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THEORETICAL CONSEQUENCE IN 2013 IN BENIN OF THE FIGHT AGAINST FUEL SELLERS OF CONTRABAND AND THE CONSUMERS' RENUNCIATION PRICE DIFFERENTIAL

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ABSTRACT

This article presents the essential elements on the foundations and evolution of the crisis of the petroleum products commerce in Benin. After having tried without success to stop such commerce, the State has passed to the extreme during the years 2012 and 2013, putting the contribution in this struggle, soldiers, policemen and other. Then, the sellers of contraband petroleum products are henceforth more distrustful than ever with a big hostility to all kind of investigating about them. Finally, the article carries out an analysis of the behavior of the consumers of the contraband gas, in regard to the evolution of the differentials of price between the informal and formal sectors. Thanks to a threshold model, it was possible to conclude rightly or wrongly, that it exist a price differential between the formal and informal sectors, which is estimated at -45 F from which a customer of c is ready to give up to the benefit of the official sector.

INTRODUCTION

The crisis of the market of the oil products is founded on the apparition and the hardiness of the competition between the informal sellers of fuels in Benin (CSFiB) and the official sector. This competition fundamentally rests on a certain number of factors that acted in its favor and appears by ricochet as reasons of the crisis, whether they are direct or no. One can mention among others:

- The active corruption to the porous border Benin-Nigeria
- The nearly direct enjoyment by the Beninese consumers of the outcomes of the subsidies of oil products at the pump by Nigeria to her citizens;
- The fraudulent imports in Benin of the Nigerian oil products sometimes stolen;
- The prices consequently low and highly competitive practiced by the wholesale and retailing informal sellers along the streets and in the houses;
- The great attraction that the displays of the CSFiBs have on the majority of the Beninese final consumers that are the drivers of trucks, of taxis, of taxi-motorcycle, of motorcycles, of private vehicles, even of administrative vehicles and other official vehicles without forgetting the operators of agricultural machines, generators, and other motors of factories and micro-industries. This situation is due to the fact that the Beninese consumer is daily in search of the possible least expensive sold articles. Sometimes the quality has no importance for them.
- The unbalance constantly growing between the demand of the Beninese consumers and the supply always insufficient of oil products by the official sector;
- The consequent slump followed by the bankruptcy of private stations (which shut their doors and withdrew). The only one parastatal in petroleum product market has not yet closed but is heavily weighed down by this fierce competition from informal sellers and was not well since several decades. It therefore appears that the market of petroleum products is indeed in crisis in Benin since several decades. But what is the justification of the crisis and what are its manifestations? It is important to answer this question by focusing on the causes and manifestations of competition between formal and informal sectors of oil in Benin, the relationship between formal and informal trafficker's sellers of petroleum products and the changing relationship between government and CSFiB along with a

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brief genesis of petroleum in Benin. The aim is to find out solutions to overcome this crisis. In this connection, it seems interesting to ultimately guide this research to the appreciation of consumer behavior in regard to the price differential between the official and informal sectors. It should be interesting to find out the differential of price from which the consumer of informal fuel is willing to give up the informal sector to the profit of the formal sector.

Genesis of the crisis of the oil product market in Benin

Manifestations of the crisis

The official sector of the oil products in Benin and its relationships with the informal sector

Before 1974, companies such as MALKEN, CFAO, SCAO, and FABRE were in activity in Dahomey, currently Benin, (Adjin and Gbénou 2009). These companies had their main offices outside of the country. The supplies were made through the intermediary of an operator named "major du commerce international" (major of international trade). The Beninese oil market was shared between these businesses. Later, other European and American companies such as SHELL, AGIP, TOTAL, MOBIL eye, British Petroleum (B.P), TEXAS Company (TEXACO) entered into theoilmarket to the favor of an economic environment characterized by a big expansion of the sector. These firms practiced quite volatile prices and due to that in 1974 a supply commission regarding the petroleum products has been created[1] in order to deal with the situation (Adjin and Gbenou, 2009). This creation has been accompanied by massive importation of petroleum products with the creation of a parastatal named Société Nationale de Commercialisation des Produits Pétroliers (SONACOP) in 1974.

Therefore, SONACOP had until 1995 the monopoly of trade of petroleum products in Benin (LARES, 2005). However, in 1995, the liberalization of the sector has been decreed (Olihide, 2010). This sector has been thus open to private companies such as Total, Shell, Texaco, and Oryx. Despite the liberalization, the country is far from being covered. Stations-services that are available are insufficient to satisfy consumer demand: there are currently less than 200 stations-services throughout the national territory, whose 80% are in the south (Olihidé, 2010). This imbalance between supply and demand combine with porous borders between Benin and Nigeria promotes the penetration of informal petroleum products. Thus, Beninese consumers now benefit the subsidies on petroleum products from Nigeria, despite the injunctions of IMF (Megbigbodo, 2013). Thus the main obstacle to the flow of petroleum products of the formal sector is s the influence of price on the standard of living of the population. The relative high cost of oil prices at the pump depends fundamentally on the cost of dollar and oil prices in the international market. The consequence is the sales slump that shakes permanently the official sector and creates for the state on average for tax shortfall of more than 24 billion CFA francs (Lares, 2005).

