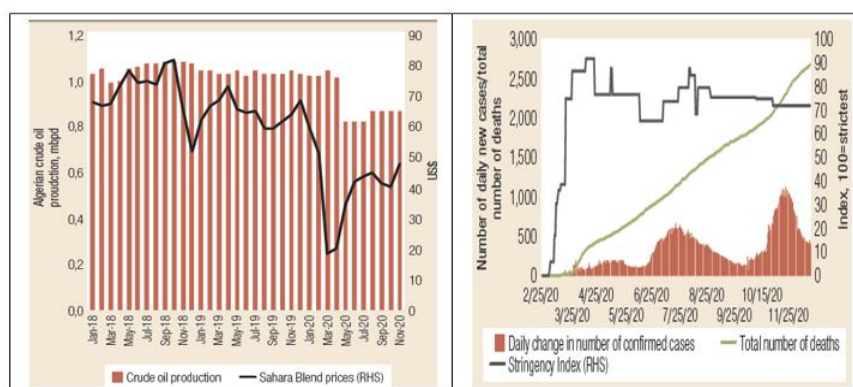

Figure 1. Sahara Blend Prices and Production Quotas and Waves of COVID-19

Source: World Bank Group, fall 2020.

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[2]. See: "Algerian health minister confirms first COVID-19 case". Africa Times. 25 February 2020. Available at: https://africatimes.com/2020/02/25/algerian-health-minister-confirms-first-covid-19-case/

A free fall of oil prices was recorded as the COVID-19 pandemic gripped the world by the end of February, with some prices even reaching negative levels. Prices for the Sahara Blend decreased drastically from US$50.9 per barrel in February 2020 to US$17.9 per barrel in March 2020, i.e. each barrel lost about two-thirds of its value. Therefore, Algeria, as an OPEC member, committed to reduce its oil production by 200 kbpd until the end-2020, in accordance with a production cut agreement reached at the OPEC+ extraordinary meeting in April 2020. This correspondingly reduced Algeria's oil production by 11.9 percent between January and November 2020 compared to the same period the previous year, while prices were at historically low levels, with Sahara Blend prices falling by 39.4 percent in the first nine months of 2020.

Consequently, the Algerian status in 2020 has been marked by unprecedented twin shock, beginning with the health crisis as the coronavirus spread, and subsequently exacerbated by the drop in oil prices. Thus, the double whammy of COVID-19 and the oil price collapse has dragged the economy into a state of near total deficit.

The Algerian undiversified economy adds insult to injury as it relies solely on oil and gas exports (hydrocarbons account for 98% of exports, 60% of tax revenues). Foreign currency reserves, which were the first line of defense against the consequences of the 2008 financial crisis, have been rapidly depleting since 2014 (from $193.6 billion in 2014 to $62 billion in February 2020). This poses a new threat to the economy, since macroeconomic indicators in general, and monetary indicators in particular, are heavily influenced by frequent hard currency monetization, but more importantly, the performance of the Algerian bank and its adopted instruments are completely reliant on oil rents.

3. Literature Review

Given the large-scale studies on the pandemic and its spillover effects on relevant indicators, the temptation to drift a review of the literature far afield is always strong. To avoid this, the following literature review is structured around aspects that are most revealing in this respect.

In the run up to the COVID-19 pandemic, there was a battery of literature that focused on the potential impact of oil price fluctuations on inflation rates. The most common finding is that oil price hikes positively influence inflation rates (Tang et al. 2010; Qianqian, 2011; Wu and Ni, 2011; Bala and Chin, 2018; Bilgin and Adali, 2020). In the same vein, other studies provide evidence of a drop in oil price pass-through to domestic inflation, implying that the link has lately weakened due to several factors including monetary policy credibility and a reduction in the degree of exchange rate pass-through and oil intensity (LeBlanc and Chinn, 2004; De Gregorio et al. 2007; Blanchard and Galí, 2007; Chen, 2009; Choi et al. 2018). Regarding the relationship between oil prices and real exchange rates, Mohammadi and Jahan-Parvar, (2012) find a weak long-run effect of oil prices on exchange rates. In contrast, Beckmann et al. (2017) find a strong link between them that is frequently observed over the long run, even though it is strongly time-varying. For oil-exporting countries, Yang et al. (2018) find a negative relationship between oil prices and exchange rates, but an uncertain relationship for oil-importing countries. The same relationship was investigated by Turhan et al. (2014) for G20 countries, and their results reveal that they are negatively correlated to each other.

Ha et al. (2021) analyze the evolution and drivers of inflation during the pandemic and the likely trajectory of inflation in the near-term using three global variables: global inflation (based on core consumer and producer price inflation), global output growth, and oil price growth. They reported important findings on global inflation, which witnessed the most muted and shortest-lived decrease among the five global recessions over the previous 50 years, while also experiencing the fastest increase since May 2020. They also pointed out that four-fifths of the global inflation decline from January-May 2020 was driven by the collapse in global demand, while oil prices drove another one-fifth.

Coulibaly (2021) provides three key pieces of evidence about the COVID-19 pandemic and its effects on the consumer price index (CPI) for West African Economic and Monetary Union (WAEMU) countries. First, the CPI was positively affected by the COVID-19 confirmed cases, whereas the overall government policy responses index had a negative impact on the CPI. Second, the government accommodative policies for COVID-19 in other countries have a positive impact on the host country's CPI. Finally, world food prices, as well as oil prices, influenced the CPI positively. According to Agyei et al. (2021), in a similar context and for Sub-Saharan Africa, COVID-19 negatively influenced food prices through the demand and supply conditions of the food market of the sampled countries, and external environmental shocks aggravated this condition. They also find that crude oil prices, inflation, and the exchange rate all exerted a detrimental effect on food prices.

As for the European Union members and the candidate countries, ERDOĞAN et al. (2020) investigate recent macroeconomic problems during the pandemic, taking inflation as a core indicator to examine, since it is directly affected by many macroeconomic variables. Their findings reveal that the increase in inflation is mainly triggered by both money supply ratios and the exchange rate. The latter itself has become increasingly volatile

due to the increase in confirmed cases, as reported in a study that included many European, Asian, and American countries, although the economic response policies implemented by those governments during the pandemic, including income support, fiscal measures, and international aid, have had a restraining effect on exchange rate volatility (Feng et al., 2021).

Villarreal-Samaniego (2021) examines the dynamics of oil prices and the previous relationship (the COVID-19 pandemic and the exchange rate) in five emerging economies: two oil-importers and three oil-exporters. The analysis discovered a negative relationship between oil prices and exchange rates in all five countries during the first quarter of 2020. Indeed, several studies have attempted to examine the impact of COVID-19 on the Euro/USD exchange rate by taking into account oil prices or other variables such as the stock market index and gold prices. Overall, the results indicated that the exchange rate, during the pandemic era, is notably influenced by those variables compared to the pre-pandemic era (Konstantakis et al., 2021; Devpura, 2021).

Despite different contexts in the previously cited literature, the linkages among the COVID-19 pandemic, inflation (or CPI) and exchange rate were separately examined. Therefore, there is a research gap that, for the most part, characterizes the rentier economies. More specifically, the overlapping of the aforementioned linkages during the COVID-19 pandemic while simultaneously accounting for oil prices.

4. Data and Methodology

The main series in our study are inflation, real effective exchange rate, and oil prices, in addition to the coronavirus dummy variable series. For this reason, we used monthly data with 138 observations for each variable from January 2010 to June 2021. To achieve our target goal, we depend on two models. The first is the internal balance, which is used to detect the effects of oil prices and the REER on inflation. The second expresses the external balance in order to detect the effects of oil prices on Algeria's REER, with coronavirus as a dummy variable in both models. While coronavirus is treated as a dummy variable in both models, the digit 0 for the period January 2010 to December 2019; and the digit 1 for the period January 2020 to June 2021, whereas the two models are as follows:

$$model\ 1:\ INF_t = a_{10} + a_{11} OIL_t + a_{13} REER_t + a_{14} COV_t + \varepsilon_{1t} \qquad (1)$$

$$model\ 2:\ REER_t = a_{20} + a_{21} OIL_t + a_{22} COV_t + \varepsilon_{2t} \qquad (2)$$

Where INF is the inflation rate calculated using the CPI and sourced from the IMF database; OIL is the price of the Sahara Blend, the Algerian crude oil benchmark, obtained from the OPEC monthly oil market report; and REER is the real effective exchange rate obtained from the Bank for International Settlements database. Finally, COV stands for coronavirus dummy variable. The parameters and white noise terms, respectively, are aij and εit.

5. Empirical Results and Discussion

5.1. ARDL Estimation

5.1.1. Unit Root Test Results

The first step in the study is to test the integration order of all the series; for this reason, we use two different tests (Augmented Dickey Fuller ADF and Phillips Perron PP tests) for the trend and intercept equation. The results obtained from table 1 show that all three series for the two tests are I(1) series, i.e. the probability of a co-integration relationship among the variables under the two models above.

Table 1. Unit Root Test Results

Variables	ADF		PP		Decision
	Statistic	**probability**	**Statistic**	**probability**	
OIL	-2.112	0.533	-2.159	0.507	/
REER	-3.480	0.045	-2.867	0.176	/
INF	-3.041	0.125	-3.371*	0.059	/
D(OIL)	-8.323***	0.000	-7.529***	0.000	I(1)
D(REER)	-4.657***	0.000	-9.717***	0.000	I(1)
D(INF)	-4.523***	0.000	-19.886***	0.000	I(1)
***the significance at 10, 5 and 1% significance level.					

Source: Author's calculations using Eviews 12.

5.1.2. Non-linearity Test

The BDS test is used as a second step to detect nonlinearity behavior for the three series, since we are using monthly data for three well-known series with nonlinear behavior. The results in the table below show that we cannot reject the hypothesis of nonlinearity for all the series at the 5% level of significance. As a result, we will use nonlinear methods to detect relationships and effects among variables in order to get a clear idea about the co-movement of the variables under study and their effects.

Table 2. BDS Test Results

OIL			
dimensions	**BDS statistic**	**Normal probability**	**Bootstrapprobability**
2	0.170635	0.0000	0.0000
3	0.284317	0.0000	0.0000
4	0.358634	0.0000	0.0000
5	0.406302	0.0000	0.0000
6	0.432817	0.0000	0.0000
INF			
2	0.197352	0.0000	0.0000
3	0.335198	0.0000	0.0000
4	0.430827	0.0000	0.0000
5	0.499239	0.0000	0.0000
6	0.549153	0.0000	0.0000
REER			
2	0.146916	0.0000	0.0000
3	0.242410	0.0000	0.0000
4	0.304344	0.0000	0.0000
5	0.337695	0.0000	0.0000
6	0.356215	0.0000	0.0000

Source: Author's calculations using Eviews 12.

5.1.3 Co-integration Analysis

Since all the variables are I(1) series, we can run co-integration tests. The ARDL procedure is used in this case to detect the co-movement of the variables and the long-run relationship in the two study models. Before we can estimate short and long run effects, we need to run a bounds test to see if there is a long-term relationship between the variables in the two models.

As shown in table 3, we cannot reject the null hypothesis of no co-integration relationship among the variables for the two models since the test statistics are greater than the critical values at 1% significance levels. This means that in the long run, the three series under investigation in our study behave in the same way.

Table 3. Bounds Test Results

Test statistic	Model 1		
	Significance	**I(0)**	**I(1)**
8.482	10%	2.713	3.453
	5%	3.235	4.053
	1%	4.130	6.393
Test statistic	Model 2		
	Significance	I(0)	I(1)
7.147	10%	3.113	3.610
	5%	3.740	4.303
	1%	5.157	5.917

Source: Author's calculations using Eviews 12.

5.1.4 Long Run Estimation

The next step in the study is to estimate the long run effects of the two models. In the first model, it is clear from the table below that both oil prices and REERs have no effect on the inflation rate because all of the p-values are greater than the 0.05 significant level, i.e. changes in oil prices and REERs do not stimulate inflation in Algeria in the long run. This stems from the fact that the Algerian bank has been adopting a sterilization monetary

policy[3] to neutralize the foreign asset fluctuations caused by oil prices and associated REER variations by offsetting its domestic assets in parallel, resulting in the long-term fading of both inflationary and deflationary pressures. However, this may support the result obtained by Habermeier et al. (2009) regarding the importance of monetary policy in reducing the pass-through of exchange rate and oil price shocks to inflation rates.

Similar to the evidence provided by Mohammadi and Jahan-Parvar, (2012) and Delgado et al. (2018), our second model reveals that oil prices have a significant effect on the REER in the long run, confirming the relationship over the study period. As is well known, the higher the oil prices (which have increased by 10%), the higher the demand for local currency and, as a result, the higher the REER (appreciated by 12.7 percent).

Table 4. Long Run Estimation Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
OIL	-1.701	-0.889	0.375
REER	4.739	0.450	0.653
C	-50.634	-0.063	0.949
Model 2			
OIL	0.127	4.375	0.000
C	87.721	35.139	0.000

Source: Author's calculations using Eviews 12.

5.1.5. Short Run Estimation

According to Engel and Granger (1987), the ECM is the best model for detecting short run effects between co-integrated variables (Error Correction Model). In our case, the ECM model results in table 5 show that for the first model, both oil prices and REERs have a positive significant influence on the inflation rate.

The impact of oil prices on the CPI, and then inflation rates, passes through the channel of petrodollar monetization in the money market, which is frequently injected into various sectors of the national economy, and because oil prices have been falling since 2014, especially with the beginning of the pandemic; its impact remains marginal (4%). However, as previously demonstrated, this evidence was frequently confirmed.

A similar positive effect in the relationship between REERs and inflation may appear to contradict the theoretical background, since the REER appreciation has not resulted in deflationary pressures and therefore reduced prices. The explanation for this contradiction, however, is due to two fundamental causes; first, lowering the import bill to reduce the balance-of-payments deficits, especially the trade balance, as a result of reduced international returns following the drop in oil prices, and second, phasing out basic commodity subsidies to reduce government spending. If the former cause coincides with an inelastic production system in a rentier economy like Algeria, it will inevitably lead to a boom in both tradable and non-tradable goods, while the latter adds fuel to the fire whenever the subsidy, which is basically intended for goods involved in the CPI calculation, is reduced. As a result, even if the REER rises, both causes have led to higher prices. It should also be noted that the ECT parameter shows a very weak adjustment in the model after any long term shock.

