The Impact of Power Supply on the Exports of Services in Cameroon

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Abstract
Power deficits constitute a crucial problem affecting the production and exports of goods and services in a modern economy. This study attempts to evaluate the impact of power deficiency on the exports of services in Cameroon. Therefore, a modified Cobb-Douglas production function and selected data retrieved from the 2018 World Development Indicators dataset for the period 1972-2017 were used in the econometric estimations. The results depict that power deficits have effects on the country's export services both in the short- and long-terms as a percentage point hike in power supply triggers an increase in the exports of services by 0.69 per cent in the short-run and 0.43 per cent in the long-run. Moreover, a one-point decline in Foreign Direct Investment causes the exports of services to decline by 0.02 per cent in the short-term and 0.07 per cent in the long-term. Overall, the results imply that electricity supply is a critical input to boost the exports of services. Thus, it is recommended that the government of Cameroon should eradicate the issue of power supply to its economy by stepping up investments in the energy sector.
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1. Introduction

Since the period of the industrial revolution, power has remained a key driver of economic activities, particularly in the secondary and tertiary sectors (Sieferle, 2001; Wrigley, 2013). The history of industrial development and major socioeconomic transformations in both the developed and emerging economies clearly indicates that energy played a critical role in mechanized and large-scale production of goods and services (Chen and Fang, 2018; Thai-Ha and Canh, 2019). In fact, it would have been difficult for mankind to attain the present level of civilization without power supply. Increasing production and productivity including innovation in firms and industries would have been virtually impossible in the absence of power supply. The transformation from cottage enterprises to modern industries would have been impossible without this vital source of power supply. According to the United Nations Industrial Development Organization-UNIDO (2009), in countries with unstable and high cost supply of power, it is difficult for industries to substantially increase their production capacity. Most of these countries are in Africa, Asia and South America.

In fact, no country has been able to develop and significantly improve the production, growth and competitiveness of its industries and economy without an affordable and sufficient supply of electric power (Wrigley, 2013; Stern, 2004). As argued by Alam (2006), energy is an indispensable force that drives up all economic activities, especially in a globalized world where production units compete with their counterparts in various parts of the world.

In view of the above, countries aspiring to shift from the production and export of agricultural and primary commodities to manufactured goods and services with high added value are obliged to address problems of epileptic and high cost power supply affecting their economies (Le, 2016). Today, the service sector vis-à-vis the secondary sector significantly rely on the supply of power (UNIDO, 2018a). This is because the entrepreneurial or business world is becoming more and more digital, thereby making it very much dependent on adequate and stable electricity supply (World Trade organization, 2018). The use of Information and Communication Technologies by enterprises to ameliorate their products (goods and services) is to a large extent influenced by the accessibility to stable and low cost electric power.

In Cameroon, the service sector is a major contributor to the Gross Domestic Product (GDP). Its contribution to the country's GDP increased by about 2.4 points in the second semester of 2021 (National Institute of Statistics-NIS, 2021). This sector comprises of hotels, restaurants, transport, wholesales and retails, financial activities, health, education, and telecommunication, amongst others (NIS, 2021). These subsectors that make up the service sector of the country are to a large extent dependent on adequate power supply for effective functioning. Consequently, frequent and prolonged power outages as experienced in the country could significantly limit the access essential services like internet, online sales, and electronic money transfer in periods of power blackouts. In this regard, the production and exports of enterprises in the service sector would be negatively affected. It is in this regard that the World Bank (2016) argued that firms involved in manufacturing, wholesale and retail activities in Cameroon identified electricity shortages as third major obstacle to their operations from a list of ten main business constraints.

Moreover, Cameroon Chamber of Commerce (2018) underlined that the exports of the service sector decreased from 6.6 per cent in 2013 to 5.3 per cent in 2017 partly because of some major factors affecting growth in the business environment of the country like corruption, administrative impediments, power supply, and access to finance. In addition, the 2018 estimates of the World Bank for Cameroon revealed that the reduction in the exports of goods and services of the country by 0.6 per cent in 2016, 1.6 per cent in 2017 was to some extent attributed to increasing power deficits. Furthermore, in first semester of 2021, the commercial trade of Cameroon recorded a deficit of 7.5 per cent (NIS, 2021). This certainly implies that power supply has a significant effect on the production and exports of services of the country. It was in this regard that WoldeRufael, (2006) underlined that the problem of the power deficit constitutes a real obstacle for the development of the Cameroonian economy as a whole and its service sector in particular.

