“Regulations of noise pollution emitted by revival churches and the well-being of neighboring populations in Cameroon”

AUTHORS	Mathieu Juliot Mpabe Bodjongo https://orcid.org/0000-0002-7212-3910

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Mathieu Juliot Mpabe Bodjongo (Cameroon)

REGULATIONS OF NOISE POLLUTION EMITTED BY REVIVAL CHURCHES AND THE WELL-BEING OF NEIGHBORING POPULATIONS IN CAMEROON

Abstract

The noise pollution is negative externalities having harmful effects on the individual's well-being. This paper examines the effect of noise pollution regulations emitted by revival churches (RC) on surrounding populations' well-being. The analysis focuses on a field survey sample of 726 individuals not belonging to RC and residing in the towns of Yaoundé and Douala, Cameroon. Drawing inspirations from the theoretical and empirical literature, the econometric results obtained with the nested logit model reveal that setting up a control plan against noise pollution produced by RC allows an increase in individuals' well-being not belonging to RC. These surrounding populations are ready to pay USD 0.889 for the "the regulation of church service opening hours," USD 0.831 for "the building of sound-proof places of worship," and USD 0.466 for "the sensitization of RC's officials on the bad effects of the noise pollution they produce." To reduce noise pollution, public authorities must not close the places of worship belonging to RCs.

Keywords religion, well-being, noise pollution, regulation, choice experiment method

JEL Classification C25, D62, H00, R38, Z12

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Mathieu Juliot Mpabe Bodjongo, Ph.D. in Economics, Lecturer, Faculty of Economics and Management, University of Dschang, Cameroon.

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INTRODUCTION

Some twenty years after adopting the law on freedom of association, the market of religion in Cameroon admits imperfections, notably noise pollution (Mpabe, 2015). In some Cameroonian cities, it has been noted that public authorities closed[1] the places of worship most often belonging to Pentecostal RCs (Mpabe, 2015). The closure of these worship places belonging to RCs was motivated by the non-respect of rules enacted by the law of 1990, the absence of legal existence, the interference, and disturbances in families, the imposture of some ministers of worship, complaints of noise nuisance especially nocturnal, etc. (Lasseur, 2010; Mpabe, 2015). Some individuals in Cameroon consider Pentecostals like witches (Batibonak, 2012).

RCs are often equipped with sophisticated sound system equipment to pace songs' rhythm in praise or worship (Mpabe & Abba, 2018). The noise emanating from this sound equipment mixed with shouts of joy and whining produce noise nuisances are likely to bring inconvenience for these surrounding populations. One should add nocturnal services (for instance, night prayers), which also generates noise pollution likely to negatively impact health, academic success, and incomes (Mweze, 2002; Cihunda, 2008). In Cameroon, the immediate house-

1 A definite closure can only be made under the competent authority of the Ministry of Territorial Administration and Decentralization.

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hold environment is not sufficiently cleansed since a much important proportion of households, that is to say, 42.4%, are victims of noise pollution (National Institute of Statistics, 2014). The concern for the health of the poor is an essential aspect of development problems. As concerns health, the 2017 HDI[2] ranking reveals that Cameroon is ranked 230th with a life expectancy of 55.02 years. Notwithstanding its decline, the poverty rate is still high in Cameroon (39.9% in 2007 and 37.5% in 2014). A church may believe that it has the right to make noises regardless of the tranquility of local populations. Practical problems with externalities arise because economic agents' property rights are poorly defined (Hal Varian, 2015). According to Roman (2015), "justice issues too often emerge into environmental debates without being addressed, and economists are increasingly aware of this."

1. LITERATURE REVIEW

As producers responsible for the negative effect, RCs have no reason to integrate into its decision (its cost-benefit calculation) to diminish or improve other agents' (surrounding populations) well-being. Given that these church premises' neighboring populations suffer numerous negative externalities, it reduces their well-being (Devoue, 2002; De Rosny, 2004; Mpabe, 2015).