The results also reveal that the COVID-19 variable has a significant positive effect on inflation in the short term, which is consistent with the results of Binder (2020). It is axiomatic that the coronavirus shock rages fear and pessimistic expectations fueled by uncertainty, resulting in an unprecedented increase in demand for goods marked by irrational consumer behavior. In addition to the disruption of supply chains and supply side fluctuations caused by the suspension of some industries as a precautionary measure imposed by the pandemic, all of these factors eventually contributed to a price increase.

In the second model, the ECT coefficient reveals a 15.8% adjustment of the model in the long term after any shock, indicating that any disruption in the model and co-movement of the two variables (oil prices and REERs) will take more than 6 months to return to equilibrium. Furthermore, the results in table 5 show that oil prices have a very small negative effect on REERs in the short term; Yang et al. (2018) found the same effect for oil-exporting countries.

However, to comprehend the aforementioned relationship, it is necessary to first understand that the Algerian bank has been devaluing the dinar since late 2014, when oil prices began to fall below $100 per barrel (the dinar has devalued by more than 50% and 70% against the euro and the dollar respectively during the period 2014-2021), in order to increase on the one hand the nominal value of oil rents, which have been locally monetized to meet the growth in domestic spending, and to mitigate the official reserve depletion on the other hand. In the

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[3] For a discussion of the relevant literature, see Djedaiet and Ayad (2017).

short run, this has resulted in the oil price-REER connection having the opposite impact. It is also worth noting that, despite the rise in oil prices during such a pandemic, they have yet to reach a point where Algeria's economy is in balance (a price above the $100 per barrel ceiling), not to mention pushing the dinar value higher.

Furthermore, COVID-19 has a strong short term impact on the REER, since the pandemic has led to a REER depreciation of roughly 150 per cent. This result is consistent with the previously mentioned analysis of the REER devaluation, especially since the onset of the pandemic in early 2020, following a critical shortage of demand for Algerian dinar as a result of the global recession which has reduced global demand for oil. Therefore, the Algerian rentier economy had no other options for stemming the depletion of official reserves and absorbing public expenditure except through a nominal increase in the monetized petrodollar. This finding is in line with that of Iqbal et al. (2020), who found a strong negative relationship between the exchange rate and COVID-19 for a short period of time.

Table 5. Short Run Estimation Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
D(OIL)	0.0405	2.286	0.023
D(REER)	0.656	8.294	0.000
D(REER(-1))	-0.223	-2.891	0.004
COV	0.637	2.066	0.040
ECT	-0.0059	-5.892	0.000
Model 2			
D(REER(-1))	0.227	2.738	0.007
D(REER(-2))	0.027	0.344	0.730
D(OIL)	-0.051	-2.621	0.009
D(OIL(-1))	0.032	1.472	0.143
COV	-1.152	-3.481	0.000
ECT	-0.158	-4.669	0.000

Source: Author's calculations using Eviews 12.

5.1.6. Quality Tests

According to the quality tests (normality distribution of the errors; autocorrelation of the errors; heteroscedasticity problem; Ramsey test for model estimation), the error series are normal, and the model estimated is appropriate. All estimators are stable over time, as shown by the CUSUM and CUSUM Squares graphs for parameter stability in time, allowing us to forecast using the two models estimation.

Table 6. Quality Tests Results

Tests	Jarque-Berra	Breusch-Godfrey	ARCH	Ramsey
Model 1	0.330	1.760	0.659	1.495
	(0.847)	(0.063)	(0.786)	(0.223)
Model 2	0.331	0.540	0.994	0.120
	(0.847)	(0.883)	(0.459)	(0.729)
(.) Denotes the probability of the tests.				

Source: Author's calculations using Eviews 12.
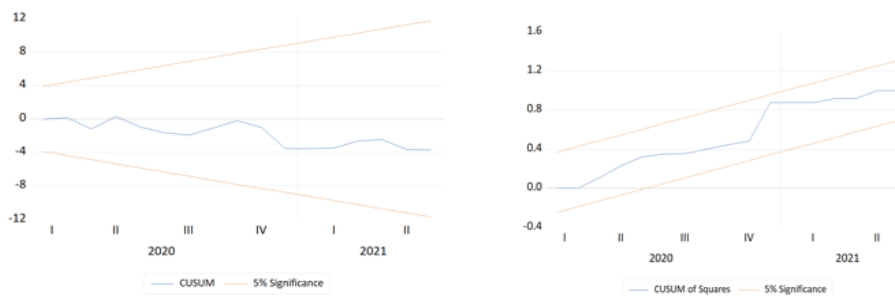
Model 1

Model 2

Figure 2. CUSUM and CUSUMSQ Graphs

5.2. NARDL Estimation

Because there is an asymmetrical effect of oil prices on macroeconomic variables, we will attempt to estimate a non-linear estimation for the two models using a NARDL approach to cope with positive and negative components of oil prices. The two models are as follows:

$$model\ 1: INF_t = a_{10} + a_{11} OIL_t + a_{13} REER_t + a_{14} COV_t + a_{15} OIL_t^+ + a_{16} OIL_t^- + \varepsilon_{1t} \quad (3)$$

$$(4) model\ 2: REER_t = a_{20} + a_{21} OIL_t + a_{22} COV_t + a_{23} OIL_t^+ + a_{24} OIL_t^- + \varepsilon_{2t}$$

Where OIL_t^+ and OIL_t^- are the positive and negative components of oil prices respectively.

5.2.1. Bounds Test

The NARDL estimation follows the same procedure as the ARDL estimation; the first step is to run the bounds test to detect the series' co-movement. The results in table 7 show that there is a co-integration relationship between the variables in both models since the statistical value is greater than the critical values at a 5% significant level, indicating that there is co-movement behavior between the cumulative components of oil prices, the REER, and the inflation rate in the first model, and between the cumulative components of oil prices and the REER in the second model.

Table 7. Bounds Test for NARDL Estimation Results

Test statistic	Model 1		
	Significance	**I(0)**	**I(1)**
3.982	10%	2.474	3.312
	5%	2.920	3.838
	1%	3.908	5.044
Test statistic	Model 2		
	Significance	I(0)	I(1)
6.767	10%	2.713	3.453
	5%	3.235	4.053
	1%	4.358	5.393

Source: Author's calculations using Eviews 12.

5.2.2. Long Run Estimation

The long run asymmetric effects estimation shows that both negative and positive oil price shocks have a significant effect on inflation rates, with a slight disparity in favor of negative ones, implying that the Algerian bank reaction to controlling inflation rates does not vary greatly depending on the different shocks.

The second model reveals that the REER responds only to negative oil price shocks at a 5% significance level; however, the relationship is a little messed up, owing to the Algerian bank's strong desire to keep the exchange rate in check through dirty floating interventions that effectively neutralize shocks.

Table. Long Run Estimation for NARDL Model Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
OIL_POS	0.137	2.137	0.034
OIL_NEG	-0.177	-3.255	0.001
REER	0.194	0.563	0.574
C	113.431	3.199	0.001
Model 2			
OIL_POS	0.070	1.697	0.092
OIL_NEG	0.091	2.852	0.005
C	103.088	50.191	0.000

Source: Author's calculations using Eviews 12.

5.2.3. Short Run Estimation

As shown in table 9, the ECT estimators are statistically significant in both models, as evidenced by the existence of an adjustment procedure after any shock, which accounts for 10.4 percent and 18.1 percent for the first and second models, respectively (low speed adjustment).

Based on the same table, the short term results for both models are not substantially different from their long run counterparts, with the exception of the larger influence of oil positive shocks on the inflation rate. A similar asymmetric impact was found by Choi et al (2018). It is important to stress that in the nonlinear estimation, the coronavirus variable has no influence on the inflation rate or the REER.

Table 9. Short Run Estimation for NARDL Model Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
D(OIL_POS)	0.130	4.270	0.000
D(OIL_NEG)	-0.018	-2.905	0.004
D(REER)	0.652	8.625	0.000
COV	-0.430	-1.182	0.239
ECT	-0.104	-4.531	0.000
Model 2			
D(REER(-1))	0.252	2.999	0.003
D(REER(-2))	0.096	1.099	0.273
D(OIL_NEG)	0.016	3.090	0.002
D(OIL_POS)	0.040	0.969	0.334
COV	-0.563	-1.358	0.176
ECT	-0.181	-5.269	0.000

Source: Author's calculations using Eviews 12.

5.2.4. Quality Tests

The quality test results of the NARDL estimation for the two models are the final step in this study, and it is clear from the results that both models are statistically acceptable because all of the tests are positive (the errors are normally distributed with no autocorrelation and with a homoscedasticity behavior for the error variance, the model is appropriate, as well as the parameters are stable over time).

Table 10. Quality Tests Results

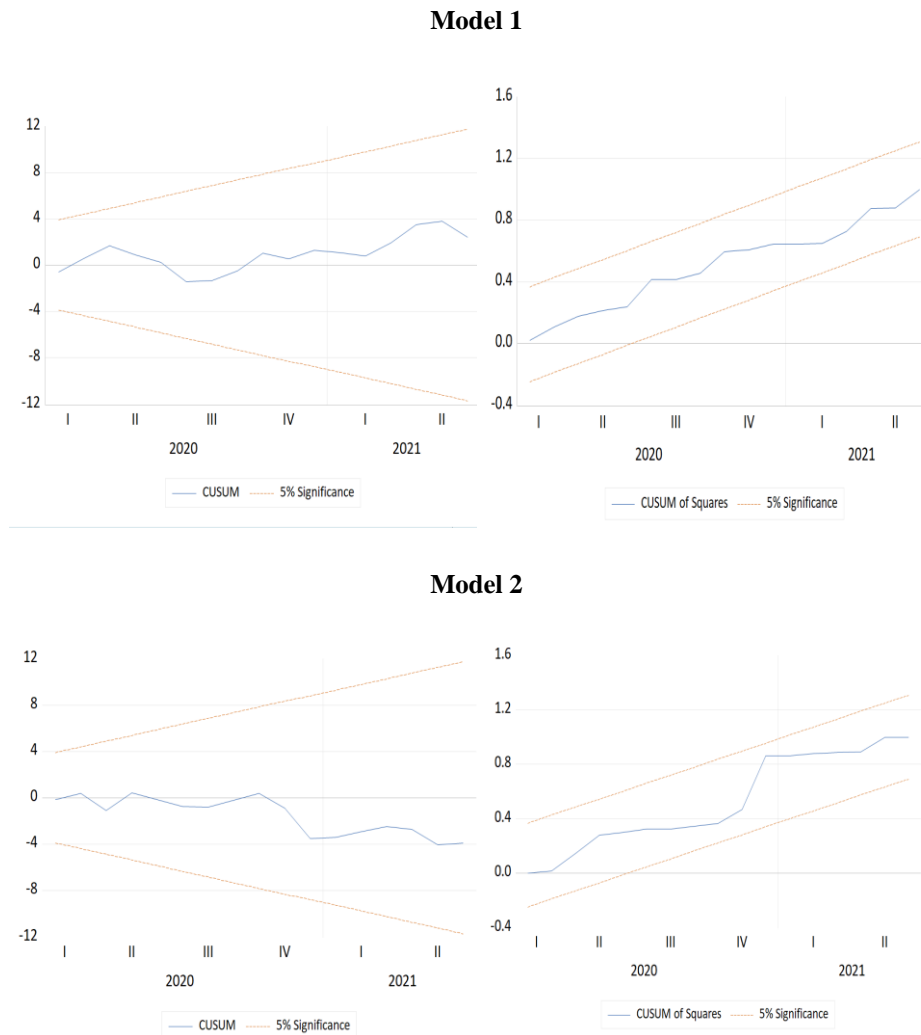| Tests	Jarque-Berra	Breusch-Godfrey	ARCH	Ramsey
Model 1	0.396	1.282	0.853	0.094
	(0.820)	(0.238)	(0.596)	(0.759)
Model 2	0.034	0.996	1.256	0.037
	(0.982)	(0.457)	(0.255)	(0.847)
(.) Denotes the probability of the tests.				

Model 1

Model 2

Figure 3. CUSUM and CUSUMSQ Graphs

6. Conclusion

This paper contributes to the emerging literature on the economic consequences of the COVID-19 pandemic, particularly in terms of monetary policy. Several papers have been published on various topics, the most important of which are: investigating the impact of the pandemic on oil prices and identifying the performance of capital markets while taking uncertainty into account. However, our contribution can be divided into two parts. First, we set up two models that represent both internal and external equilibrium to determine the interrelationship among variables (oil prices, REER, and inflation). Second, we examine how the aforementioned models reacted to the COVID-19 pandemic, which has coupled with a drop in oil prices in Algeria as a pure rentier economy.

Overall, the evidence suggests that both models have eloquently responded to the coronavirus only in the linear estimation, i.e. the COVID-19 pandemic had a substantial negative effect on the REER and a positive effect on the inflation rate in the short term linear estimation. This gives the impression of the Algerian economy's high vulnerability, which is also confirmed by the considerable positive effect of oil prices on inflation rates. However, the effect of the REER on inflation does not match the findings; this is mostly attributable to two factors: lowering the import bill and progressively reducing basic commodity subsidies. The former strives to minimize balance-of-payments deficits by reducing official reserve depletion, while the latter aims to alleviate the budget deficit by cutting public expenditure; both have driven inflation despite the REER appreciation.

The nonlinear estimation illustrates the long- and short-term responsiveness of inflation rates to both positive and negative oil price shocks, underlining once again the economic fragility in the face of oil price fluctuations. The relationship between the latter and the REER is a little hazy, as the Algerian bank does not allow it to float freely or even partially, as seen by the dinar devaluation strategy.

The costs of an undiversified economy should not be disregarded, as they have been in previous crises. In other words, unless the pandemic coincided with a wholly dependent on oil revenues, the impact on inflation and the exchange rate would not have been that severe. As a result, policymakers must put an end to this curse by making major efforts to diversify the economy in order to better absorb future shocks, as it is unacceptable to keep macroeconomic indicators out of check in this manner.