To this extent, some studies examined the impact of the power deficits on the production cost, manufacturing, and employment in some developing economies including Cameroon (Ismaila and Fambon, 2020; Tamo et al. 2010; World Bank 2016; Justice 2016; UNIDO, 2009, etc.). It was observed that these studies paid less attention on assessing the impact of electricity deficiency on the service sector. It is for this reason that this study seeks to make an evaluation of the impact of electricity supply on the exports of the service sector in Cameroon. More precisely, it would attempt to respond to the research question: what is the short-term and long-term impact of electricity supply on the exports of services in Cameroon? To respond to this question, the rest of the paper is structured as follows: Section 2 presents the literature review, Section 3 unveils and justifies the empirical strategy, Section 4 depicts and discusses the main findings and Section 5 concludes the paper.

2. Literature review

Economies experiencing relatively high rates of electricity outages and instabilities could habor fewer small enterprises and larger ones that rely on electricity, particularly in the manufacturing and services sectors. This is because most small enterprises generally have limited financial resources and technical knowhow that can enable them to auto-generate electricity; meanwhile larger ones would prefer location sites where electricity is of high quality and stable in supply (Alby and Straub, 2011). For instance, evidence from India indicates that when firms are facing problems of insufficient electricity supply and voltage fluctuation, they may not have the incentive to increase their investments and would prefer to delocalize their activities (Abeberese, 2012). In Cameroon, most industries and production units are located in areas with access to electricity though it supplies are irregular and fluctuating.

Therefore, electricity supply as an input constitutes a vital factor which defines whether a business environment is sustainable or not. Surely, a country or region with severe power outages would definitely be considered as unfavorable for business that require an adequate supply of power to sustain their economic activities (Tybout, 2000). In fact, when the business environment of an economy is favorable to economic activities, resources are more likely to be channeled to the most productive uses and firms will invest more to increase their productivity (World Bank Enterprise Surveys, 2016). To this extent, the economy can create and distribute more wealth, thereby accelerating exports, reducing poverty, enhancing economic growth and development. In this regard, energy availability affects investments in various sectors of the economy as it lowers sectorial contributions to GDP.

Although the inadequate and unstable supply of power adversely affect all types of enterprises the world over, the magnitude of the negative impact is usually greater on Small and Medium Enterprises (SMEs) and businesses with a relative high dependence on energy to carry out their activities (Page, 2012; Karen et al., 2015). It was in this regard that Mchopa et al. (2014) using a survey on Tanzanian firms underlined that the rationing of electricity resulted in about 50 per cent reduction in the productivity of SMEs in the country. Also, Lean and Smyth (2010) examined the causal effects between the production of power, exports, prices of goods, and GDP in Malaysia from 1970 to 2008; and concluded that insufficient electricity supply partly caused by transmission and distribution losses adversely affected the production of industries and the economic growth of the country.

Furthermore, Murry and Nan (1996) examined the relationship between the consumption of power in 23 nations for the period ranging from 1970 and 1990 using the Granger causality technique. The findings of their work disclosed that in developing countries like Kenya, where power blackouts are a major problem, there was no significant positive relationship between the supply of energy and the country's GDP. However, in countries like Canada and South Korea where electricity supply to their economies is adequate and stable, a significant bi-directional causal relationship between GDP and power supply was observed. Thus, Murry and Nan (1996) concluded that investing in energy to improve the production of electricity drives up economic growth and development through improvements in the production and exports of goods and services.