People living near the RCs complain of the noise pollution caused by the latter. To attract faithful, RC pastors perform to each other a harsh sonic competition (Mpabe & Abba, 2018). Night vigil and preaching are multiplied with the most effective sound system, accompanied by music broadcasted by loudspeakers, some of which are directed towards the outside of the church. It is thunderous music that these RCs offer to neighbors and which disturbs their night sleep. Pupils and students are not spared by this music, which prevents them from studying and working from home, just like the patients who are interned in health centers based near the revival churches. Each church wants to be better heard and the most famous of the milieu. Some individuals incessantly denounce these facts to public authorities.

In the case of Cameroon, Mpabe (2015) shows at the end of the pilot survey that the RC members residing close to these RCs are not, for the most part, worried by the noise pollution emitted by it. RC pastors were not conscious of the harmful effects of noise pollution on the surrounding population's well-being. They even intimidate and use threatening words towards the complainants' neighboring populations.

Revival churches are not often installed on state concessions granted by the state. They often occupy buildings with sound systems in residential neighborhoods, with considerate effects on the local populations' tranquility, given that the sound space is sufficiently invested with shouting, wailing, songs of praise, prayers, and preaching. In Cameroon (Batibonak, 2012), as in many other countries, notably the Democratic Republic of Congo (Dorrier & Ziavoula, 2005), Rwanda (Gatanazi, 2018), Togo (Ayetan, 2019), and France (Koussens & Dejean, 2013; Métout, 2017), revival churches are often closed for non-compliance with the regulations governing noise pollution. The constitution in these different countries recognizes freedom of religion and worship. However, this is regulated by laws that determine the conditions of exercise and the limits, notably in matters of public tranquility.

For the specific case of Cameroon, Decree No. 2011/2583/PM of 23 August 2011 prohibits noisy activities that are likely to disturb the neighborhood beyond the limit values set by the noise pollution standards and authorizes public authorities to take measures to temporarily or permanently close the polluting establishment in order to put an end to noise pollution. Even when they can have the desire to apply this regulation and respect the noise limit range fixed by the structure in charge of standard and quality in Cameroon, revival churches will not control the volume of the noise nuisances they broadcast during religious services. Besides, households are not always equipped with a sound level meter to assess the volume of noise emitted by nearby revival churches.

The closure of revival churches due to noise nuisance can be detrimental to their faith since reli-

2 HDI: Human Development Index

gion plays an important role in people's well-being (Mpabe & Abba, 2018). It can also induce social conflicts, especially when religious groups feel discriminated against by public authorities' decisions (Koussens & Dejean, 2013; Lasseur, 2016). Kessous and Dejean (2013) reveal that the RCs in Quebec are often discriminated against for obtaining the certificate of occupation, which provides for administrative recognition of the place of worship.

However, without calling into question the principle of secularism, think that it is time for public authorities to implement regulatory instruments to the market of religion. When a negative external effect accompanies an activity, it must be scrapped because collective well-being happens to be reduced. Protest movements have often been organized by population victims of noise pollution (Dobruszkes, 2008). The fact that the market does not consider these externalities justifies the state's action which can internalize these external effects using three instruments (Depret & Hamdouch, 2009; Bontems & Rotillon, 2013; Combes, Combes-Motel, & Schwartz, 2016; Bougon & Lavergne, 2019): economic instruments (tax, subvention, tradable permits) and the institutional instruments (casting standards or quotas, regulations, information and sensitization campaigns). Some of these instruments are more or less restrictive or incentive. The state must endeavor to remedy the imbalance caused by externalities and market instability, which are rarely a spontaneous creation and can hardly function effectively outside a legal and regulatory framework, which guarantees the protection of ownership rights and compliance with contracts (Bozio & Grenet, 2017).