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Mediating effect of cost of safety on performance of bread bakers: Evidence from Kogi State, Nigeria

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Abstract

The study investigated the mediating effect of cost of safety on the performance of bread bakers: Evidence from Kogi State Nigeria. The purpose was to examine the extent to which safety costs mediate or explain the underlying mechanism of the relationship between workers' safety and their performance. Data for the study were obtained from responses to the questionnaire distributed to 260 workers in seven (7) bread baking enterprises in the state out of which 163 of them (questionnaires) were returned. The analysis of the data was done using bootstrapping and regression statistical tools. The results of bootstrapping showed that the Average Casual Mediation Effect (ACME) is Total Effect (TE) minus Direct Effect (DE) of X (safety) and M (mediator) on Y (performance) and the coefficient of M have the same value of 0.3744 significant at 1 percent level. The result indicates partial mediation, the aim of mediation analysis. Similarly, the regression result indicated that approximately 53 percent of changes in Y are explained by the combined effect of X and M which is partial accountability of the variables akin to partial mediation of bootstrapping result. The study recommends that business owners especially bakery owners in Kogi State should take issues of safety seriously by providing adequate safety equipment and training workers on safety precautions.

1. Introduction

The safety of workers is paramount to management organizations and the government of any nation. Safety programmes especially for workers operating in factories were first introduced in Nigeria during the colonial period. The essence of the programmes was to enable organizations to manage and control safety risks and hazards in work environments. The negative effects of these risks and hazards are of various magnitudes ranging from accidents, injury, diseases, illness, and death impacting negatively on employees' and business performance, environment, and economy.

The hazards stem from physical exposure of workers as a result of handling/operating tools and equipment, high level of ambient noise from machines, and high repetitive motions and vibrations (Vander grift, Gold, Hanlon & Punnett, 2012 cited in Oloveze, Chukwuoyims, Ogbonna & Anayo Chukwu, 2021)

In Nigeria successive governments in a bid to guarantee the safety of workers, initiated a lot of safety programmes backed up by various legislations. These legislations include the Labour Act of 1974 the factory Act of 1987 and the workman's compensation Act of 1987. Other Acts on the health and safety of workers in Nigeria are the Health and Safety Labour Act of 1990 and the Workman's Compensation Act, 2004 amended in 2011 [Employee's compensation Act (ECA), 2011]. These laws are meant to legally seek management's commitment to employers. Safety has a lot of cost implications (Odigbo & Ekeh, 2019). Thus Desmond (2019) opined that Investment in the Safety of workers from accidents fatal and non-fatal has huge cost Implications and is associated with employees' performance and attainment of overall objective(s) of organizations.

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It is in view of this performance that many organizations in advanced economies such as the USA, UK, and China spend millions of dollars on safety programmes in terms of safety equipment procurement, maintenance of such equipment, and training of workers on safety measures are in compliance with applicable laws on safety precautions and compensation procedure in these countries. Similarly, in sub-Saharan African countries, such as Ghana, Kenya, and South Africa, These are laws that support the establishment of an accident-free working environment for employees with swift punitive measures on default [Brooklyn, (2018)], unfortunately, however, in Nigeria, though laws on employee safety are in place they are scarcely compelled with due to lack of enforcement (Barrikan & Jens). It is quite common that Nigerian business owners (entrepreneurs) are known for showing little or no interest/concern for employees' safety as their primary focus is on the return of their investment (Botinwa & Akinlade, 2020). The case of this nonchalant attitude of entrepreneurs to workers' safety in Nigeria is prevalent in private organizations where little or no fund is committed to securing the safety of their employees. (Botinwa & Akinlade, 2020)

Therefore, the objective of the study is to examine the extent to which safety costs to the management of enterprises (mediator) mediate between or explain the underlying mechanism of the relationship between workers' safety and their performance/ service quality.

2. Literature Review

Conceptual Review

Cost of Safety (CoS): This refers to the cost of planned safety programmes for workers operating in an organization (Brooklyn, 2018). The programmes especially for factory workers are meant to protect them from injuries, diseases, illnesses, and accidents that could claim their lives. Otolu and Adesuga (2019) viewed CoS as an investment of management that shows their (management) commitment to the health and safety of their employees and the environment in which business operations take place. Some important considerations of management in the area of employee safety and a healthy working environment involving governmental funds (costs) include plant layout, fire prevention system, provision of safety equipment, and safety training for workers. Other safety provision programme of an organization according to Mitchel and Harrison (2018) includes the installation of alarms and warning system, adequate lighting in work areas, flooring of working areas that are easy to clean, and mounting of signboards at strategic business premises with clear written safety instructions. These provisions are necessary and critical to business operation as injuries sustained by workers in factory accidents could sometimes be fatal leading to permanent disability and even death of worker(s) difficult to replace even temporarily.

It is in view of the importance attached to workers' safety especially those working in a hazardous business environment that Clarsion and Moore (2019) classified an organization's investment in the area of provision of safety facilities into three namely (i). Provision of adequate safety equipment (ii) Training of Workers on safety precautions and handling of equipment and (iii). Maintenance of Safety equipment and working tools/machines.

Performance: Performance (P) in the case of an employee refers to how a worker (Staff) carries out his/her duty role, tasks, and behaves in the workplace (Hildal & Urzil, 2016). P is an important ingredient for an organization's success measured by Quality, Quantity, Effectiveness, and Efficiency of Output. The Q^2 fund, E^2 of Outcome generally referred to as P metrics helps both management and employees review methods and ways tasks are performed for the improvement of P employees to meet business as well as customers' needs (Fanner & Timlon, 2018). With the metrics, an individual P can be assessed in terms of his/her daily, weekly, or monthly efforts in sustaining patronage of goods and services delivered and the overall profitability of an enterprise. For a manufacturing enterprise, some of the commonly used P metrics according to Dulman and Arler (2018), Morgger (2019) and Brooks (2020) are the number of product defects, number of errors, and number of units made (Produced) and abstention rate.

Empirical Review

In literature, the relationship between the safety of employees and their performance has been established. For instance, Grace and Rosemary (2018) conducted a study on maintaining the health and safety of workers in the workplace. Employee and employer's role in ensuring a safe working environment. The aim was to ascertain the importance of a healthy working environment. Data for the study were obtained from teachers in Mboomi west district working in secondary schools. Findings from the responses on the need for safety in a working environment descriptively analyzed using charts revealed that firstly P is closely linked to safety and secondly, lack of training on environmental hazards affects performance. The findings indicate that safety with all the cost implications is a mediator that explains the underlying mechanism of the relationship between Safety (x) and performance P (y) of workers.

In Pakistan, Yumei, Maryam, Mutaz Tahur, and Imtiaz (2021) did a study on put safety first: Exploring the role of health and safety practices in improving the performance of SMEs. The purpose was to ascertain the role of health and safety practices in improving the performance of workers. Data obtained from a sample of employees in SMEs descriptively analyzed using mean, Standard deviation, and inferential statistics technique (Pearson correlation coefficient two-tailed and simple regression: Findings showed that health and safety practices have a significant effect on performance. The result is an indication of the association/ relationship between safety and performance of workers in a workplace.

Alex Shangman, Ka, Charles, and Tariq (2020) carried out a study on promoting employee safety in Chinese construction companies. The essence is to examine the role of organizations' leadership in promoting a safe climate for performance. The study adopted a quantitative research method. Results of responses obtained from 106 construction professionals analyzed descriptively indicated that exerting certain leadership strategies that encourage workers to comply with safety practices will improve performance. Encouraging safety in the workplace entails the provision of safety equipment and training of workers on safety practices.

The association between safety and performance of workers has ever been established for instance in Japan, Chung and Yonsi (2016) in the study examined the relationship between safety practices and the performance of employees in construction companies. Results of descriptive analysis of responses from 235 employees in six construction firms revealed a positive relationship between the quality, quantity, and safety, compliance with safety measuring, and performance of employees. The finding implies that safety in the workplace is a sine qua non (sacrosanct) to the performance of employees especially those workers in factories prone to various risks forms of accidents and injuries.

In the USA, Ranold and Elliot (2019) analyzed the effect of safety and productivity in fifty (50) manufacturing firms in Florida for the period 2006 to 2017). Ex-post factor, descriptive and analytical research approaches were adopted for the study. The results indicated that a positive and significant relationship exists between the safety and productivity of workers. Consistent with Ranold & Elliot (2019) Hallistron and Porttan (2020) examined the effect of safety and health practices on employee performance in twenty (20) manufacturing firms in Chicago from 2000 to 2017 and found that the safe practice of employees has a significant effect on their productivity and responsible for increased output of firms.

Further Studies in Sub-Saharan Africa provided further evidence on the positive effects of safety on workers' productivity. For instance in Cameroon, Kenneth and Doule (2019) in a study of the effect of employee health and safety practice on the performance of the shipping industry found out that employees in the industry are prone to safety and health hazards having a negative impact on their productivity. The finding implies that safety is a critical factor that dictates the level of productivity of employees.

In Nigeria, Paggi and Onaru (2020) did a study on the safety practice and performance of employees. Data for the study were obtained from responses of ninety-six (96) workers from ten (10) selected manufacturing companies in Lagos. Results of descriptive analysis of data indicated a positive relationship between safety practices and the performance of employees. It was further revealed that inadequate provision of safety facilities has exposed workers to numerous hazards with a negative effect on performance. The finding implies that safety is a factor in the performance of employees, especially those working in manufacturing outfits. Similarly, in a study on health and safety in a working environment in Nigeria, Niyi and Damola (2020) examined the provision of safety equipment and the productivity of employees. Data for the study were obtained from eight (8) companies, four (4) each from Lagos and Ogun States. Results of stepwise regression analysis showed that a relationship exists between the dependent variable (employees productivity) and the provision of adequate precautionary equipment. The findings consistent with that of Keneth Doule (2019) and Paggi & Onaru (2020) imply that the availability of safety equipment to workers is a necessity for the performance and attainment of objective(s) of business organizations.

3. Theoretical Framework

The study is anchored on Heinrich's theory of accident/incident propounded in 1936 (Stokoff, 2014; Ranold & Elliot, 2019). The theory also called the ''domino'' theory of accident, was developed based on the study made by the Committee on Safety and Production of the American Engineering Council (CS & PAEC) from where the theorist found out the sequence/order of accident occurrence in factories. The chronological order according to Heinrich is (i) Ancestry and Social environment (ii) Fault of persons (iii) Unsafe act and/or mechanical or physical hazards (iv) Accident and (v) Injury. According to the theory, one factor is dependent on another and one follows because of another thereby consulting a sequence.

The main axioms/assumptions of the theory according to Ermos and Assar (2016), Hildals & Urzil (2016), Dowell and Balmark (2017), and Dulman and Arler (2018) are that (i) Accident and injury are invariably

permitted by the unsafe act of and/or mechanical or physical hazards (ii) Occurrence of accidents and injuries are largely preventable (iii) Management has the best opportunity and ability to initiate the work of prevention and therefore should assume responsibility and (iv) Management duty of accident and injury prevention are exercised through supervisors or factory foremen. The supervisory capacity of the foremen to control work performance influences successful accident prevention. The axioms/assumptions of theory widely referred to as the first set of principles or guidelines on employee safety are still relevant in modern-day industrial relations that guarantee harmony between factory workers and management (Kenneth & Doule, 2019: Halliston & Portlan, 2020).

The relevance of the theory to the study stems from its emphasis on accident causation and prevention, management control, function and responsibility, cost of an accident, safety, the productivity of workers etcetera of which workers and managers of the enterprises of this study need to take note of.

4. Methodology

The section describes the procedure adopted in data collection. The study covered workers in the bread baking industry in Kogi State where data on safety equipment available, the number of safety training programmes received by employees, and the effects on their performance were obtained.

Out of a population of 463 workers in seven (7) bread barking enterprises in the state namely: Omaye bakery, ADL bakery, Mummy bakery, Eddy bakery, Peter & Co bakery, Kogi bakery, and MXD bakery, 260 of them (workers) were randomly selected. Questionnaires earlier designed to reflect five (5) point Likert scale were distributed to the respondents out of which 163 (questionnaires) were returned representing approximately 63 percent response rate.

Validities and Reliability of the Instrument

Validity and reliability of the questionnaire construct were done using Cronbach's Alpha with Item of the construct on the variables (M, X, and Y) having Cronbanch's Alpha Co efficient value greater than 0.6. The minimum value of Cronbach's Alpha acceptable for internal Consistency and reliability of measuring instrument is 0.6 (Nully 1994 cited in Dapo & Tola, 2016).

Table 1. Measurement of variables

Variable	Measurement	Source
M = Mediator	Cost Mediating variables are measured by the number of safety equipment, training on safety, and frequency of maintenance of the equipment	Stokoff (2014), Ermon & Assar (2016) Orplan & Bahle (2017)
X = Safety	Measured by the absence of occurrence of accidents, illness, injury, and death of employees.	Blohher (2015), Gillard & Nehan (2018)
Y = Performance	Measured by output quality and quantity, number of defects, and efficiency of output	Locdoll (2015) Dowell & Balmark (2017) Morrcel (2018)

Source: Author's computation, 2022.

Model Specification

The model used in the study was adopted from the work of Churchil (2015) and Doyel (2017) and Maxwell (2018) included variables such as provision and maintenance of safety equipment and training of workers on safety precautions as factors that mediate/explain the underlying mechanism of the relationship between safety (X) and performance(Y) of workers especially those working in hazardous environment such as in manufacturing/production outfit. The cost of production of these facilities is a function of the frequency/magnitude at which they are available to workers (Mitchel & Harrison, 2018).

The regression analysis involving the three variables: X→ Y, X→ M and X+ M →Y decomposed into econometric equation according to Baron and Kenny (1986) and Shrout and Bolger (2002) are as follows:

$Y \quad = b_0 + b_1 X + e$ ------------------equation 1 (X → Y)

$M \quad = b_0 + b_2 X + e$ ------------------equation 2 (X → M)

$Y \quad = b_0 + b_4 X + b_3 M + e$ ------------equation 3 (X + M →Y)

Where:

Y = Performance of employee.

M= Cost of provision of safety equipment, training, and maintenance

X= All the indices of the safety of an employee (absence of accident, injury, sickness, and illness).