For example, Kouakou (2011) employed the Autoregressive Distributed Lags bounds test to examine the correlation between power consumption, production and economic growth in Ivory Coast during the period

1971-2008. The findings of the study indicated that there existed a long-term relationship between all the variables. The results further revealed a bi-directional causal relationship between power consumption, production of goods and services, and economic growth. In addition, Shahbaz and Lean (2012) conducted a similar study in Pakistan for the timeframe ranging from 1972 to 2009 and found that adequate and stable electricity supply positively affected the economic growth of the State mainly through the production and exports of goods and services.

However, insufficient electricity supply limits productivity and reduces competiveness of enterprises and industries as well as the economic growth of a whole country (UNIDO, 2018a; Page, 2012; Ongono, 2009; UNCTAD, 2017). For instance, recurrent and prolonged electricity outages experienced by enterprises in Nigeria in 2007 cause the closure of approximately 30 per cent of firms and left about 60 per cent of enterprises in precarious conditions resulting to abusive waste of resources, retrenchments and growing unemployment (Emeka, 2008). The author emphasized that this situation was severe for the country's industries because most enterprises had to embark on the auto-generation of power due to the electricity outages. In essence, energy availability is related to a country's GDP as countries tend to be less economically developed and have low GDP per capita when energy supply to their economies is inadequate for the production of goods and services. It partly reflects the large income gap between developing and developed economies. In fact, power availability for the production of goods and services affects the competitiveness of firms in foreign markets as businesses operating under power voltage regimes produce high cost goods and services whose prices are less competitive. On the contrary, firms producing under cheap and adequate power supply produce low cost products which most often are relatively more competitive in both domestic and foreign markets. Studies by Phillip et al. (2012) on firms operating under electricity constraints also support that most enterprises in the developing world produce high and less competitive goods and services than their counterparts in developed countries.

In this regard, there is no doubt that this would limit the production capacity of affected firms, reduce their competitiveness and to some extent threaten their market shares. In short, although the autonomous production of power by enterprises to continue operating during outages may be beneficial to them during periods of power blackouts in the form of long-run revenue gains, it could have an enormous adverse effects on enterprises in the short-run (Marques and Fuinhas, 2012). This usually lead to productivity losses in the short-term due to the fueling, repairing and maintaining power generators, training of personnel to use new energy efficient technologies and equipment, etc. (Justice, 2016). Thus, frequent disruptions in the supply of electricity, as well as voltage fluctuation sometimes leave enterprises with no choice than to invest in alternative sources of energy to avoid disrupting production during power blackouts or voltage fluctuations (Lee and Anas, 1992; Philippe et al., 2012).

It was in this regard that Escribano and Guasch (2005) in assessing the impact of the business environment (among which electricity deficiencies) on firm-level productivity in Guatemala, Honduras, and Nicaragua revealed that a percentage upturn in the average duration of electricity blackouts caused a reduction in the productivity of the affected enterprises by 0.2 to 0.1 per cent. Moreover, shortages in power supply accompanied with increases in its prices make firms to revert to the utilization of low quality fuels such as coal in order to run their machinery to keep to production. In countries where alternative energy sources are unavailable, imports of alternative sources tend to affect the country's trade balance and even the GDP, especially when import prices of alternative sources soar.

According to Stern (2004), reverting to low quality energy has a negative impact on the volume of products that firms produce, as well as the quantity of power they use to produce them because more of low quality power is always needed a produce a given good or service (Stern, 2004). This would increase the quantity of energy consumed by the firms, thereby increasing their production cost. Thus, reducing the quantity and quality of goods and services, thereby making them less competitive in foreign markets. It was in the light of these facts that Stern (2004) argued that compared to electricity (considered as high quality energy), more of low quality energy such as coal will be necessary for the production of a unit of GDP.