Lasseur (2010) acknowledges that secularism is luck for conquering religious associations, but it also seems important for public powers to "prevent the excesses" upon which are exposed to the most vulnerable populations. This regulation, which must be conducted by the public authorities, in case of market failures, is often questioned by the proponents of the School of Public Choice. The latter blames the public authorities for acts of corruption, the lack of financial or material means, and the lack of information (Laffont, 2003; Lévêque, 1998). Furthermore, on the legal plan, contrary to the advocates of "radical secularism" (Hervieu-Leger, 2001), the partisans of "moderate secularism" (Momo, 1999) consider secularism as a doctrine that regards religions and church services as a phenomenon foreign to the state. Public authorities must not intervene in the market of religion as long as public order is not disrupted. Momo (1999) supports the fact that the state must "intervene or plan its interventions in religious affairs to safeguard and maintain public order. It must ensure individual and public liberties for all citizens while preserving public order and general interest".

This study examines how individuals residing in urban areas in Cameroon value the setting up of regulation aimed at reducing noise pollution produced by RC. It contributes to economics literature on several aspects. Firstly, to the best of our knowledge, it is the first study in economics that tackles the problem of noise pollution from RCs. Some economic studies looked into noise pollution in Western countries, mostly in the transports' domain (Faburel & Luchini, 2000; Schade, 2003; Bureau, 2005; Lijesen, Van der Straaten, Dekkers, & Van Elk, 2010; Püschel & Evangelinos, 2012). No extension has been done for the moment in the religious sphere. Secondly, it proposes solutions to public authorities from the perspective of reducing noise pollution emitted by RC. This noise pollution from RCs induces expenses for the surrounding non-member persons. The latter currently supports the total cost since they are not charged to those responsible, that is RCs. The evaluation of these costs is useful because it can contribute to political arbitrations and public decisions (in particular the application of the polluter-pays regulation principle) to reduce social inequalities and increase the population's well-being (Faburel & Luchini, 2000).

2. AIMS

The aim of the current study is twofold: (i) to demonstrate that, the closure of places of worship by public authorities is not an optimal solution to the negative externalities problems caused by revival churches and (ii) to propose other effective instruments in view of reducing noise pollution emitted by revival churches in Cameroon.

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3. METHOD

The author chooses the experiment choice method to attain the objective. Lusk and Schroeder (2004) and Alfnes, Guttormsen, Steine, and Kolstad (2007) used the choice experiment method. Also, compared to other experimental methods, the choice experiments method has the advantage (Lusk & Schroeder, 2004): (1) of being used on goods and services which do not exist or which are not sellable in the market and (2) of gathering more data for more comprehensive statistical analysis because of their relatively lower costs.

3.1. Identification of relevant attributes

In light of literature (Dorier-Aprill & Ziavoula, 2005), dozens of instruments for noise pollution regulation were initially selected. Among these noise pollution regulation instruments, there were the economic instruments of regulation, such as taxes. Subsequently, a pilot survey was first conducted toward 80 individuals residing within a radius of 300 meters from the worship places belonging to RCs, and over 20 pastors from RCs in Douala and Yaoundé. It is at the end of this pilot investigation that three noise pollution regulation instruments were selected:

1) regulation fixing worship hours between 6 a.m. to 8 p.m. (yes or no);

2) construction of sound-proof church areas (yes or no);

3) regular sensitization of RC officials as to the effects of noise pollution (yes or no).

The three retained noise pollution control instruments are the regulatory ones (standard). They were preferred at the expense of economic instruments (especially tax) to reduce noise pollution. This choice is not based on comparing these instruments in terms of economic and environmental efficiency, but on the conditions of their acceptability. Chiroleu-Assouline (2007) acknowledges that "the argument of efficiency is not always sufficient to oblige the use of an instrument wherein the acceptability considerations prevail."

To these three regulatory instruments, the cost of the regulation device against noise pollution has been added. In total, then, when looking at the table 1, the control device against noise pollution comprises of four attributes. These attributes meet the criteria defined by Liquet (2001). By way of illustration, they can be operationalized by the public authorities.

Table 1. Description of noise pollution regulatory instruments

Source: Author.