5. Findings and Discussions

Table 2. Analysis of X predictor of Y (X → Y)

Item	Estimate	Std. Error	t-value	Pr(>/t/)
Constant	3.1024	0.7279	4.3281	0.000
X	0.4159	0.1168	3.7442	0.0073
b_1	0.4160			
$R^2 = 0.43$				
F- Statistics 59.13				

Author's computation using R-Statistical Package

The effect of X on Y is 0.4159 and significant at a 1percent level of significance. Further, 43 percent of changes in Y are explained by X implying a relationship between X and Y.

Table 3. Analysis of the effect of X on M (X → M)

Item	Estimate	Std. Error	t-value	Pr(>/t/)
Constant	1.57450	0.61866	2.67225	0.0131
X	0.58907	0.09920	6.2349	0.0008
b_2	0.58907			
$R^2 = 0.382$				
F- Statistics =83.158				

Source: Computation using R- Statistical Package.

The table shows the effect of X on M at a 1 percent level of significance with approximately 38 percent likely changes in M explained by X.

Table 4. Analysis of the effect of X and M on Y (X+M → Y)

Item	Estimate	Std. Error	t-value	Pr(>/t/)
Constant	1.9995	0.6358	3.3022	0.0031
X(b_4)	0.0416	0.1151	0.3791	0.7546
M(b_3)	0.06673	0.1055	6.6371	0.001
$R^2 = 0.526$				
F- Statistics= 182.78				

Source: Computation using R- Statistical package

The table shows the value of X at 0.0416 and that of M at 0.6673 with P< 0.001. These results indicate the disappearance of the effect of X on Y (the value of M greater than that of X) implying full mediation of M between X and Y. Full mediation effect rarely exists in business practice (Brooklyn, 2018).

Table 5. Mediation: Direct and Indirect effects of X and M on Y – Summary Result.

Item	Estimate	C1 (Lower)	C1 (Upper)	P- Value
ACME	0.3744	0.2263	0.5556	0.000
ADE	0.0416	0.1849	0.2728	0.000
Total Effect	0.4160	0.1641	0.6084	0.000
Prop: Mediated	0.9450	0.5517	1.9761	0.000

Source: Computation using bootstrapping package

The Total Effect (TE) in summary as indicated in table 4 is 0.4160, the same figure of b_1 in Table 1 (X → Y) that is an effect of X on Y without M (mediator). The Average Direct Effect (ADE) is 0.0416 is b_4 indicated in table 3 which the Direct Effect (DE) of X on Y after taking into consideration a mediation (indirect) effect of M on Y. Therefore the Average Causal Mediation Effect (ACME) is the Total Effect (TE) minus the Direct Effect (DE) ($b_1 - b_4$) that is 0.4160 − 0.0416 = 0.3744 which is the product of the coefficient of X, the same value with the Coefficient of M which is b_2 X b_3 that is 0.58907 x 0.6356 = 0.3744 indicating partial mediation of M (mediator) at 1 percent level of significance which is the main aim of mediation analysis.

6. Conclusion and Recommendation

For many years the topic of occupational safety has been attracting the attention of players in the labour market. This has brought about the initiation of safety laws and programmes by the government and managers of enterprises across the globe. In Nigeria just like other countries, laws to secure the safety of workers are in place, unfortunately, many business owners in the country pay little or no attention to complying with the laws as they (entrepreneurs) show little or no concern about the safety of their employees. The emphasis of the safety law is on the need for employers of labour to provide adequate safety equipment and train workers on safety precautions especially employees operating in a hazardous environment. Therefore the study examined the mediating effects of the provision of safety equipment, training of workers on safety precautions, and maintenance of the equipment) in guaranteeing the safety and performance of bread bakers in Kogi State. Data for the study were obtained from the responses of 163 workers in seven (7) bread baking enterprises in the state.

Analysis of the data was done using bootstrapping and R-Statistical package techniques to determine the indirect effects of X and M on Y and the significance of the impact of variables on Y. The results of bootstrapping analysis showed that ACME (TE –DE) or b_1-b_4 and the co-efficient of M (mediator) or b_2 x b_3 have the same value of 0.3744 significant at a 1 percent level. This indicates partial mediation of M which is the main aim of mediation analysis given that full mediation rarely occurs. Similarly, the results of the regression analysis with an R^2 value of 0.526 (Table 3) indicate that approximately 53 percent of changes in Y (performance) of employees are explained by the combined effect of X and M while the rest 47 percent of changes in Y are accounted for other factors other than X and M. This is partial accountability of X and M on the likely changes in Y akin to partial mediation. The study recommends that business owners particularly bread bakery owners in Kogi State should take the issue of the safety of workers seriously by providing adequate safety equipment and training their employees on safety precautions in the workplace for the positive effect the facilities can have on performance.

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Adaptive capacity and nutritional status of households in Cameroon

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Abstract

To cope with the various shocks that may occur in their lives, households emphasise their adaptive capacity in order to minimise the negative economic consequences they may experience, particularly in terms of food and nutrition security. This behaviour of households is a dimension of their resilience to food insecurity. The objective of this study is therefore to analyse how adaptive capacity promotes the nutritional status of households in Cameroon. Using data from the FSMS 2020 survey and statistical and logistic regression methods, the study reveals that physical and human capital contribute significantly to improving the nutritional status of households in Cameroon. These results therefore call for the strengthening of training and livelihoods to ensure better household nutritional status.

1. Introduction

The recurrent crises in sub-Saharan Africa in general and in Cameroon in particular raise real concerns for the achievement of sustainable food and nutrition security. The root causes of vulnerability to food insecurity and malnutrition are complex and multidimensional. They are linked to a series of interrelated factors such as poverty, health, hygiene, access to basic social services, dietary behaviour, socio-cultural norms, low levels of production, access to markets, inadequate public policies, as well as frequent climatic variations and other shocks, which result in large numbers of people being plunged into a state of near-permanent fragility (FAO, 2016).

An analysis of the impact of Covid 19 was conducted in the ten regions of Cameroon in September 2020. This analysis reveals the following results: firstly, the pandemic has been a real brake on production, affecting 42% of agricultural assets; secondly, it has caused an increase in post-harvest losses and a scarcity of basic foodstuffs; and thirdly, it has increased purchase prices by 3% compared to a normal situation. This situation is exacerbated by the socio-political crisis in the North West and South West regions, the floods and the security crisis due to Boko Haram in the Far-North and the influx of refugees in the East region due to the war in CAR. As a result, an estimated 2.7 million people were in crisis or worse between October and December 2020 (Minader et al., 2020).

An amount of 30 billion CFA Francs has been estimated to cover immediate livelihood needs, which are fourfold: material and technical support to short-cycle food producer organisations; provision of livelihood support to affected households; monitoring of market functionality and evaluation of food stocks; and building physical and monetary seed security stocks (http://www.fao.org/cameroun/fao-au-cameroun/fr/; accessed 04/03/2021).

In order to address this situation, which is continuously deteriorating the state of national food and nutrition security, the formulation and implementation of a national resilience programme is being considered by the

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government. However, the measurement of resilience is not obvious as it is not directly measurable. It has to be measured by proxy indicators that require a conceptual framework containing specific variables and context, and a particular focus such as resilience to food insecurity. Thus, in this study, we propose to analyse the adaptive capacity dimension of resilience and the household nutritional status dimension of food security by asking the fundamental question: does adaptive capacity promote improved household nutritional status in Cameroon?

The objective of this study is therefore to assess and analyse the contribution of the adaptive capacity of households in Cameroon to their nutritional status. Adaptive capacity is understood here in terms of human, physical and financial capital, while nutritional status is defined in terms of education, health and child nutrition. Thus, using data from the FSMS 2020 survey of MINADER, WFP and FAO, we apply, with reference to the literature, a statistical analysis and regression by a logit model to obtain the results necessary for the analysis.

The study is divided into six sections. After the introduction, the second section provides a literature review. The third section presents the methodology used. The fourth section presents the results which lead to the discussion in the fifth section. The conclusion and recommendations constitute the sixth section.

2. Literature review

There are several approaches to nutritional status in the economic literature, although most often linked to infant and child feeding conditions. There is also a broad conception of the adaptive capacity of households and individuals.

2.1. Nutritional status

The literature review on nutritional status presents the definition and conceptual approach of the notion on the one hand and its factors and implications on the other.

2.1.1. Definition and conceptual approach

Nutritional status is the result of a complex hierarchy of factors that begins with direct exposure to quality food and health care and extends to more indirect interactions with social and economic infrastructures that contribute to a multitude of socio-environmental factors that ultimately contribute to an individual's nutritional status (Hoffman, 2017). The term nutritional security emerged with the recognition of the need to include nutritional aspects in food security. Unlike food, which is primarily defined as any substance that people eat and drink to sustain life and growth, nutrition adds aspects of health services, a healthy environment and care practices. Specifically, "a person is considered nutritionally secure when he or she has an adequate diet and the food consumed is biologically used to maintain adequate performance in terms of growth, stamina, or recovery from illness, pregnancy, lactation, and physical labour"... (Frankenberger et al. 1997).

 Nutritional security is considered to be achieved when access to an adequately nutritious diet is combined with an adequate sanitary environment, health services and care to ensure a healthy and active life for all household members (Pangaribowo et al., 2013). The FAO has defined nutritional security as a condition in which all people at all times consume food in sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, combined with adequate health environment, health services and care (CFS 2012). The term food and nutrition security is used to combine aspects of food security and nutrition security, as well as to emphasise the idea that they are linked. The use of the term 'food and nutrition security' has become standard practice in a number of international agencies such as IFPRI, UNICEF and FAO. Weingärtner (2010) has developed a definition of food and nutrition security as a condition in which adequate food (quantity, quality, safety, socio-cultural acceptability) is available and accessible to all people at all times and used satisfactorily to live a healthy and happy life. As the term food and nutrition security has combined the two security concepts in a more integrated way as a single policy objective, this term is more widely used.

2.1.2. Factors and implications of nutritional status

While food adequacy is a necessary condition for good nutrition, it is not sufficient. There are a number of non-food factors that also influence children's nutritional outcomes. The physical and environmental health of the household and its members and the quality of care the child receives are particularly important (Tiwari et al., 2013). This implies that food is only one of many factors that contribute to good nutrition, and any effort to assess the impact of food security on nutritional outcomes must take into account the effect of these factors.

There are situations where it is appropriate to consider assessing the nutritional status of other age groups besides young children. These include situations where there is reasonable doubt that the nutritional status of young children reflects the nutritional status of the general population. In populations where cultural traditions give

preference to feeding young children, older adults may be more severely affected. Other situations may refer to cases where many older adults or children present to selective feeding programmes or health centres with malnutrition, or there are credible anecdotal reports of frequent malnutrition among adults or adolescents (UNHCR, 2005).

Headey and Ecker (2012) assess a set of food security indicators but do so at a much broader level using cross-sectional validity, nutritional relevance and intertemporal validity lenses. While their analysis and the food security measures they use do not fully overlap with the focus of our work, the spirit of their work, particularly the nutritional relevance component, does come close. In developing countries, infectious diseases such as diarrhoeal diseases and respiratory infections are the main nutrition-related health problems due to unhealthy home environments (Pangaribowo et al., 2013).

Healthy eating throughout life ensures good nutrition and a long life. Indeed, there is a relationship between what people eat and their health. However, most people choose foods for reasons other than their nutritional value. Because food choices are an integral part of people's lifestyles, it is sometimes difficult for them to change their eating habits. Factors that influence food choices include preferences, ethnicity, values, habits, availability, health and nutrition (Nti, 2008). Eating habits, which are influenced by a number of reasons, some of which are listed above, determine the nutritional and health status of people (Krause and Mahan, 1984). Regardless of the factors that influence dietary patterns, adequate dietary intake is essential, as nutritional well-being plays an important role in promoting and maintaining health. Diet can influence the risk of developing certain chronic diseases and plays a role in preventing morbidity and mortality. In addition, the health and nutritional status of the mother, who is primarily the primary caregiver for her children, has been found to affect her ability to care for them effectively (Engel et al., 1997).

At the micro level, malnutrition manifests itself in reduced school attendance (Daniels and Adair 2004), which can lead to lower educational achievement, reduced productivity and reduced lifetime earnings (Alderman 2006). Specifically, Behrman et al. (2004) suggest that malnutrition can have intergenerational impacts as it reduces lifetime earnings by about 12%. Malnutrition, especially in children, negatively affects the formation of various tissues and organs, which interferes with natural biological processes and can have detrimental consequences on the physiological wellbeing of children (Osei, & Lambon-Quayefio, 2021). According to Grantham-McGregor (1999) and Martins et al. (2011), stunting associated with malnutrition can lead to poor mental development and learning outcomes as well as behavioural abnormalities.

2.2. Adaptability

After presenting the definition and the conceptual approach, the literature presents the indicators for measuring adaptive capacity.

2.2.1. Definition and conceptual approach to adaptive capacity

The term adaptive capacity has its roots in the management and sociology of organisations and businesses where it was linked to the ability of organisations to respond to change in their environment (Engle, 2011). Despite the many differences in the field of interpretation (including environment and food security), the concept of adaptive capacity is considered important for facilitating adaptation by both reducing vulnerability and building resilience (Issahaku, D., 2019). In recent decades, research on climate change adaptation has attracted considerable interest, resulting in dominant paradigms of vulnerability and resilience frameworks for climate change adaptation studies (Engle, 2011). Several definitions of adaptive capacity have been cited in the literature. This may be due to the variety of contexts in which the term is applied. Some definitions are context-specific. For example, adaptive capacity can be defined as the institutions, capacities and resources to undertake adaptive actions. This definition is applicable at the national and international levels (Kuriakose, Bizkova, & Bachofen, 2009). Another literature considers adaptive capacity in assessing the inherent characteristics of institutions. Thus, adaptive capacity is seen as the "characteristics of institutions that empower social actors to respond to short- and long-term impacts either through planned measures or by enabling and encouraging creative responses from society both ex ante and ex post". (Gupta et al., 2010). The adaptive response thus varies according to prevailing ecological and socio-economic conditions: this may include local agro-ecology, education levels, gender, income, availability of support systems and services (Deressa et al., 2008). These and other capabilities play a key role in determining how well individuals and communities are able to cope with climate impacts and maintain the functioning of their socio-economic systems (Robeyns, 2005).