This therefore implies that reverting to low quality fuels by firms in an effort to continue production during power blackouts could be counterproductive because the quality of goods and services, growth and competitiveness of firms may be jeopardized. As such, the economic growth and development of an entire economy could be negatively affected considering the interdependent nature of the various sectors and branches that constitute a national economy (Jorgenson, 1984). Overall, auto-generating power or developing energy efficient technologies generates additional cost to the concerned enterprises. If the enterprises cannot transfer this additional cost to the consumer through higher prices, they could be obliged to maintain the prices of their products and use part or all of their profits to cover up for the auto-generation cost of electricity. In some, developed and industrialized countries, governments may intervene through grants, subsidies, and tax reductions if the industries are producers of necessity products. In less developed economies where these relief measures are not adequately or properly implemented to encourage production, most of the affected firms collapse, thereby causing revenue falls and uncompetitiveness of products in both domestic and foreign markets. The long-run effect of this could be the closure of firms. This has occurred in many developing countries during the implementation of the Structural Adjustment Programs.

Clearly, this increases the production cost of firms, reduces the quality of their products, compromises their competitiveness and threatens their survival. Considering these facts, it is therefore clear that power shortages do not only increase the production cost of industries but also constitute a threat to socio-economic development, particularly in Africa where it is badly needed (Page, 2012). Nonetheless, resorting to energy-saving technologies is not without a cost considering that it will require several years of research and development, as well as enormous financial, material and human resources to develop or use (Berndt et al., 1993). Conversely, adequate power supply at low prices harnesses and enhances the production of intermediary and final goods and services, leads to the creation of more jobs, increases the incomes and ameliorates the livelihoods of individuals, particularly those of the poor and the vulnerable (Ouedraogo, 2013; Steinbuks and Foster, 2010).

Generally, enterprises that own power generators auto-generate at least a small quantity of electricity no matter the cost to continue production during periods of power outages. This is because the marginal revenue of an input's product tends towards infinity as the quantity of the input tends to zero (Stern, 2004). Nonetheless, some firms choose to completely halt their production activities during power outages even if they have generators. This is because they consider that the additional and high cost they will incur to auto-generate electricity is same as a tax increase on power. As such, they would rather prefer to avoid to bear the additional cost by completely shutting down production during power outages.

This could result in a reduction in the quantity of goods and services enterprises produce at that given period, and eventually give room for the imports of similar and rival products which may lead to dumping with its precarious consequences to the economy. To this extent, prolong periods of power outages could compel firms that cannot auto-generate electricity to halt production for long periods. When production is halted, the enterprises concerned would have no products to sell if the stocks of their goods are exhausted. During this period, they will be obliged to pay workers even if they are not producing and /or selling. This would make them to incur heavy losses that might lead to their closure (Palakiyèm, 2016).

3. Methodology

3.1. Specification of the model

In order to measure the impact of power supply on the exports of services, a modified Cobb-Douglas production function is considered. This function expressed in equation (1).

$$Y = AK^{\alpha_1} L^{\alpha_2} PS^{\alpha_3} \varepsilon^{\mu} \quad (1)$$

Where Y represents the output of firms which could be goods or services, K is capital, L designates labor force, PS denotes power supply, A stands for the technological factor, ε is assumed to be the error term N (i.i.d), and α_1, α_2, α_3 are the elasticities of output to capital, labor, and power supply respectively.

In order to capture the technology factor, denoted by A that is used by enterprises, Foreign Direct Investment (FDI) and Net Domestic Credit (NDC) were employed. These two variables were used to capture A because some of the technology firms used is from foreign corporations that interact with domestic firms (Thai-Ha and Canh, 2019). Also, national firms that do not have the technical capabilities to develop their own technologies or innovations, tend to buy them from research laboratories or inventors. In this regard, the financial capacity and NDC could play a critical role in the acquisition of technology. Thus, the technology factor is presented in equation (2)

$$A_t = \phi FDI^{\delta_1} NDC^{\delta_2} \quad (2)$$

Where ϕ is the constant time-invariant, and δ_1 and δ_2 are the elasticities of technology to FDI and NDC, respectively.