[1]ByDecree No.74-059/MTSME/ CAB Department of Public Works, Mines and Energy

Finally it should be noted other bottlenecks such as inadequate distribution infrastructure and the irregular supply of certain stations that are not likely to dissipate events of this crisis. Nature abhors a vacuum, it is clear that CSFiB take opportunity of the many and vast areas not covered by the official sector. This situation is worsen further with the arrival on the transport market, motorcycle taxis commonly called "zémidjan". The "zémidjan" is deemed to be the most loyal customers of CSFiB. According to Medjibodo (2013), "90% of the total fuel consumption of the economic capital is from the informal market. It contributes directly and indirectly to income for more than one million of Beninese."Statistics from Lares (2005) show that CSFiB make their turnover generating income well above what they would have hoped to win in other activities. The consequence is that they cling and resist the orders of successive governments summoning since more than two decades to stop their illegal activities.

Relationship between government and fuel sellers of contraband

The informal sale of petroleum products has become resistant and despite four decades of struggle of the authorities who have succeeded. Thus, in November 2012, the government will call the army, police and others to strengthen the fight against CSFiB by providing to them necessary logistics. However, this initiative is useless like in the case of Cameroon, Togo and Tunisia. This failure of government fight is justified by several foundations including: the density of branches, financial assets, the strategic nature and influence of some traffickers.

The density of ramifications

The illegal sale of petroleum products involves several countries in the sub-region: include Togo, Benin, Nigeria, Cameroon, Niger, and so on. .....

Financial assets

CSFiB get petroleum products from Nigeria, not only at the pump but also in the bush from the stolen products by traffickers in Nigerian. Despite periodic price increases in Nigeria, the prices charged by CSFiB in Benin remain competitive and promotes their financial enrichment. Thus, this situation favors their resistance to government actions.

The strategic nature and influence of some traffickers

It is noteworthy that among the importers of this product one can found old and new personalities that activate and maintain the large-scale corruption.A year later the authorities intervened this time with more acute by mobilizing all the republican forces, but without success. Thus, l CSFiBs in 2013, tracked continuously with the summons to stop illegal trade develop other strategies based on mistrust and prudence.

The Fuel sellers of contraband in 2013, a very hard-to-reach population

The literature on possible tracks of exits of crises

The literature revolves around three main ideas: reconditioning of adulterated as online exposed on shelves or stored at home in thecans, the tax issue and the idea ofconversion CSFiB.

According Doutetien (2012) and LARES (2005), CSFiB are exposed to serious and even fatal diseases, because of poor packaging of gasoline, diesel and others. There are also their methods of handling such products which confers a dangerous nature to this trade. In fact, these products are stored in cans and bottles kept at home by these sellers. Sometimes transfer operations through communication pipe lead them to suck the fuel gas yet very harmful. There is also the risk of fires that is very high. There have already been highlighted several cases of diseases and fires that resulted in the loss of human lives. Accordingly, Doutetien (2012) rightly suggests that special drums with inexpensive professional pump are used instead of cans and bottles. He also referred to, rightly or wrongly, the possibility of establishing special tax contribution of this sector to reduce the shortfall in terms of tax. However, it is appropriate to ask whether this is not a form of legalization of illegal activity that will have to disappear sooner or later. This is just to find the right strategy.About the issue of conversion, the idea seems to germinate from CSFiB themselves, in response at the beginning of the last quarter of 2013, to the government that asked them to stop this illegal trade. What do actually think about these topics? The answer to this question suggests the implementation of an operational statistical investigation.

Survey failure

Let us recallthat with the pressures that they undergo, pressures assorted of seizures and other shapes of police violence since November 2012, the CSFiBs became very hard-to-reach population. Indeed, they did not accept to be interrogated, or to be recruited in sample in December 2012.The literature reveals that this type of population is a priori without sampling frame since the CSFiBs are not recorded nowhere. Therefore, one cannot constitute them in sample by the means of any method based on a sampling frame. Even the method of investigation-filter of Kalton (2009) that is a sort of strategy of constitution of a precarious frame, didn't work, same situation with the Time Location Sampling (TLS) of Quaglia and Vivier (1995). Indeed, the TLS is an investigation place-moment permitting to identify the individuals to investigate due to a selection of a set of places that they are supposed to frequent in precise moments. The limitation of this method on the CSFiBs is evident since there are not any particular places that they frequent and where one is supposed to find them to investigate them. Even though it was the case, since they are henceforth distrustful, reticent, and hostile to any investigation, even to the statistical investigations that they don't want to make the effort to distinguish from a police investigation, the failure remains obvious.