Although abundant in the economic literature on climate change analysis, the concept of adaptive capacity is also, but very little, present in the literature on food security. Yet food insecurity, exacerbated by climate hazards, leads to reduced income-earning opportunities, progressive erosion of the household asset base and chronic poverty. The loss of human capital leads to changes in household morphology, including higher dependency ratios and an increased proportion of households headed by women and children. Disaster-affected

households that have experienced changes in family structure and those that have been forced to sell their assets are more vulnerable to risk (Doocy et al., 2005). Adaptive capacity is therefore another important dimension of resilience to food insecurity, measuring the ability of the household to adapt and respond to shocks (Alinovi et al., 2010). It is therefore the ability of a household to adapt to a new situation and develop new livelihood strategies. Having active and educated family members can, for example, mitigate the negative effects of a shock on a household (FAO, 2018). There is therefore a need to strengthen the financial and economic endowments and capacities of vulnerable populations to enable the most exposed groups to withstand both chronic diseases and sudden shocks to food and social security. Indeed, during and after natural disasters, households frequently modify their behaviour through coping mechanisms that aim to avoid liability and/or reduce risk. Adaptive capacity refers to the ability of the individual or household to cope with risks and thus build resilience (Doocy et al, 2005).

2.2.2. Adaptive Capacity Assessments

A multitude of factors contribute to adaptive capacity, both at the individual and household level. Similarly, several methods have been used to assess adaptive capacity. Lockwood et al. (2015) identified some of these approaches as inductive theory, secondary data assessment, self-assessment and future modelling methods. A number of these approaches have led to the development of indices, indicators and subsequently dimensions to be used to measure adaptive capacity. The dimensions of adaptive capacity vary across institutions and disciplines (Issahaku, 2019). In its Third Assessment Report, the IPCC (2001) identified economic resources, information and skills, infrastructure, technology, institutions and equity as key determinants of adaptive capacity. Adger (2003) and Pelling & High (2005), from a political economy and geography perspective, suggest that social capital, trust, organisations and the ability to act together influence adaptive capacity. Brown et al (2010) developed a community capacity self-assessment tool that uses the five capitals framework of rural livelihoods. The aim was to enable local resource users to better manage their environment. The average household education level (years); access to formal education; dependency ratio; household perception of ability to influence the quality of basic services in the community; household perception of ability to influence the decision making process in the community are all dimensions identified by FAO (2018). The variables observed and considered as determinants of household adaptive capacity by Alinovi et al, (2010) are in turn: diversity of income sources (DIV); employment ratio (EMP); average education (EDU) and food ratio (FRA). The diversity of approaches to assessing adaptive capacity and factors stems from the fact that adaptive capacity is an inherent property and can only be quantified using appropriate indicators. These indicators are sometimes context specific, making it difficult to apply a generally accepted methodology across disciplines and contexts. The choice of indicators and the methodology used to achieve them is therefore essential to obtain the validity of the measured indices (Issahaku, 2019).

This study uses Issahaku's (2019) capital approach, which considers physical capital, human capital, financial capital, social capital and access to information as factors in adaptive capacity. But we will focus on the first three types of capital mentioned above. The conceptual framework of adaptive capacity and household well-being thus illustrates the complex nature of adaptation and the potential interactions between the determinants of adaptive capacity in the context of our study.1.1. Use This Style for Level Two Headings

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3. Methodology

3.1. Data

The data used in our research come from a survey conducted in seven regions of Cameroon in February 2020. This is the Food Safety Management System (FSMS) survey initiated by the Ministry of Agriculture and Rural Development (MINADER) through the Programme National et Veille et de Renforcement de la Sécurité Alimentaire (PNVRSA), supported by the FAO and the WFP. This survey is intended to monitor household food security in Cameroon. It aims to improve access to information on the nutritional status of households, and to inform and support decision-making by food security actors in the implementation of various food-related projects and programmes.

The construction of the sample therefore responds to the objective of assessing the level of national food security. The sample thus constituted covered the Adamawa, East, North, North West, West and South West regions. The survey covered 34 departments in all six regions, 76 districts. In sum, the survey covered 5038 households, of which 4168 were rural and 870 urban.

Data analysis was carried out using Microsoft Excel and the Statistical Package for Social Sciences (SPSS) version 17. The means, percentages and frequencies of the socio- demographic characteristics of the households

are presented in tables. The binary logistic model with the cumulative distribution function was used. STATA software, version 14, was also used to determine the regression coefficients on household nutritional status.

3.2. Analysis method and tools

3.2.1. Analytical framework of adaptive capacity

Adaptive capacity is an inherent property that requires the use of theoretical frameworks for its assessment (Piya, 2012). Theoretical frameworks provide a set of indicators used to estimate adaptive capacity. This study uses the sustainable livelihoods approach of DFID (1999) and Ellis (2000), which considers livelihood outcomes as a function of access to or ownership of livelihood assets. A concept that emerges from Amartya Sen's (1981) rights approach. This approach proposes that households that possess a sufficient range of rights, assets or capabilities have more opportunities to choose coping strategies to deal with adversity and reduce their risks (Jakobsen, 2011; Ludi & Slater, 2008). The sustainable livelihoods framework has been shown to be applicable in analysing farmers' ability to adapt sustainable agricultural practices in Australia (Nelson et al., 2010). The sustainable livelihoods framework is used to contextualise the complex nature of household livelihoods and identifies five capitals that constitute an individual or systemic asset in the face of climatic adversity: physical, social, financial, human and informational. Physical, financial and human assets are used in the formulation of the variables for this study. The indicators are presented in Table 1.1 with the different annotations they have been subject to. Social and informational capital are not exclusively included in this study due to their absence in the database used.

Early studies on adaptive capacity assigned equal weight to all indicators (Nelson et al., 2005; Vincent, 2004), while some recent studies assign weight to various indices using expert opinion or other mathematical means such as principal component analysis (Abdul-Razak & Kruse, 2017; Defiesta & Rapera, 2014; Piya, 2012). As adaptive capacity is context specific, the study argues that the use of expert opinion in its assessment is invaluable.

Table 1. Adaptive capacity indicators and variables

Indicators	Modalities	Units
Human capital	Level of education of the head of the household	Ordinal value
	Agricultural training and experience	Ordinal value
Physical capital	Access to arable land	Ordinal value
	Cultivated area	Ordinal value
	Agricultural equipment	Ordinal value
Financial capital	Funds and support from family members	Ordinal value
	Access to credit	Ordinal value
	Income diversification	Ordinal value

Source: Authors

3.2.2- Analytical framework of household nutritional status

Food adequacy is not the only necessary and sufficient condition for good nutrition. There are a number of non-food factors that also influence child and household nutritional outcomes (Tiwari et al., 2013). Thus, it can be noted that nutritional status includes indicators that describe the current situation of the household (child nutrition), but also the capacity of the household to improve this nutritional status in the short term (health) and in the medium or long term (education) (http://www.fao.org/3/y5773f/y5773f05, accessed 04/03/2021).

The household nutritional status framework is used to contextualise the complex nature of household food security. It identifies several indicators, the seven best known of which are: child undernutrition, micronutrient deficiency, adult overnutrition, mortality, education, health and productivity. For this study, we use micronutrient deficiency, education and health to assess and analyse the nutritional status of households in Cameroon. These indicators in our study are presented in Table 1.2 along with the different annotations that were made to them. As the other indicators are missing from the database, their use in this research is simply not possible.

Table 2. Indicators and variables of nutritional status

Indicators	Modalities	Units
Education	All children aged 6-14 in a household are in school	Ordinal value
Health	No chronic illness in the household	Ordinal value
Micronutrient deficiency	Inadequate or inappropriate feeding of children aged 6-23 months	Ordinal value

Source: Authors

3.2.3. Analytical model for logit analysis

The relationship between household coping capacity and nutritional status was modelled using the binary logistic distribution function. Three dependent variables were identified in this model: education, health and nutrient deficiency of children aged 6-23 months. Access to education for children aged 6-14 years in the household, the presence of chronic diseases and the difficulty (lack of food, inappropriate food or lack of means for preparation) of feeding children aged 6-23 months are considered as binary outcomes. The predictor variables are socio-demographic characteristics and indicators of coping skills. The model variables are provided by the conceptual framework of the study.

Table 3. Variables in the logit model

Variables	Measure
Variables dependent on nutritional status	
Education	1=All children aged 6-14 in the household are in school; 0=None
Health	1=There is no chronic disease in the household; 0=No
Nutrition for children aged 6 to 23 months	1=Children's diet is sufficient and appropriate; 0=No
Independent variables	
Age (AGE)	Continuous values
Sex (SEX)	1=Male; 0=Female
Household status (EMS)	1=Permanent resident; 0=No
Household size (MSE)	Continuous values
Education level of the head of household (NED)	1=At least secondary level; 0=No
Agricultural Training and Experience (ATE)	1=Training; 0=No
Agricultural production equipment (EQP)	1=Yes; 0=No
Cultivated area (SUC)	1=More than 2ha; 0=No
Women landowners (FPF)	1=Yes; 0=No
Source of credit (SCR)	1=Formal source; 0=No
Aid (AID)	1=Assistance from at least 2 people; 0=No
Diversity of income sources (DSR)	1=Yes; 0=No

Source: Authors

Both probit and logit models are applicable in situations where the estimated probability of occurrence of a particular outcome lies between 0 and 1 when the value of the explanatory variables changes; and the relationship between the probability values and the explanatory values is not linear. We consider Y as the variable to be predicted (explained variable), and X = (X1, X2... XJ) the predictor variables (explanatory variables). We chose binary logistic regression in reference to the work of Issahaku (2019). Y represents the value of the dichotomous dependent variable taking either the value 0 to present absence, failure, "no" or in this case, an unsatisfactory nutritional state; or the value 1 to present contrary presence, success, "yes" or in this particular case, an adequate nutritional state. X represents the values of the different predictive attributes for each participant or household, which may have discrete or continuous values.

If there are several predictors, the logistic regression equation is represented as follows:

$Y = \beta_0 + \beta_1 X1 + \beta_2 X2 + \beta_3 X3 + ... + \beta_j X_j + \varepsilon_i$, with j = 1, ..., n (Standard formula).

This linear equation is translated into a logarithmic expression in the logistic regression analysis. In other words, instead of predicting a Y-score, logistic regression predicts the probability of obtaining a certain target value (1 or 0) on Y.

Given the predictor variables provided in Table 3, the logit models empirically indicate that their effect on the outcome variable is given as follows

$Yi = \beta_0 + \beta_1 AGE + \beta_2 SEX + \beta_3 SME + \beta_4 TME + \beta_5 NED + \beta_6 FAE + \beta_7 EQP + \beta_8 SUC + \beta_9 SCR + \beta_{10} AID + \beta_{11} DSR + e_i$

Where

β_0 = the intercept;

β_i = the regression coefficients to be estimated;

e_i = the error term;

A positive logit indicates that as the value of the predictor increases by one unit, the probability of the outcome also increases. A negative logit indicates that as the value of the predictor increases by one, the probability of the outcome decreases.

4. Results

4.1- Descriptive statistics

4.1.1. Socio-demographic characteristics

In our sample of the Cameroonian population, there were more male respondents (75.24%) than female (24.75%). The majority of the respondents were between the ages of thirty-one and fifty, representing 51.88% of the total number of respondents. However, 32.69% of the respondents were between fifty-one and seventy years of age, while those between fifteen and thirty years of age represented 11.15% and the oldest respondents, i.e. those over seventy years of age, constituted 4.26%. It should be noted that the vast majority of respondents, i.e. 85.94%, are permanent residents who have not moved in the three years preceding the survey. Families displaced here represent 12.34% and refugees 1.23% of respondents. Household size reveals that 46.01% of households are made up of five members or less, while those with between six and ten individuals are about 40.53% compared to 13.45% for households with more than ten people.

4.1.2. Household human capital

It can be seen that a good fraction of heads of household have only received a primary level of education (30.90%), although those with secondary education (27.33%) are also in considerable proportion. It should be noted that 6.7% of heads of household have a higher level of education, while the number of literate heads of household and those with no education are 14.23% and 14.47% respectively. On the other hand, the majority of respondents have no agricultural training (52.46%). Many of them responded that they received their agricultural training on the job (30.09%). A few, however, had received occasional training during seminars and workshops (14.19%). Only 1.29% of the respondents were trained in an agricultural school and there were also agricultural engineers (0.51%) and agricultural technicians (1.44%).

4.1.3. Household physical capital

A large majority of households (89.3%) reported that they do not own any agricultural production assets. About a quarter of the households (24.49%) have no hectare of cultivated land, while 35.43% cultivate less than one hectare. In addition, 24.03% of the households surveyed cultivate between one and two hectares, while 8.23% cultivate between two and three hectares of agricultural land. However, 3.27% of households cultivate between three and four hectares and the rest have at least four to five hectares. Very few households (19.80%) have women as landowners.

4.1.4. Household financial capital

The main sources of credit in the study area are community savings and credit associations and relatives and friends. More than half of the households (64.80%) reported accessing credit through other sources, which include neighbourhood shopkeepers and traders. In addition, a large proportion of households (15.5%) obtain credit from relatives and friends, while 10.5% have access to credit from tontines. Only 4.2% have access to bank and similar credits. More than a third of households (35.6%) reported receiving remittances from family members, relatives and aid organisations.

The main livelihood diversification activities of the surveyed communities are agriculture and trade. The majority (85.41%) of the households have only one source of income from their main activities, while 14.58% have several sources of income.

4.2. Relationship between household adaptive capacity and household nutritional status: the regression model

The nutritional status of households is captured here firstly by education, which refers to the presence within the household of children aged 6 to 14 who are not in school. This variable shows that human capital formation is a positive factor in long-term nutrition. Then, the other dimension is health captured by the presence within the family of members suffering from chronic diseases. Poor health is considered in the literature as a reduction in

the individual's productive capacity. Finally, the dimension of children from 6 to 23 months of age is captured here by an insufficiency of the nutrients necessary for the growth of these children. This shows that many families have difficulties in ensuring a healthy diet in quality and quantity for this group of children.