By substituting equation (2) into equation (1), equation (3) is derived.

$$Y_t = \phi FDI^{\delta_1} NDC^{\delta_2} K^{\alpha_1} L^{\alpha_2} PS^{\alpha_3} \varepsilon^{\mu} \quad (3)$$

The factors capital (K) and Labor (L) in equation (3) are captured by Gross Fixed Capital Formation (GFCF) and the total available Labor Force (LF) respectively. By replacing K and L in equation (3) by GFCF and LF respectively, equation (4) is obtained.

$$Y_t = \phi FDI^{\delta_1} NDC^{\delta_2} GFCF^{\alpha_1} LF^{\alpha_2} PS^{\alpha_3} \varepsilon^{\mu} \quad (4)$$

Thus, the equation to enable us to measure the impact of power supply on the exports of services is obtained by replacing the term Y_t in equation (4) by the term Exp_t.

$$Exp_t = \phi FDI^{\delta_1} NDC^{\delta_2} GFCF^{\alpha_1} LF^{\alpha_2} PS^{\alpha_3} \varepsilon^{\mu} \quad (5)$$

Where Exp_t denotes the exports of services. By linearizing equation (5), the final function used to measure the impact of power supply on the exports of services in Cameroon is presented by equation (6).

$$\log Exp_t = \alpha_0 + \alpha_1 \log FDI_t + \alpha_2 \log NDC_t + \alpha_3 \log GFCF_t + \alpha_4 \log LF_t + \alpha_5 \log PS_t + \varepsilon_t \quad (6)$$

3.2. Variables

In this study, the independent variable is power supply, meanwhile the dependent variable is the exports of services. The control variables are: gross fixed capital formation, Foreign Direct Investment, labor force, and net domestic credit.

To determine the quantity of power or electricity effectively supplied, its quantity that is lost in the transmission and distribution networks is subtracted from the total energy produced from hydroelectric dams, thermal centers, coal, oil, and natural gas. These sources of power production are chosen because it is from them that electricity from the national grid is produced and supplied to the Cameroonian economy (MINEE, 2015). It is worthwhile to underscore that electricity transmission and distribution losses refer to the total quantity of electricity lost in the transmission and distribution networks. The higher the transmission and distribution losses, the lower the electricity supplied to the economy of Cameroon and the lower the production of goods and services.

Gross fixed capital formation refers to the net increase in physical capital. In this study, it is assumed that economic activities, especially in the service and secondary sectors trigger an increase in the production and purchase of physical assets. But without sufficient electricity supply, the production of these physical assets will be limited and this will affect the growth and development of firms.

FDI signifies the total amount of foreign capital inflow into a country, region, town, etc. In this work, it is considered that adequate and stable supply of electricity influence the location of foreign firms that greatly rely on power for production.

Labor force denotes the total number of skilled and unskilled workforce in a country. Net domestic credit refers to the loans that are granted to economic agents in an economy. These loans are generally invested by the economic agents contracting them by purchasing production equipment, auto-generating power, acquiring technologies and innovations, etc. in order to improve their production and boost their exports.

It is worth noting that the choice of the above-mentioned variables (dependent, independent and control) was motivated by the critical role they play in harnessing and enhancing production and exports of goods and services (World Bank, 2016; UNIDO, 2009; UNIDO, 2018a; UNCTAD, 2017). In fact, the variables are among the main factors which make a business environment to be favorable for enterprises to effectively operate (UNIDO, 2018a).

3.3. Data

The data used in this work was obtained from the World Bank dataset (World Development Indicators-WDI) of 2018, which covers the period 1972-2017. This period was chosen because it is long enough for a time series analysis as is the case in this study. As such it enables a better evaluation of the impact of power supply on the exports of services in Cameroon. Moreover, data was available and continuous for all the selected variables over the chosen period.

3.4. Empirical strategy

In other to estimate the impact of power outages on the exports of services in Cameroon, the following estimation techniques were employed:

3.4.1. Phillips - Perron unit root test

Just like the Augmented Dickey Fuller (ADF) test, the Phillips–Perron (PP) test is a unit root test that is used in time series analysis to verify whether variables are stationary or not and at what level they are in case of stationarity. The PP test is built on that of the ADF of null hypothesis p=1 in $\Delta y_t = (p-1)\, y_{t-1} + ut$, where Δ is the first difference operator (Phillip and Perron, 1988). It is presumed that in the PP test, any serial correlation and heteroskedasticity in the error term (u_t) of the regression are corrected automatically in the test equation by modifying the test statistics ($t_{\pi=0}$ and $T\,\hat{}_{\pi}$) of the error term (Min and Guna, 2018).