Attributes or regulatory device instruments against noise pollution	Definition	Level of attributes
The regulation fixing church service hours between 6 a.m. and 8 p.m.	This regulation will reduce the volume of nocturnal noise emitted by RCs	Yes No
The construction of sound-proof worship places	The construction of sound-proof church buildings means that every church place belonging to RCs must be sound-proof. As a reminder, some night clubs located in Douala and Yaoundé are sound-proof in keeping with the regulation in force	Yes No
The sensitization of RC pastors on noise pollution	Public authorities should regularly sensitize pastors and other officials of RCs about the effects of noise pollution they emit on the well-being of the surrounding populations	Yes No
The daily cost of the regulatory device against noise pollution spread by RCs	The daily cost of the noise control device emitted by RC	USD 1 USD 2

3.2. Construction of profiles and progress of experimental sessions

The experimental protocol is organized around a discrete choice exercise based on the complete profiles' method, which consists of presenting each respondent with a complete set of attribute combinations. Before asking the respondents about their preferences, the different scenarios and profile selection procedures were explained in detail. Given that four attributes, each with two modalities, were selected, 16 profiles were established (i.e., 2^4). The table 2 below show an example of choice profile card.

Joint analysis and contingent evaluation are often confronted with a hypothetical bias that occurs when, during a questionnaire survey, the respondent does not take into account all the constraints that would weigh on his choice in a real situation, particularly the available budget, financial penalties in case of the wrong choice, and the availability of the product. The experiment was conducted in Cameroon, a developing country with a 37.5% monetary poverty rate at the survey time. To overcome this hypothetical bias, it was assumed during each experiment that the respondent receives from the investigating officer's the sum of FCFA 2,000 (USD 4) to pay a regulatory system aimed at reducing noise pollution. The idea is to know if the respondent receives this amount daily and how much he is ready to allocate daily to protect himself from the noise nuisances emitted by the surrounding RCs.

Table 2. Example of choice of profile card

Source: Author.

Scenario			
Attributes or instruments of the control device of noise pollution	**Alternatives**		
	Service A	**Service B**	**Option C**
Regulation fixing church worship hours between 6 a.m. and 8 p.m.	Yes	No	I prefer none of the two services (A and B)
Construction of sound-proof places of worship	Yes	No	
Regular sensitization of RC officials on the harmful effects of noise pollution	Yes	Yes	
Individual cost of the regulation device against noise pollution	USD 1	USD 2	
Tick the regulation device that you prefer			

In this study, unlike a good number of studies[3] conducted in developed countries and on consumer's choice preferences, the experiences are not carried out in experimental laboratories equipped with computers. Budgetary constraints and the sample size of the study did not permit laboratory experiences. To circumvent this pitfall, the individuals surveyed were subjected, during face-to-face interviews, to question sheets comprising cards of profiles' choices like in computers.

3.3. Data collection

In the absence of detailed information in ECAM3 (National Institute of Statistics, 2007) and BUCREP (2010), the study uses data from the survey conducted by Mpabe (2015) with the assistance of the "Centre de Recherche en Economies et Gestion" (CEREG) of the University of Yaoundé 2 between September and December 2012 in all the councils of the cities of Yaoundé and Douala that are two big Cameroonian cities in terms of population size. The head office of 26 out of 47 religious associations authorized by MINATD is found therein.

This survey is a targeted survey that was performed on persons living within 300 m from RCs. 726 individuals were extracted from this database who were not members of the RCs and lived near their worship places.

The choice of the investigation unit is justified by the fact that at the end of the pilot survey carried out by Mpabe (2015), the RC members residing close to these RCs are not, for the most part, worried by the noise pollution emitted by it. The choice of the distance between the residence of the surveyed person and RC emanates from the pilot investigation.

3.4. The econometric model specification

The nested logit model, which will serve as an operational framework for the econometric estimations, is often used when some modalities are similar to others concerning other unobserved factors. The modalities are regrouped under subgroups, in such a manner that the independence hypothesis of irrelevant states (IIA) is valid within each group. If a modality is eliminated, the probabilities of other modalities must increase.

This model is represented by a decision tree where each branch constitutes a subset of modalities within which hypothesis IIA is respected (Mc Fadden, 1974). This model has been applied in several areas of economics, especially environmental economics (Michaud, 2010, 2013; De Blaeij, Nunes,

3 Michaud (2010)

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& Van Den Bergh, 2007), health economics (Ryan & Skätun, 2004) and economics of transport (Hensher & Greene, 2002).