The relationship between adaptive capacity and nutritional status of households was assessed using the logit model with the cumulative distribution function. Table 5 shows the logit analysis for assessing the relationship between adaptive capacity and nutritional status for all households in our population. However, for the sake of precision and consistency, we felt it was important to disaggregate the explained variables between rural and urban households, hence the results presented in **Table 5**.

Table 4. Regression on the overall population

VARIABLES	Education	Health	Nutrition
Age (AGE)	-0.00435	-0.0444***	0.00629
	(0.00358)	(0.00372)	(0.00391)
Sex (SEX)	0.219**	0.168	0.213*
	(0.103)	(0.109)	(0.112)
Household status (EMS)	1.137***	0.279**	0.126
	(0.110)	(0.131)	(0.128)
Household size (MSE)	-0.00802	-0.0342***	-0.00528
	(0.0114)	(0.00956)	(0.0107)
Education level of the head of household (NED)	0.597***	-0.00632	0.282***
	(0.102)	(0.103)	(0.0989)
Agricultural Training and Experience (ATE)	1.128***	-0.198	0.171
	(0.432)	(0.240)	(0.255)
Agricultural production equipment (EQP)	-0.141	0.0406	1.187***
	(0.135)	(0.151)	(0.175)
Cultivated area (SUC)	0.172	-0.231*	-0.210*
	(0.122)	(0.118)	(0.119)
Women landowners (FPF)	-0.0627	-0.332***	-0.133
	(0.108)	(0.107)	(0.113)
Source of credit (SCR)	-0.179	-0.401***	-0.146
	(0.117)	(0.112)	(0.126)
Aid (IDA)	-0.224*	-0.781***	-0.395***
	(0.116)	(0.108)	(0.127)
Diversity of income sources (DSR)	-0.0956	0.118	-0.0438
	(0.0994)	(0.101)	(0.0991)
Constant	0.519***	4.320***	0.425*
	(0.199)	(0.235)	(0.218)
Comments	3,671	5,038	2,730
	(0.116)	(0.108)	(0.127)

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors based on FSMS 2020 data and Stata 14 software

The significance of the predictors in the results of the non-specific model (i.e. with non- disaggregated variables) is similar to that of the disaggregated model. The latter model can therefore be referred to as it provides more detail in the study. The results show that not all variables are significant predictors to the same degree of the different dimensions of household nutritional status. For example, age, gender, agricultural education and area cultivated in rural households are significant predictors of the education dimension of nutritional status, while household status and education level of the household head are significant for both urban and rural households in the education dimension. The source of household credit was found to be inversely related to education in the urban area. Age, household size, women's land ownership, source of credit and aid are significant predictors and inversely related to the health dimension for both urban and rural households. However, household status and diversity of income sources significantly favour the health of rural households. The possession of equipment favours child nutrition in both types of household. This child nutrition is reinforced in the urban area by the status of the household and in the rural area by the gender and level of education of the head of household.

Table 6. Population regression with disaggregated data

VARIABLES	Education		Health		Nutrition	
	Urban	Rural	Urban	Rural	Urban	Rural
AGE	0.0125	-0.00662*	-0.0717***	-0.0419***	0.0300**	0.00289
	(0.0128)	(0.00375)	(0.0132)	(0.00388)	(0.0120)	(0.00417)
SEX	0.00852	0.273**	0.314	0.188	0.174	0.238**
	(0.393)	(0.108)	(0.311)	(0.117)	(0.308)	(0.121)
SME	1.958***	0.996***	0.0449	0.253*	1.255***	0.00173
	(0.405)	(0.115)	(0.488)	(0.135)	(0.470)	(0.135)
TME	-0.0125	-0.0118	-0.0752***	-0.0332***	0.0571	-0.0135
	(0.0450)	(0.0115)	(0.0273)	(0.0101)	(0.0352)	(0.0110)
NED	0.683*	0.501***	-0.154	-0.0521	-0.287	0.342***
	(0.353)	(0.108)	(0.301)	(0.112)	(0.269)	(0.111)
FAE	-	0.767*	0.279	-0.435	0.877	-0.0163
		(0.444)	(0.517)	(0.276)	(0.563)	(0.292)
EQP	0.217	-0.130	-0.206	0.0668	1.199**	1.205***
	(0.681)	(0.139)	(0.457)	(0.161)	(0.567)	(0.185)
SUC	-	0.240*	0.969	-0.250**	-0.797	-0.111
		(0.124)	(0.618)	(0.121)	(0.490)	(0.125)
FPF	0.136	-0.0415	-0.720**	-0.270**	0.110	-0.153
	(0.590)	(0.111)	(0.338)	(0.113)	(0.381)	(0.120)
SCR	-1.067***	-0.129	-0.619**	-0.383***	-0.259	-0.121
	(0.374)	(0.127)	(0.277)	(0.123)	(0.294)	(0.143)
AID	-0.157	-0.159	-0.757**	-0.768***	0.108	-0.412***
	(0.472)	(0.121)	(0.364)	(0.114)	(0.426)	(0.135)
DSR	-0.639	0.0255	-0.346	0.230**	-0.678**	0.0617
	(0.396)	(0.104)	(0.320)	(0.107)	(0.305)	(0.107)
Constant	0.796	0.486**	7.136***	4.025***	-1.098	0.569**
	(0.733)	(0.210)	(0.830)	(0.246)	(0.789)	(0.232)
Comments	566	3,002	870	4,168	439	2,291

Robust standard errors in parentheses

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: Authors based on FSMS 2020 data and Stata 14 software.

5. Discussion

Undernutrition remains a major problem in sub-Saharan Africa, including Cameroon. In fact, a number of studies have examined the nutritional status and food intake of children and adults in several countries. While many of these studies have reported inadequate nutritional intake and low food security of people for these countries, it is also important to recognise that the context of economic and social factors that are associated with nutritional status, and the way in which these relationships are presented, change over time (Hoffman et al., 2017).

5.1. Household human capital assessment

Human capital was indicated using the level of education of the household head and the agricultural training of the household head. Less than 35% of household heads have at least secondary education. However, the level of education of the head of household is positively and significantly related to the nutritional status in terms of education and nutrition of children aged 6-23 months in rural households. Furthermore, agricultural training is positively associated with education as a dimension of household nutritional status. These results are consistent with those reported by Issahaku, D. (2019) that school enrolment, agricultural training and experience in agricultural production are factors that enhance human capital and raise household nutritional status in Ghana. Moreover, Waswa et al (2015) showed that a programme involving an educational intervention increased dietary diversity in a sample of 207 households in Bondo and Teso South sub-counties in Kenya.

5.2. Household physical capital

Physical capital for this study was indicated by the ownership of agricultural production equipment, the area under cultivation and the ownership of land titles by women. The results of the study indicate that the majority (89.3%) of households do not own agricultural equipment adequate for satisfactory production. However, this equipment is positively and very significantly related to child nutritional status, both in urban and rural areas. More than 80% of households do not have more than 2 ha of cultivated land. However, the positive link between cultivated area and education could be that a large area leads to large production. This production is a source of income to ensure the education of everyone in the household. Conversely, the negative link with health implies that large areas require more work and health is likely to deteriorate. Women's land ownership is negatively related to health, probably for the reason given about the area cultivated in relation to the health dimension of household nutritional status. This is corroborated by Issahaku, D. (2019) who notes that agricultural equipment strengthens the nutritional status of households thanks to the weight it has in the constitution of physical capital which contributes to the adaptive capacities of households. However, these results are in contrast to other studies. Indeed, with regard to maternal autonomy, the more independent a mother is in making decisions about health care, education, food, and having an independent source of income, the more likely her children are to be properly nourished (Ziaei et al. 2015). Land use, described as the sum of all agricultural land cultivated by a household, indicates the productive capacity of the household. However, efficient production would require smaller farm sizes to facilitate maximum resource utilisation. A large farm combined with efficient production could greatly improve household income generation and asset building, which would facilitate adaptation to climate change and variability.

5.3. Household financial capital

In this study, financial capital was indicated by access to credit, aid and the number of income sources. The study found that only 35.6 per cent of households reported receiving remittances from a family member or relative. The study also revealed that more than half of the households (64.8%) reported accessing credit from sources such as shopkeepers and traders in the neighbourhood. Only 15.5%, 10.5% and 4.2% of households used relatives/friends, tontine and banks respectively. We also note that 85.4% of households do not manage to diversify their sources of income. For those households that do, the main secondary source of income is trade. Yet access to credit and aid is negatively related to child health and nutritional status. One might think that non-regularity, dependence and difficulty of repayment are factors that justify a negative impact on the nutritional status of the management. These results are in contrast to the work of Tetteh Anang et al (2015) who show that credit from all sources, formal and informal, contributes to improving the adaptive capacity and nutritional status of populations. The role of informal credit sources in facilitating adaptation may therefore require further investigation. In addition, households in the study area consider relatives and friends to be a reliable source of credit, available to the majority, as financial institutions such as banks are the main source of credit for only 4.2% of all households.

Nabwera et al. in 2017 reported that intensive health and nutrition interventions have reduced the prevalence of undernutrition by 50% in The Gambia, but that more comprehensive and sustained programs are needed to have a more significant and lasting impact on children's health. The adult and household surveys illustrate that many households are food insecure and reveal relationships between the nutritional status of individuals and various

non-food factors. In addition to the factors analysed in this study, many other socio-demographic factors may explain the results presented, including age, gender, status and household size.

Thus, in our study, the results reveal that the age of the head of household is a factor negatively related to the nutritional status of the household in terms of health and education. Male heads of households bring a significant improvement in household nutritional status. The fact that a household has a stable or permanent status favours its nutritional status compared to those who are displaced or refugees. Households with many members are likely to have a poor nutritional status. These results are consistent with several other studies that present the involvement of socio-demographic factors in improving the nutritional status of individuals and households (Kosaka & Umezaki, 2017).

6. Conclusion and recommendations

The study assessed and analysed the contribution of resilience in terms of adaptive capacity to the nutritional status of households in Cameroon. Adaptive capacity is understood here in terms of human, physical and financial capital, while nutritional status is understood in terms of education, health and child nutrition. The data used in our work comes from the FSMS 2020 survey of MINADER, WFP and FAO. With reference to the literature, we used statistical analysis and regression by a logit model to obtain the results necessary for the analysis.

Overall, the nutritional status of households declines as the age of the head of household and the size of the household increases. Also, the fact that a household has access to credit, aid and diversity of financial sources or land ownership for women does not contribute to improving the nutritional status of the household. This result highlights the relevance of the credit and aid that households receive, which is sometimes for the consumption of goods and services. However, permanent residence status, the level of education of the head of the household and all other training that contributes to the strengthening of human capital are variables that contribute to the improvement of the nutritional status of the household. Physical capital improves child nutrition and education.

The main hypothesis of this chapter assumes that there are factors of adaptive capacity that improve household food security in terms of nutritional status. This hypothesis is therefore validated. Indeed, the results show that adaptive capacity factors such as agricultural training, level of education and ownership of agricultural production equipment contribute positively to the construction of household food security levels. However, it should be noted that other factors such as aid and credit for consumption are likely to have a negative impact on household food security.

In sum, as Cameroon is marked by the presence of several crises of various kinds that have a definite impact on the standard of living of the population, particularly on their food security, it is appropriate for the public authorities to adapt and readjust food security policies. Indeed, several international organisations and experts agree that it is preferable to strengthen the resilience of households rather than to provide them with financial and material resources in order to enable them to maintain a desirable standard of living in the face of shocks. Thus, in order to ensure a sustained nutritional status, this study recommends capacity building in terms of training to improve the human capital of each household. It is therefore a question of multiplying and diversifying the training courses that offer the tools and techniques needed to increase production. In addition, the government should place special emphasis on strengthening people's livelihoods. The government should therefore mobilise more resources both internally and through technical and financial partners to finance the various activities related to this household livelihoods plan. Similarly, it should seize this opportunity to address more seriously the weaknesses of Cameroon's agricultural sector, namely: i) low productivity; ii) insufficient conservation and storage infrastructure; iii) opening up production basins and access to the market for agricultural products; iv) adopting climate-smart agriculture; and v) formulating a resilience programme in partnership with all food security stakeholders.

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Political instability and economic growth in Nigeria

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Abstract

Using annual data spanning from 1984 to 2020, the study analysed the effect of political instability on economic growth in Nigeria. To explore both the short and long-run relationship, the Autoregressive Distributed Lag (ARDL) technique is used. The cointegration test shows that political instability and economic growth are cointegrated. In the short run, the finding indicated that political instability negatively impacted economic growth. Likewise, in the long-run, political instability harms economic growth. Government expenditure contributed to economic growth in the short-run and long-run. Gross capital formation and financial development have detrimental effect on economic growth. Based on the findings from this study, there is a need for the government to address the frequent political instability to achieve the expected long-term growth in the economy.

1. Introduction

Political instability is regarded as one of the hindrances to economic development. This is based on the premise that it serves as an obstacle to the long-term policies and thereby limiting policymakers to short-term macroeconomic policies. In addition, political instability results in frequent changes in policies and this, in turn, adversely affects the performance of the various sectors of the economy. Tabassam et al., (2016) emphasised that an unstable political environment reduces the level of investment in the economy and hence economic growth due to the uncertainty and volatility. Asteriou and Price (2001) argued that the patterns of government spending are affected by political instability as the government has to spend more to restore stability instead of on investment. Aisen and Veiga (2011) indicated that political instability reduces the level of productivity as well as the rate of human and physical accumulation while Kuznets (1966) linked the slow growth rate of an economy to political disorder. Barro (2013) claimed that the effect of economic policies on economic growth depends on the prevailing political conditions.

Several studies have reported a negative relationship between political instability and economic growth. For instance, studies like Gupta (1990), Barro (1991), Alesina, et al., (1996), Perotti (1996), Ades and Chua (1997) and Abdelhameed and Rashdan (2021) all reported an inverse connection between political instability and economic growth. However, studies on political instability and economic growth are scanty in Nigeria. This might likely be due to the unavailability of data as Gurgul and Lach (2013) linked the lack of attention on political instability and economic growth nexus in the past to insufficient data.