Therefore, the PP test is more robust in the general forms of heteroskedasticity in the error term of a regression. As such, it could be more reliable in time series analysis than the ADF in the presence of serial correlation and heteroscedasticity (Phillips, 1991). In this regard, the PP test is usually considered as the Dickey-Fuller statistics which have been made more robust to serial correlation and heteroskedasticity by using the Newey-West (1987) estimator of heteroskedasticity and serial auto-correlation in the covariance matrix of the regression.

3.4.2. Autoregressive distributed lag bounds test for co-integration

An Autoregressive Distributed Lag (ARDL) model is an Ordinary Least Square based model which is applicable for both non-stationary time series and time series with mixed order of integration (Pesaran et al., 1999). This test, in recent times, has been very valuable in the testing for the presence of long-term relationships between economic variables in a time series. Thus, the ARDL method is the major workhorse in dynamic single equation regressions. In fact, the ARDL model takes sufficient numbers of lags to capture the data generating process in general to a specific modeling framework (Min and Guna, 2018).

Furthermore, a dynamic Error Correction Model can be derived from the ARDL through a simple linear transformation, thereby enabling the former to integrate the short-term dynamics with the long-term equilibrium without losing long-run information and also prevent the occurrence of any spurious results (Min and Guna, 2018). In addition, this approach has shown to have good, large and finite sample properties which enable a more precise evaluation of the impact of one variable on another in the long-term (Phillips, 1991).

3.4.3. Toda and Yamamoto test for causality

The Toda and Yamamoto test is effectuated to ensure that the results of the causality test are reliable. It is assumed that the Toda and Yamamoto test (1995) is very robust to the integration and co-integration properties of a time series analysis as it guarantees the asymptotic distribution of the Wald statistic, which permits the obtainment of non-spurious results, and more precise causal relationships between variables in a series (Maddala, 2001; Gujarati, 2006; Santos and Chris, 2013). For Toda and Yamamoto (1995), the causality between two variables X_t and Y_t can be tested by determining the order of integration and the optimal number of the lags of the variables.

4. Presentation and discussion of findings

The results of the various tests that were conducted to find out the impact of power deficits on the exports of services are unveiled below.

4.1. Results of the Phillips-Perron test

The results of the Phillips-Perron are displayed in Table 1. They revealed that all the variables are not stationary at level as shown in Column 2 of Table 1. The non-stationary variables are labor force, exports of services, net domestic credit, and power supply. They are considered to be non-stationary at level because the corresponding absolute values of their PP Tests Statistics in Column 2 are less than the Critical Value (-3.5155) at 5 per cent. But at first difference, all the variables of the series are stationary as their corresponding PP Test Statistics values in Column 4 are higher than the Critical Value (-3.5130) in absolute terms at 5 per cent. To this effect, they are said to be stationary of order one, that is, I[1] as displayed in Column 6 of the table.

Table 1: Phillips-Perron test results

Variables	At Level		At First Difference		
	PP Test Statistics	Probabilities	PP Test Statistics	Probabilities	Decision
Export of Other Goods and Services (% of GDP)	-3.4233	0.0152	-19.7852	0.0000	I(1)
Gross fixed capital formation (% of GDP)	-3.5473	0.0463	-21.0989	0.0000	I(1)
Foreign Direct Investment, net inflows (% of GDP)	-6.6708	0.0000	-15.0946	0.0000	I(1)
Labor Force (total)	-1.5833	0.7839	-10.3701	0.0000	I(1)
Net Domestic Credit (current LCU)	-2.5549	0.3019	-4.8401	0.0017	I(1)
Power Supply	-2.0460	0.5764	-4.8630	0.0004	I(1)
Critical Values at 5 per cent	**-3.5155**		**-3.5130**		-

Source: Computed by Authors using STATA 14

4.2. Results of the ARLD Bounds Test

The results of the co-integration test between the various variables are presented in Table 2. They point out that there is a co-integration relationship between the exports of services and power supply as the value of the F-statistic (19.5080), in Column 3 of Table 2 is greater than the critical values of the upper bound (I1) at all levels of significance. This implies that there is a link between the exports of services and the explanatory variables in the long-term. The result implies that the variables of the series could be linearly combined in the long-run, and any shocks or variations that occur in the immediate and short-terms would be adjusted in the future. In this regard, the results indicate some degree of convergence between the variables.