The decision of choice is made at several levels. The decisions' first level concerns the choice between "preferring a noise pollution regulation service" and "preferring nothing." The second level of decisions concerns the choice between service A and service B when the decision to prefer a regulation service has previously been made.

The utility of individuals is a function of the characteristics of alternatives j and individual i. The utility function U_{ij} is constituted of a deterministic part V_j and a random part ε_{ij}:

$$U_{ij} = V_{ij} + \varepsilon_{ij}. \quad (1)$$

The determinist part of utility can be written as a linear function of the regulation device's characteristics against noise pollution and individual characteristics; and can be specified as follows:

$$\begin{aligned} V_{ij} &= \alpha_0 + \beta_1 RHC_{ij} + \beta_2 CMI_{ij} + \beta_3 SENS + \\ &+ \beta_4 COUT_{ij} + \alpha_1 GENDER_{ij} + \alpha_2 REV_{ij} + \\ &+ \alpha_3 AGE_{ij} + \alpha_4 IDR_{ij} + \alpha_5 LAIC_{ij} + \\ &+ \alpha_6 EDS_{ij} + \alpha_7 SM_{ij}, \end{aligned} \quad (2)$$

where (service A or service B) and $U_j = 0$ with $j = 0$), α and β are the econometrical model's estimated coefficients.

RHC, CMI, SENS, and *COUT* are the attributes of noise pollution control device:

1) *RHC* is the variable which captures the regulation setting the hours of worship between 6 a.m. and 8 p.m.;

2) *CMI* represents the variable which captures the construction of sound-proof church areas;

3) *SENS* is the variable that captures RC officials' regular sensitization on the harmful effects of noise pollution;

4) *COUT* represents the cost of the noise pollution control system.

Variables that represent the inquired persons' characteristics are *IDR, REV, LAIC, AGE, EDS, SM*, and *GENDER*.

IDR is the qualitative variable that captures the religious participation degree of the respondent individual. It admits two modalities: 0 = weak religious participation; 1 = high religious participation. It entails an index constituted of 8 indicators of religious participation, calculated by Mpabe (2015) from the multiple component analysis methods:

1) belief in a God;

2) the importance of a God in life;

3) the belief in life after death;

4) belief in paradise;

5) frequency of prayer;

6) frequency of financial or material contribution within the religious community;

7) frequency of physical presence in religious services; and

8) frequency of religious reading.

REV is a qualitative variable that captures the monetary well-being of the respondent. It is assumed that the income quartile measures this variable. Consequently, it admits 4 modalities: 0 = quartile of order 1, 1 = quartile of order 2; 2 = quartile of order 2; 3 = quartile of order 4.

LAIC is a qualitative variable that allows appreciating the exact knowledge level of secularity by the respondent. It admits two modalities: 0 if the individual does not exactly know the notion of secularity and 1 on the contrary case.

AGE is a quantitative variable that measures the individual's age. The age of individuals in the database is between 20 and 60 years old.

GENDER is a dichotomous variable that enables to assess the gender of the respondent. It admits the modalities: 0 if the individual is male and 1 if they are female.

EDS is a qualitative variable that permits to capture the respondent's health status. It admits two modalities: 0 if the individual is not in good health and 1 otherwise.

SM is a binary variable that enables one to appreciate the respondent's matrimonial situation. It admits as modalities: 0 if the individual is not married and 1 if they are married.

After computing the coefficients of the regulation device attributes against noise pollution, the marginal rate of substitution between three instruments (main attributes) is a ratio between their estimated coefficients. According to Louviere, Hensher, and Swait (2000), the ratio between the coefficient of each "main attribute" of the control device against noise pollution and the coefficient "regulation device cost against noise pollution" can be considered as the marginal willingness to pay this attribute:

1) the marginal willingness to pay for *RHC* noted $WTP_{RHC} = \beta_1 / \beta_4$;

2) the marginal willingness to pay for *CMI* noted $WTP_{CMI} = \beta_2 / \beta_4$;

3) the marginal willingness to pay for *SENS* noted $WTP_{SENS} = \beta_3 / \beta_4$.