The sampling method of hard-to-reach population that seems relevant to be used in this case is the RDS (Respondent Driving Sampling) of Heckathorn (1997). Then, it is sufficient to have the confidence of a few first respondents that will recruit others in their samples on their turn. But, it didn't work with the CSFiBs in January 2013. It is therefore essential to bring the necessary change allowing succeeding in investigating this particularly hard-to-reach population. However, it is not at all the goal pursued in this article because as long as the CSFiBs will have customers, it will be difficult to get from them, a renunciation to their illegal activity. How would it be necessary therefore to drive the consumer, faithful customer of the CSFiB to abandon this category of suppliers? From what differential of price, this later is ready to buy at stations-services?The present article aims to find out from what differential of price, the consumer usually buying from CSFiBs is willing to abandon them to the profit of the official sector.

The model of evaluation of price differential

Variables and relevance of the model

This study uses a non linear model of seven variables:
The dependent variable, Y, is the consumption of informal fuel.
The six independent variables are:
The consumption of official fuel, X1
The coverage rate of stations-services, X2
The number of cars in traffic, X3
The number of motorcycles in traffic, X4
The exchange rate CFA F/Naira, X5
The gross margin per liter sold per type of actors, X6
The total number of actors of the system, X7
The differential of price between the formal and informal sectors, DP

Since to equal price in the two sectors, the consumer always prefers the informal sector, it appears obviously, according to the model that there is a negative threshold of the differential (official sector price-informal sector price) from which the consumer "faithful" to the informal sector will finish by abandoning it to the profit of the station-services. Therefore, this negative threshold is symptomatic, because the corresponding price to the station is lower of an amount $\boldsymbol{\lambda}$. In this case the threshold of the differential will write itself -$|\boldsymbol{\lambda}|$.As indicated, a model to change of regimes adapted well here to this situation of non linearity. It is a model in doorstep permitting to have the régimes of informal consumption of gas according to the doorstep of the differential of price between the casual and the formal of gas to Benin.

Specification of the model

The model used is:

$$Y_t=c_0+c_1X1_t+\ c_2X2_t+\ c_3X3_t+\ c_4X4_t+c_5X5_t+c_6X6_t+c_7X7_t+c_8 1|(DP_t)\ +\ \varepsilon_t \text{with} \quad (1)$$

$$\mathbf{1}| = \begin{cases} \mathbf{1}\boldsymbol{siDP_t > \lambda_0} \\ \mathbf{0}\boldsymbol{siDP_t \leq \lambda_0} \end{cases}$$

1| is a dummy variable associated with the threshold $\boldsymbol{\lambda_0}$ indicating changes in consumption pattern (like the model Goldfeld and Quandt precursor). And are identified by two regimes of informal consumption: one where consumers of gasoline are disproportionately in the informal sector regardless of the level of the price differential (between the formal and the informal market gasoline market in Benin), and a second where consumers are more oriented towards more service stations from a price differential $\boldsymbol{\lambda_0}$.Le parameter $\boldsymbol{\lambda_0}$ is the possible threshold price differential (DP), around which the consumer of gasoline rocker regime informal consumption to the stations service. MBDS variable represents the gross margin per liter of a retailer or wholesaler of semi informal

gasoline (in CFA francs). ε_test a normal white noise. The constant model is C. The parameters to be estimated are the coefficients αi, i = 1, ..., 9. Thus, these coefficients measure the effect on informal fuel consumption, respectively explanatory variables according to the price differential between the formal and informal gasoline Benin either above or below the specified threshold.

Data

They are annual and cover the period from March 1996 to March 2014. Thus, 15 annual observations that are relatively insufficient for a good econometric analysis. Due to that the data have been semi-annualized in order to have 36 observations. The algorithm of Goldstein and Kahn (1976) is used to semi-annualized the flow data, while stock data were semi-annualized by the means of the average semestrial sliding between two years. As the variables are not expressed in the same unit, those whose standard deviation exceeds 2 were subjected to logarithmic smoothing. As certain values of "price differential" variable are negative, it has been applied a breakage rate of 1/100.