Table 2: Bounds Test results

ARDL Bounds Test		
Included observations : 40		
Test Statistic	Value	K
F-statistic	19.5080	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.08	3
5%	2.39	3.38
2.5%	2.7	3.73
1%	3.06	4.15

Source: Calculated by Authors Using STATA 14

4.3. Results of Toda and Yamamoto causality test

The results of the Toda and Yamamoto causality test are unveiled in Table 3. They show that:

Firstly, the exports of services have a causal effect on gross fixed capital formation. This suggests that an increase in exports could lead to a surge in the demand for capital goods for further production. As a result, more capital goods will be manufactured and sold, thereby leading to an increase in the accumulation of capital. On the contrary, a decline in the exports of domestic firms might cause a reduction in the production of services, and subsequently result in a decrease in the demand and production of physical assets, thereby negatively affecting the accumulation of gross fixed capital.

Secondly, the exports of services have a causal effect on power supply. In fact, when exports increase, the volume of locally manufactured goods and services equally augments. Consequently, the quantity of power needed by industries in order to increase their production to the required levels hikes. As such, the consumption of power will in no doubt surge.

Thirdly, the findings reveal that the exports of services have a causal effect on net domestic credit. This result implies that when local firms increase their exports, they tend to borrow more from financial institutions in order to augment the quantity and improve the quality of their products. In other terms, when exports increase, domestic firms borrow and invest so as to satisfy the demand of their foreign customers. This reaction of enterprises to foreign demand results in an increase in their indebtedness and possibly the duration of the reimbursement period of the loans. However, the period of reimbursement of loans acquired will depend on revenue inflows and profits made from the exports of the products. In fact, an increase in foreign demand indicates that the services are competitive and loans acquired from either domestic or foreign institutions will be paid in the short-run if everything is held constant.

Fourthly, the findings show that labor force is affected by the exports of services. This suggests that when domestic firms sell their services on foreign markets, they are obliged or compelled to respect international norms or standards in terms of the quality, sanitary, health, etc. By so doing, they acquire new experiences and their personnel develop more skills to enable them to effectively and efficiently execute the tasks, activities, and missions assigned them. Moreover, when domestic enterprises export more, everything being equal, they increase their production by recruiting more workers and/or increasing the purchase of capital goods. This leads to an increase in employment and the improvement of the skills and know-how of already employed staff. In this regard, the exports of services are said to have a positive causal effect on the quantity and quality of a labor force.

Table 3: Toda and Yamamoto Causality Test Results

Model	*Df*	Zero hypothesis	Khi-two statistics	Critical probability *(p-value)*)
1	5	*EXPGS* does not cause FDI	11.1795	0,0246
		FDI does not cause EXPGS	3.7506	0.4408
2	5	*EXPGS* does not cause GFCF	52.2673	0.0000
		GFCF does not cause EXPGS	3.6593	0.4541
3	5	*EXPGS* does not cause PS	14.4930	0.0059
		PS does not cause EXPGS	1.9095	0.7524
4	5	*EXPGS* does not cause NDC	42.9366	0,0000
		NDC does not cause EXPGS	6.5658	0.1607
5	5	*EXPGS* does not cause LF	98.6390	0.0000
		LF does not cause EXPGS	0.3497	0.9864
6	5	*EXPGS* does not cause ALL	216.822	0,0000

Source: Computed by Authors Using STATA 14

4.4. Impact of power supply on the exports of services

The impact of electricity supply on the exports of services in Cameroon is displayed in Table 4. The findings showed that inadequate and unstable power supply in Cameroon have an impact on its exports of services both in the short-run and in the long-run. More precisely, a percentage point increase in power supply triggers an increase in the exports of services by 0.69 per cent in the short-run and 0.43 per cent in the long-run. In fact, this result indicates that power supply is critical to boost the exports of services in Cameroon. Therefore, adequate and stable supply of low cost power to the tertiary sector of the country could enable it to earn more foreign income.