In recent times, most of the empirical studies that examined the relationship between political instability and economic growth have been criticised based on the data used to capture political instability. For instance, de

Haan (2007) argued that the most of the variables used in political instability-economic growth nexus suffered from measurement errors and this has cast doubt over the validity of their findings. According to Jong-A-Pin (2009), many attempts have been made to address the problem of measurement errors as some studies have resorted to construct a dimensional index using principal components analysis (PCA) while some studies used the discriminant analysis or logit analysis. Also, evidence from past studies showed that most of the studies which examined the connection between political instability and economic growth focused on panel data or cross-country analysis. For instance, Alesina et al. (1992, 1996); Mbaku (1988, 1992); Zureiqat (2005); Polachek and Sevastianova (2012); Okafor (2017); Elbargathi and Al-Assaf (2019); and Dalyop (2019) are panel studies while country specific studies on Nigeria are scanty.

The lack of sufficient studies on the connection between political instability and economic growth in Nigeria coupled with the issue of measurement error highlighted in previous studies motivate this study. This study intends to contribute to the literature by examining the impact of political instability on economic growth in Nigeria in the following ways. First, Nigeria is a nation has been experiencing significant levels of political instability since 1999 in which the findings from this study can help policymakers in making appropriate decisions. For instance, political instability has been a major issue since its independence in 1960. The frequent changes of government that is quite common since 1960 have promoted unstable economic policies, inconsistent economic planning and poor leadership. It has also constituted an adverse economic environment, which makes it difficult for rapid economic growth. Between 1966 and 1993, out of several coups that took place in Nigeria, six eventually led to the formation of new governments. Even after Nigeria successfully transited to the democratic system of government in 1999, the country has been facing a series of religious, community and ethnic crises that led to the loss of lives and livelihood.

Second, this study will provide robust and new evidence free from measurement error as this study employs new data set on various types of conflicts from the International Country Risk Guide (ICRG) for the analysis. The remaining parts of this study are organised as follows; Session 2 consists of the literature review; the methodology is presented in session 3; session 4 presents the measurement of the variables. Session 5 contains the empirical analysis while session 6 presents the conclusion and recommendation.

2. Literature Review

Regarding the nexus between political instability and economic growth, some studies investigated the relationship using time series while some studies use panel data. Starting with time-series studies, for instance, Ali, Hashmi and Hassan (2013) focused their attention on the effect of both economic and political factors on the volatile economic expansion and investments in Pakistan for the period 1972-2009. The study used factors such as corruption, political instability, frequent changes in regime, energy crisis and conflicts among political parties as non-economic factors. To analyse the long-run and short-run relationship between political instability and domestic private investments, the study used the ARDL cointegration approach along with Error Correction Model. The study found that the poor economic growth in Pakistan is caused by capital flight, which occurs because of the uncertainty created by non-economic factors. Like Ali, Hashmi and Hassan (2013), Sweidan (2016) employed the ARDL model and Kalman filter econometric techniques to investigate the connection between political instability and economic growth in Jordan. The study used data that cover the period 1967-2009. The study found that political instability produces a significant adverse effect on economic growth throughout the study period. The study also found that political instability has an adverse impact on government expenditure. Also, on the Pakistan economy, Tabassam, Hashmi and Rehman (2016) examined the connection between political unrest and economic growth using annual time series covering 22 years. The study used terrorism, election, regime and strikes to proxy political instability. However, the authors used ARCH and GARCH models instead of the ARDL model. The result from GARCH (1, 1) model in the mean equation indicated that only terrorism has an inverse relationship with the mean equation of GDP per capita. However, the results of the GARCH (1, 1) model with explanatory variables in the variance equation revealed that elections and regimes are the only two explanatory variables that impacted negatively the volatility of GDP. Jong-A Pin (2009) used Exploratory Factor Analysis to analyse if the different measurements of political instability will produce a different effect on economic growth and if this effect is causal. The study utilised 25 political instability indicators. The research found that from the dimensions of political instability utilised in the study, only instability of the political regime failed to impact economic growth positively. The study concludes that the four dimensions of political instability used have different effects on economic development.

Gong and Rao (2016) focused on investigating if the prolonged political instability experienced in Fiji would produce a harmful effect on the economy. The study covered the period 1970–2011 and used the Synthetic Control Method. The study confirmed that prolonged political instability constitutes a hindrance to economic growth during the study period.

On the panel studies, Aisen and Veiga (2013) focused on how political instability affects economic growth in a sample consisting of 169 developing and developed countries. The study covered the period 1960 to 2004. The study employed the system GMM technique for the estimation of the relationship. The result from the estimations showed that a high level of political instability contributed to the poor growth of GDP per capita. The study emphasised that irrespective of the channels, political instability impedes economic growth by reducing the level of productivity growth rate. In a similar study, Okafor (2017) used panel data from 15 members of the Economic Community of West Africa States (ECOWAS) countries to investigate the impact of political instability and economic growth for the period 2005 - 2012. The study used fixed effect and generalised method of moments techniques of analysis while different types of conflict were also used for the analysis. The results revealed that variables such as terrorism and others exerted a negative impact on economic growth in the selected countries. Gurgul and Lach (2013) were interested in determining the connection between political instability and economic growth. To achieve this objective, the study used 10 Central and Eastern European countries (CEE) while the study spanned through 1990–2009. The study found that when government change is used to define political instability, it has a detrimental impact on economic growth. For the period 1980 to 2013, Dalyop (2019) used data from 52 African nations to investigate the connection between political instability and economic growth. The panel analysis showed that there is a direct relationship between political stability and economic growth. The results further indicated that political instability constitutes an obstacle to economic growth. Also, the study established that a low level of economic growth worsens and promotes political instability in Africa.

3. Methodology

Econometric models that estimate the effect of political instability on economic growth are mainly multivariate regression models (Abdelkader, 2017). The functional form of the empirical model/equation for this study is specified as follows;

GDP = f(POL, GCF, FD, HUM, GOVE, FDI)   (1)

where GDP is the aggregate output level, POL is political instability, GCF is gross capital accumulation, FD is financial development, HUM represents human capital, GOVE is the government expenditure and FDI is foreign direct investment.

The econometrics form of the model can take the general form as follow;

$$\Delta(GDP_t) \quad = \quad \gamma_0 + \gamma_1(POL_t) \quad + \quad \gamma_2(CGF_t) \quad + \quad \gamma_3(FD_t) + \gamma_4(HUM_t) + \gamma_5 GOVE_t + \gamma_6(FDI_t) + \varepsilon_t$$
(2)

The ARDL bound test approach[1] of the connection between political instability and economic growth in Nigeria is specified in the form of an unrestricted error correction model to test for cointegration as follows:

$$\Delta GDP_t \quad = \quad \beta_0 \quad + \quad \beta_1 GDP_{t-1} \quad + \quad \beta_2 POL_{t-1} \quad + \quad \beta_3 GCF_{t-1} \quad + \quad \beta_4 FD_{t-1} \quad +$$
$$\beta_5 HUM_{t-1} + \beta_6 GOVE_{t-1} + \beta_7 FDI_{t-1} + \quad \beta_8 \sum_{i=1}^n \Delta GDP_{t-1} + \beta_9 \sum_{i=0}^n \Delta POL_{t-1} + \quad \beta_{10} \sum_{i=0}^n \Delta CGF_{t-1} \quad +$$
$$\beta_{11} \sum_{i=0}^n \Delta FD_{t-1} + \beta_{12} \sum_{i=0}^n \Delta HUM_{t-1} + \beta_{13} \sum_{i=0}^n \Delta GOVE_{t-1} + \beta_{14} \sum_{i=0}^n \Delta FDI_{t-1}$$

$$+\varepsilon_{1t}$$
(3)

where n represents the lag order and Δ denotes the first difference operator. GDP_{t-1} represents the lagged dependent variable. β_0 signifies the drift term and ε_{1t} sands for the residuals. On Eq. (3), we applied the ARDL bounds procedure as it permits a joint significance test of the null hypothesis of no cointegration ((H_0: $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$) against its alternative (H_1: $\beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 \neq 0$ that cointegration exists. To determine the presence of the cointegrating long-run relationship in the model, the F-statistics is employed. The calculated F-statistics will be compared to the critical values tabulated by Pesaran et al. (2001). Pesaran et al. (2001) computed two sets of critical values (lower and upper critical bounds) for a given significance level. One group shows that all variables are I(0) and the other group shows they are all I(1). Therefore, the H_0 hypothesis test will be rejected if the calculated F-statistics is greater than its upper critical value. This signifies the existence of the cointegrating long-run relationship. But the H_0 hypothesis will not be discarded if the calculated F-statistics is below its lower critical value. This suggests that the long-run cointegration relationship is not existing. Finally, if the calculated F-statistics is between a lower bond and an upper bond, the test will be inconclusive. Regarding the optimal lag selection, we employed the Schwarz Bayesian Criterion (SBC).

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[1] It has the advantage of combining I(0) and I(1) variables together.

The ARDL model can be used to analyse both long-run and short-term associations between the variables. For the estimation of the long-term relationship, the following model is adopted;

$$GDP_t = \alpha_0 + \alpha_1 \sum_{i=1}^{n} GDP_{-1} + \alpha_2 \sum_{i=0}^{n} POL_{t-1} + \alpha_3 \sum_{i=0}^{n} GCF_{t-1} + \alpha_4 \sum_{i=0}^{n} \Delta FD_{t-1} + \alpha_5 \sum_{i=0}^{n} HUM_{t-1} + \alpha_6 \sum_{i=0}^{n} GOVE_{t-1} + \alpha_7 \sum_{i=0}^{n} FDI_{t-1} + \varepsilon_{1t}$$
(4)

The ARDL-ECM model is used for short-term relationships. If there is co-integration between the variables, then it is acceptable to use the ECM model. When short-run dynamic parameters are obtained by estimating an error correction model related to long-run estimates, this model is derived. It is possible to present this as follows;

$$\Delta GDP_t = \alpha_0 + \alpha_1 \sum_{i=1}^{n} \Delta GDP_{-1} + \alpha_2 \sum_{i=0}^{n} \Delta POL_{t-1} + \alpha_3 \sum_{i=0}^{n} \Delta GCF_{t-1}$$
$$+ \alpha_4 \sum_{i=0}^{n} \Delta FD_{t-1} + \alpha_5 \sum_{i=0}^{n} \Delta HUM_{t-1} + \alpha_6 \sum_{i=0}^{n} \Delta GOVE_{t-1} + \alpha_7 \sum_{i=0}^{n} \Delta FDI_{t-1} + \alpha_8 ECM_t + \varepsilon_{1t}$$
(5)

4. Measurement of Variable and Data Source

4.1 Data Description and Sources

We make use of annual time series data, which covers the period 1984-2020. The reason for choosing this period is based on data availability. Specifically, the data on the different types of conflicts from the (ICRG) starts in 1984. The variables include; GDP per capita (constant 2015 U.S. dollars) - this is measured by gross domestic product divided by midyear population. Gross capital formation (GCF) as % GDP– this is the gross fixed capital formation. Human capital (HUM) – this is measured by the total labour force. Political instability (POL) – political instability is proxied by internal conflict. Internal conflict is an appraisal of political viciousness in the nation and its potential effect on administration. The risk rating is made up of three subcomponents, each of which has a maximum score of four points and a minimum score of zero. A 4-point score equals very low risk, while a 0-point score equals very high risk. Financial development (FD) as % GDP is measured by domestic credit to private sector. Government expenditure (GOVE) – this is the government expenditure of consumption as % GDP. Foreign direct investment (FDI) as % GDP – This is the average of FDI net inflows to GDP. The data on GDP per capita, physical capital, human capital, government expenditure, financial development and foreign direct investment are obtained from the World Development Indicator. Data on internal conflict is the Political Risk Components (PRC) from the ICRG. The descriptive statistics of the variables are presented in appendix A1 while the correlation matrix of the variables is presented in appendix A2.

5. Empirical Analysis

5.1 Unit root test

The analysis of this study begins with the examination of the unit root test. This is very necessary to determine the stationarity of the variables. To achieve this, we perform two different unit root tests, namely, Augmented Dicky-Fuller (ADF) and Philip-Perron (PP). The results of the unit roots are presented in table 1. The Augmented Dicky-Fuller result shows that almost all the variables except the gross capital formation are integrated into the I(1) process. The gross capital formation is stationary in level. Likewise, the Philip-Perron test indicates that all the variables are stationary at first order aside from the gross capital formation which is stationary at level.

Table 1. Unit Root Test

Variables	ADF		PP	
	Level	First Difference	Level	First Difference
GDP	1.2307	-3.4855***	1.7197	-4.3454***
GCF	-1.8830*	-7.4995***	-2.1615**	-7.4292***
HUM	3.1662	-4.2110**	-1.8996	-2.7331***
POL	-1.3843	-5.8148***	-0.3656	-5.8167***
FD	0.3988	-5.5302***	-0.3130	-5.1344***
GOVE	0.2786	-5.0656***	-0.1524	-5.1601***
FDI	-0.4385	-6.000***	-0.0875	-6.3490***

Note: (**) (***) signifies significance at 5% and 1% level respectively.

Source: Authors Computation

5.2 Cointegration Analysis

Having determined the stationarity of the variables, the study then performs a cointegration test. This is necessary as it helps to determine if a long-run relationship exists or not among the variables employed in this study. Several econometrics techniques that can be used to explore the existence of long-run cointegration relationships among variables are existing in the literature. For instance, the fully modified OLS methodology by Engle and Granger (1987) and Philip and Hansen (1990) is commonly used for univariate cointegration in the literature. However, for multivariate cointegration, most of the studies are employing Johansen (1988) and Johansen and Juselius (1990) full information maximum likelihood methodology. Most of the studies are using Johansen cointegration because it has the advantage of accommodating bias due to the small sample size and can present more than a cointegration relationship. However, one major weakness of this technique is that it requires all the variables to be integrated in the same order. In this study, the ARDL methodology developed by Pesaran and Smith (1995) and Pesaran et al. (2001) is employed because it has overcome the weakness of Johansen's cointegration and is based on its advantages over other multivariate cointegration methodologies. The results of the cointegration test are presented in table 2. The results of the Bound test show that there is a long-run relationship among the variables. This is because the estimated F-statistics (12.7553) is above the upper bound of critical value (4.8370), which means that the null hypothesis of no co-integration is rejected.