The model becomes

$ln(Y_t)= c_0+ c_1 ln(X1_t) + c_2 ln(X2_t) + c_3 ln(X3_t)+ c_4 ln(X4_t) + c_5 ln(X5_t) + c_6 ln(X6_t) + c_7 ln(X7_t) + c_8 ln(1|(RDP_t) + \varepsilon_t$ avec (2)

$$\mathbf{1}| = \begin{cases} \mathbf{1} si RDP_t > \boldsymbol{\lambda_1} \\ \mathbf{0} si RDP_t \leq \boldsymbol{\lambda_1} \end{cases}$$

Determination of the threshold

The estimation method used is a threshold model. It allows identifying the existence of a threshold from which the consumer changes consumption regime. It operates according to this method, introduced by Hansen, (2000) a set of simulations from which, the reference equation (2) is estimated for different threshold values. First, the estimation by Ordinary Least Squares (OLS) will be used, for several values of the threshold.The optimal threshold $\hat{\boldsymbol{\lambda}}_i$ is determined from equation (2) estimated for all possible values of the (DP) variable between-36FCFA and 248 FCFA.

Test of non-linearity of the overall model in the optimal threshold value

Here it was tested the conservation of the nonlinearity of the model in the vicinity of the threshold using the approaches of Tsay (1989), Saikkonen and Luukkonnen (1988). The two approaches are firstly that aimed to test the linearity without specific spécificacition of the alternative (Zokoian, 1994) and on the other hand the non-linearity test developed by Tsay (1989) in the case of autoregressive models with a threshold, and that of the linearity test of Saikkonen and Luukkonnen (1988) based on a Lagrange[2] multiplier statistic. The reference assumption to be tested here is the hypothesis of "linearity" (H0). Regarding to the linearity test of Saikkonen and Luukkonnen (1988), three test statistics based on the Likelihood are proposed[3].They are asymptotically equivalent under H0.

Test of significance of the determined threshold

The baseline assumption here is the non significance of the threshold value (H0). In practice, the significance of the threshold of the transition variable defining regimes is directly correlated with the significance of the estimated coefficient of this variable in at least one linear regimes of the global nonlinear model[4]. Thus, the threshold value is more significant when the confidence level of acceptance of the hypothesis of significance of the estimated coefficient of the threshold variable is high. The null hypothesis of "non significance" of the threshold value is rejected if the p-value of the estimated coefficient of the transition variable is greater than the risk of error chosen, and this in at least one regime[5].

RESULTS AND CONCLUSION

The general report is that the crisis will not stop its development as long as the number of services-stations will not be reinforced. It is applicable relevant observation in spite of the effect of the highly competitive prices of the informal sector. According to the previous model, if one designated by PO the official price to which gas is sold in the Beninese stations during one period, then by PI the price to which this product is sold in the informal sector, that is to say gas is less expensive in the informal sector during the same period: the variable of interest is DP= PO – PI.The study shows that the informal sector is susceptible to be abandoned by customers to the profit of the official sector if DP= PO-PI = -45FCFA. Thus, a differential of " -45 F " between the formal and informal sectors brings the consumer to get a stock from the station-services. To be clearer, if the price to the station is for example of 600f, the study reveals that even though it is 644f in the informal sector, the consumer prefers to remain always in the informal even though the product is there more expensive. It is therefore obvious that even to equal price in the two sectors; the consumer seems to prefer the informal. It is only when it is expensive of about 45f in the informal sector that the consumer seems preferring the formal sector, that is to say from the limit delta P≥45 ($DP \geq 45$). A minimal threshold of 45f is sufficient therefore to make topple the consumer's behavior. It is relevant since because of the very insufficient number of stations, the customers who abandon the informal sector should make in majority big efforts before buying from a station. This aspect of official station-services insufficiency weighs heavy so in the balance that there is a ground to wonder what would happen so in the present conditions, all CSFiBs stopped their activities systematically. No solution is therefore foreseeable without the previous of a mobilization of investment fund for the creation of station-services or cooperative of micro-stations. It is the less that one can

[2] This test is the most powerful test of linearity according Zokoian (1994), and its power is even higher with large sample size. It applies to all types of threshold models.

[3] In fact it is the first statistic that is the one of the authors, and is directly based on the likelihood. The other two are approximations there of.

[4] In the case the transition variable is one of the explanatory variables.

[5] Otherwise, it is necessary that the transition variable (threshold variable) is significant in at least one of the regimes.

consider in all research of track of exit of crisis of the Beninese oil market.Thus, besides the genesis of the obstinate crisis that shakes the Beninese oil market, the present article has been dedicated to the analysis of the consumer's behavior in regard to price differential variable between the two sectors, variable that seems to be determining in this crisis. Regarding to the behavior of the fuel sellers of contraband, it was not possible in this article to have necessary elements for an efficient diagnosis. They persistent of course in their activity after a big resistance to the different struggles of the public powers that followed each other, even to struggles reinforced by police pressures in 2012 and 2013. The consequent statute of hard-to-reach population of which they can be qualified in such conditions requires a change of the RDS or perhaps of the TLS for a better technical device of the poll of their opinions on the question of their reconversion. Also, it is necessary to rely on a more specific survey model in order to survey this hard-to-reach population due to reticence and hostility: the SBUC model.

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