The results further reveal that the exports of services are very sensitive to the variation in domestic credit and the inflow of FDI. For example, a one-point decline in FDI causes the exports of services to reduce by 0.02 per cent in the short-term and 0.07 per cent in the long-term. From this result, it could be observed that the negative impact of a percentage decrease in the inflow of FDI is more severe on the exports of services in the long-term as the decline in the latter soars from 0.02 in the short-term to 0.07 in the long-term. From this finding, it could be said that the inflow of FDI to the service sector in Cameroon is very much determined by electricity supply.

The results equally purport that a percentage decease in the quantity of domestic credit granted to enterprises causes the exports of services to shrink by 0.35 per cent in the short-term and 0.48 per cent in the long term. These results also reveal that the access to finance is critical to improve the exports of services in Cameroon. From the findings, it could be pointed out that a unit fall in net domestic credit has a higher negative impact on the exports of services both in the short- and long-terms compared to that of FDI. This implies that the availability of and accessibility to financial resources by firms are essential to enhance the exports services.

Table 4: Results of the Error Correction Model

Explanatory Variables	Exports of Other Goods and Services	
	Short-term	Long-term
Gross Fixed Capital Formation	0.0990 (0.0187)	0.3935 (0.0171)
Foreign Direct Investment	-0.02498 (0.0634)	-0.0766 (0.0171)
Labor Force	-0.3851 (0.0157	0.0143 (0.8765)
Net Domestic Credit	-0.3538 (0.0001)	-0.4829 (0.0000)
Power Supply	0.6942 (0.0013)	0.4373 (0.0618)

Source: Estimated by Authors Using STATA 14

5. Conclusion

The production and supply of power in adequate quantities and at low cost have been at the center of socio-economic development and improvement of welfare in the past century (Sieferle, 2001; Attia et al., 2015; Cheng and Fang, 2018). This is because large-scale production requires continuous and stable supply of electricity (Corbett and Fan, 2017).

In fact, an ample power supply is indispensable for the production of goods and services. Therefore, any electricity deficits would certainly have negative repercussions on economic units. To this extent, countries, particularly those in Sub Saharan Africa whose businesses experience frequent scheduled and unscheduled power blackouts have frail economies and ailing industries. Consequently, they heavily rely on the exports of agricultural and primary commodities at very unstable or fluctuating prices dictated by foreign buyers (Justice, 2016; Ngoe, 2013).

It is in this regard that this study laid emphasis on evaluating the impact of inadequate and unstable electricity supply on the exports of services in Cameroon. This was done using a modified Cobb-Douglas production function and selected data on Cameroon for the period ranging from 1972 to 2017.

The results of the unit root test revealed that the all the variables used in this study were stationary at first difference, suggesting that they are integrated of order one, that is, I(1). Moreover, the results of the co-integration tests done using bounds tests indicated that the variables of the series are co-integrated. Furthermore, the results of the Toda and Yamamoto tests indicated the existence of causal effects among the variables.

Globally, the results of the econometric estimations purported that power deficits affect the exports of services both in the short- and long-terms. More precisely, a percentage point increase in power supply triggers the exports of services to increase by 0.69 per cent in the short-run and 0.43 per cent in the long-run. The results further showed that the exports of services are very sensitive to the variation in domestic credit and the inflow of FDI as a one-point decline in FDI causes the exports of services to reduce by 0.02 per cent in the short-term and

0.07 per cent in the long-term.

To this extent, the findings point out that power supply is indispensable when it comes to harnessing and enhancing the export of services, and improving the attractiveness of the economy of Cameroon. In this regard, electricity supply has to remain at the center of economic and development policies in Cameroon. In fact, efforts to continuously improve electricity supply to the country's economy have be stepped up substantially in order to improve the performance of economic units that rely on power for production.

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