Table 2. Cointegration results

Model	Calculated F -statistic	
GDP = f(GOVE, POL, GCF, FD, FDI, HUM)	12.7553	
	K = 6,	N= 37
Critical Values	Lower bound	Upper bound
5%	3.1700	4.8370
10%	2.5778	3.9920

Notes: Critical bounds of F-statistic are shown in Narayan (2005). K stands for the number of independent variables. N refers to the number of observations.

Source: Authors Computation

5.3 Long-run and Short-run Results

Determining the lag order of the model is important before the estimation of the long-term coefficient. Based on the actual statistics of sample data, Schwarz-Bayes Criterion (SBC) is used to identify the optimal lag order of all the variables in the model. The highest lag order among the variables is 2 and finally, ARDL (2,2,1,2,0,2,1) is identified as the most appropriate. The long-run result is presented in Table 3. The results in Table 3 indicate that political instability harms economic growth as its coefficient is negative and significant at 1%. This shows that political instability is detrimental to economic growth in the long-run. This finding is consistent with Aisen and Veiga (2011), Murad and Alshyab (2019), Ayessa and Hakizimana (2021). It also supports the theoretical argument that political instability polarises communities, making it more difficult for governments to reach an agreement on state capacity expenditure. Political instability distorts economic activities and hence lowering economic growth. The implementation of long term political and economic reforms needed in the economy is adversely affected by political instability and as a result, economic growth might not be feasible. The uncertainty created by political instability affects savings and investment decisions whereas a lack of sufficient savings and investment hinders long term economic growth. The coefficient of government expenditure is positive and significant which indicates that government expenditure enhances economic growth in sub-Saharan Africa in the long-run. This finding is in line with Bojanic (2013), Kapunda and Topera (2013). According to Lee, Won and Jei (2019), government expenditure can boost economic growth when it increases private productivity. The increase of government on health care and education can also lead to rapid economic growth. Gross capital formation produces a significant negative effect on economic growth. The coefficient of gross capital formation is significant at 1%. This is in line with Akinlo (2021) and Aslan and Altinoz (2021) who found that gross capital formation has a negative impact on economic growth. However, this finding does not support Nweke et.al (2017) and Ajose and Oyedokun (2018) who found an insignificant effect of gross capital formation on economic growth in Nigeria. This is an indication that Nigeria is deficient in infrastructural development. The lack of physical infrastructure will not allow the scarce resources to be put into rational use. The inefficient use of resources prevents large scale production and an increase in employment, which can enhance economic growth. Financial development harms economic growth. The coefficient of financial development is significant negative. This implies that financial development harms economic growth. This is in line with previous studies (e.g. Allen

et al. 2014; Adeniyi et al. 2015; Ductor and Grechyna, 2015; Akinlo 2021) which found a negative relationship between financial development and economic growth. According to Allen et al. (2014), financial development might likely hurt economic growth when there is too much money in the economy. Philippon (2010), Santomero and Seater (2000), and Murphy, Shleifer, and Vishny (1991) said that a rapidly growing financial sector generates high rents and attracts resources ideally ought to be utilized in other sectors, but when there's sub-optimal allocation of the resources that implies that feasible growth rates might not be attained, in the short and long term. Likewise, human capital is detrimental to economic growth. This finding is consistent with Aryeetey and Fosu (2005) and Asiedu (2010). However, this finding contradicts Adelakun (2011), Anyanwu et al., (2015) and Osoba and Tella (2017) who found that human capital enhances economic growth.

Table 3. Estimated ARDL long-run coefficients: ARDL (1,0,1,1,2,1,1)

Regressor	Coefficient	t-statistics	Probability
POL	-0.0330***	-11.4465	0.000
GOVE	0.0231***	11.5237	0.000
GCF	-0.0212***	15.7646	0.000
FD	-0.0056***	-0.0014	0.003
FDI	-0.0052*	-0.0027	0.094
HUM	-2.3861***	11.4667	0.000
C	22.3511***	13.6262	0.000

Note: (*) and (***) signifies significance at 5% and 1% level respectively.

Source: Authors Computation

Table 4 presents the short-run results under the error correction model. Starting with the coefficient of the ECM_{-1}. The coefficient of ECM_{-1} is negative which implies that it possesses the correct sign. In terms of significance, the coefficient of ECM_{-1} is statistically significant at 1%. Political instability has an inverse relationship with economic growth in the short-run. The coefficient of political instability is negative and significant at 1%. Government contributes to economic growth in Nigeria during the study period. Gross capital formation is unable to promote economic growth in the long-run. This means that, in the short-run, there is an inverse relationship between gross capital formation and economic growth in Nigeria. This is in line with Oyeleke and Akinlo (2019), who, in the short-run found a negative relationship between gross capital formation and economic growth. However, gross capital formation lagged by one period contributes to economic growth. Financial development fails to positively impact economic growth like in the long-run. Unlike in the long-run, foreign direct investment contributes to economic growth in the short-run. Human capital promotes economic growth in the short-run based on its positive and significant coefficient at 1%. The positive association between human capital and economic growth in the short-run may be attributed to the importance of human capital in enabling the quality of life and promoting social and economic change. Also, human capital enhances the absorption of modern technology in developing countries.

Table 4. Estimated ARDL short-run coefficients: ARDL (1,1,1,1,2,1,1)

Regressor	Coefficient	t-statistics	Probability
ΔGDP_{-1}	-0.4984***	-3.9461	0.002
ΔPOL	-0.0061***	-6.8484	0.000
$\Delta GOVE$	0.0064***	6.9326	0.000
$\Delta GOVE_{-1}$	-0.0054***	-5.6763	0.000
ΔGCF	-0.0046***	-8.7749	0.000
ΔGCF_{-1}	0.0017***	3.8140	0.002
ΔFD	-0.0272***	-3.9406	0.002
ΔFDI	0.0034***	3.9406	0.002
ΔFDI_{-1}	0.0033***	3.3012	0.006
ΔHUM	0.6686***	3.3002	0.006
ECM_{-1}	-0.4648***	-13.3416	0.000

Note: (***) signifies significance at 1% level.

Source: Authors Computation

5.4 Diagnostic Tests

The diagnostic tests are presented in appendix A3. J-B normality is employed to test the distribution of the residual. This is often important since one of the presumptions of CLRM residual is normally distributed with zero mean and constant variance. To test for serial autocorrelation in the model, the Breusch-Godfrey LM test is employed while Autoregressive conditional heteroskedasticity (ARCH) is used to check the autocorrelation in the variance of the error term. Ramsey's reset test is used to test the functional misspecification of the model. The results from the diagnostics tests indicate there is no misspecification of the model. Likewise, heteroscedasticity and serial correlation problems are absent. For instance, the probability of the J-B normality residual is insignificant which means the residual is normally distributed. Likewise, the probabilities of Ramsey's reset test and Autoregressive conditional heteroskedasticity are insignificant which shows that the model is well specified and has no heteroskedasticity problem respectively.

5.5 Stability Test

According to Bahmani-Oskooee and Brooks (1999), a stability test is important because the cointegration of variables does not imply the stability of the estimated coefficients. Therefore, to verify the stability of the models, the study plots the cumulative sum of recursive residuals CUSUM and the cumulative sum of recursive residuals of square CUSUM. We present the stability results in appendix A4. From the figure, the graph of CUSUM and CUSUMS statistics lies between the critical bounds. This indicates that the estimated coefficients are stable. Likewise, the long-run estimates are stable in the ARDL Models because the divergence in CUSUM and CUSUMS graphs is absent.

6. Conclusion and Recommendations

This study examines the impact of political instability on economic growth in Nigeria during the period 1984-2020. Using the ARDL model, the study established that political instability harms economic growth in both the short-run and long-run. The study also found that gross capital formation and financial development have a negative relationship between gross capital formation and economic growth in both the short-run and long-run. Government expenditure is found to contribute to economic growth in the study in both short-run and long- run. Foreign direct investment and human capital have a negative effect on economic growth in the long-run but contribute to economic growth in the short-run.

The findings from this study have some implications. The negative effect of political instability on economic growth found in this study call for the government effort reduces political instability in the country. Political instability makes business transactions difficult among different ethnic groups due to a lack of trust. The fear of attack on business during conflict affects business decisions and the level of investment. The aftermath effect of

a conflict can also has great consequences on economic growth. The fact that economic activities are paralysed during the political crises is an indication that economic growth will be affected. The loss of businesses leads to an increase in the level of unemployment, which worsens the economic situation. Business cannot thrive in an unconducive environment as no investors will be motivated to invest in an environment that is not safe for business. To minimise the occurrence of political instability, the study recommends the following; First, the government must reduce the level of unemployment in Nigeria. The high level of unemployment promotes political instability. Many graduates possess the necessary skills and education to contribute to economic growth but are unemployed. Most of these people can easily be manipulated into crime in an attempt to survive. People that fully employed and busy can hardly be used as a weapon of violence. The political leaders usually take advantage of the unemployed and used them as political thugs to cause destruction and promote violence during and after the election. Reducing the level of unemployment by the government will also reduce the level of poverty in the country. There is a high level of poverty in Nigeria today, more than in the past decades. People resorted to all kinds of crimes to evade poverty. The high level of unemployment, corruption, inconsistent policies of the government and bad leadership has increased the level of poverty geometrically in Nigeria. There is currently a high level of crimes such as kidnapping, fraudsters, banditry and burglary, which are highly connected to the level of poverty. Second, there is a need for the government to establish special organs or agencies that will maintain equal rights for all ethnic groups and religious groups, and hold a constructive dialogue. Those agencies will serve as regulators, which can promote peace and be able to devise a solution for the resolution of differences based on the needs of different ethnic groups and religious groups. The agencies must also be saddled with the responsibility of ensuring that various ethnic and religious groups are treated equally and benefit in the sharing of national wealth.

Table A1. Descriptive Statistics of the Variables

	Mean	Median	Max	Min	Std. Dev.	Skew.	Kurtosis	Obs.
GDP	3.2689	3.2464	3.4295	3.1505	0.1029	0.3007	1.5121	37
GCF	29.6318	27.8659	53.1867	14.9039	11.5748	0.2638	1.9104	37
LAB	7.6440	7.6511	7.7579	7.5023	0.0807	-0.2464	1.7369	31
GOVE	4.1902	2.1485	9.4483	0.9112	3.1525	0.4639	1.6257	37
POL	7.1793	6.5	11	4.58	1.7386	1.0432	3.0142	33
FD	9.9568	8.4351	19.6256	4.9575	3.7420	1.0469	3.5028	37
FDI	3.0932	2.1913	8.3119	0.0185	2.4410	0.4609	1.9991	37

Appendix A2: Correlation Matrix

	GDP	GCF	LAB	GOVE	INTC	FD	FDI
GDP	1						
GCF	-0.8880	1					
LAB	0.8937	-0.9809	1				
GOVE	0.8601	-0.8179	0.8201	1			
POL	-0.6054	0.5165	-0.5828	-0.4934	1		
FD	0.7283	-0.7513	0.7679	0.8228	-0.4551	1	
FDI	0.7083	-0.7125	0.7578	0.8090	-0.442	0.6584	1

Appendix A3: Diagnostic Tests

ARDL – VECM model diagnostic tests

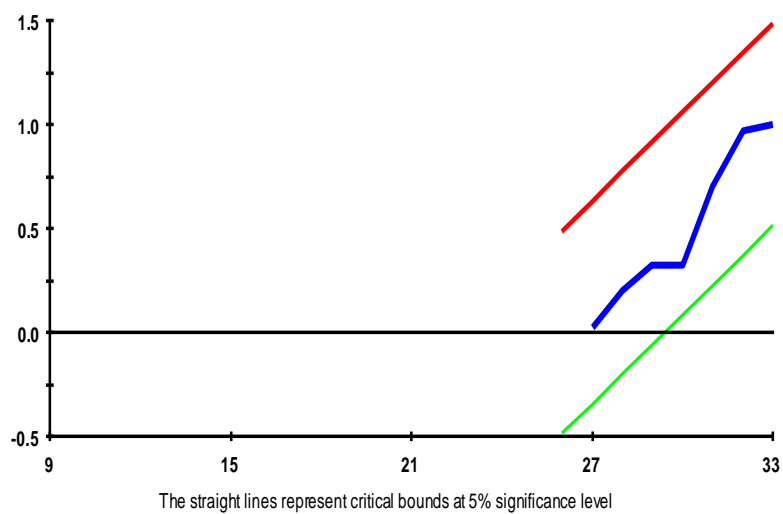| Test statistics	LM
Functional form	$\chi^2(1) = 2.2770 \ (0.131)$
Normality	$\chi^2(2) = 3.3558 \ (0.187)$
Heteroscedasticity	$\chi^2(1) = 0.4545 \ (0.500)$

Appendix A4

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
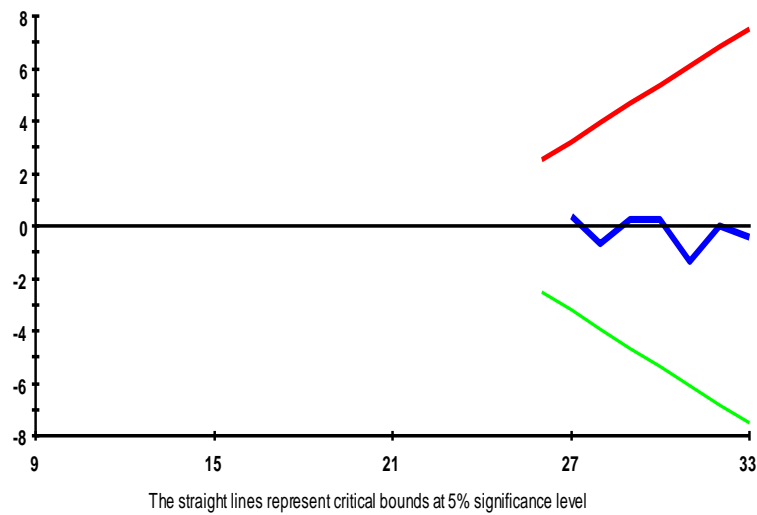
Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

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