4. RESULTS

Each individual who took part in the experimental sessions in the field was subjected to 11 scenarios or decisions about the regulation device choice to reduce noise pollution emitted by RCs. In each scenario, they must choose a service among the three services offered to them. In the end, for econometric estimations needs, only one scenario will be retained. Hence, a total of 2,178 observations (726·3) were obtained. The option "prefers a regulation device aimed at reducing noise pollution emitted by RC" was retained 645 times (88.84% of situations of choice). This relatively high percentage indicates that setting up a regulation device to reduce RCs noise pollution seems to be important for individuals not part of NMR. This regulation device can reduce some illnesses, such as sleep disorders.

On the contrary, the option "not preferring any regulation device aiming to reduce RCs noise pollution" was retained 81 times (11.16% of choice situations).

The observation rate of the econometric model variables is 100%. Besides, nearly 80.51% of individuals consider it useful to put a regulation system against noise pollution emitted by RCs. Concerning the instruments of this system, individuals are in favor of:

Table 3. Specified tree structure of the nested logit model: case of noise pollution regulation

Source: Author, from Stata 11.0.

Option	Number of observations	Service	Number of observations	Number of the alternative or service choices
Prefers noise pollution regulation setup	1452	A	726	467
		B	726	178
Prefers no noise pollution regulation setup	726	C	726	81

Table 4. Elements of descriptive statistics

Source: Author, from Stata 15.

Variables	Mean	Standard deviation	Minimum	Maximum
Choice	0.333	0.471	0	1
Gender	0.492	0.500	0	1
Age of the individual	31.161	8.448	20	60
Matrimonial situation	0.626	0.483	0	1
Health status	0.909	0.287	0	1
Level of religiosity	0.720	0.448	0	1
Monetary well-being	1.647	1.141	0	3
Exact knowledge on secularism	0.344	0.475	0	1
Regulation on worship hours	0.440	0.496	0	1
Construction of sound-proof walls	0.448	0.497	0	1
Regular sensitization of RC promoters	0.444	0.497	0	1
Cost	1	0.816	0	2

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1) the regulation of church hours of worship (48.06%);

2) the construction of sound-proof worship places (49%); and

3) the sensitization of RC officials (50.73%).

It is noticed that people of low religious participation find relatively more useful in the implementation of a control device aimed at reducing noise pollution emitted by RCs than high religious participation persons. 84.22% (79.07% respectively) of people are favorable to this device, knowing that they have a low level (high respectively) of religious participation.

Concerning men, women value more the setting up of a control device aiming to reduce RCs noise pollution. In effect, 82.38% of women (78.69% of men respectively) consider it important to set up this device. Moreover, compared to individuals who do not have good knowledge, people with a good knowledge of the concept of secularism find it equally useful to implement the regulatory system aimed at reducing the noise pollution emitted by RCs.

Youths seem relatively more interested in setting up a regulatory system to reduce the noise pollution emitted by RCs. 81.20% of young people (78.38% of elderly people respectively) favor setting up such a device.

The monetarily non-poor give relatively more interest to establishing a regulatory system aimed at reducing the noise pollution emitted by RCs. Indeed, 81.38% of people who are not monetarily poor (77.24% of monetarily poor people respectively) value a device of this nature.

The nested logit model used here is specified correctly since it appears that the likelihood ratio test establishes that the model is globally significant. The upper half of the table showing the econometric results presents the marginal utilities of the regulation device's attributes aimed at reducing noise pollution emitted by RCs.

Table 5. Results of the estimation of the nested logit model

Source: Author.

Choice	Model 1		Model 2		Model 3		Model 4		Model 5	
	Coef.	Std. err.	Coef.	Std. err	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Services (attributes of services)										
Regulation of worship hours (Ref: No)	0.824*	0.485	0.692*	0.421	0.639*	0.389	0.615*	0.375	0.606*	0.369
Construction of sound-proof walls (Ref: No)	0.770**	0.393	0.643*	0.357	0.593*	0.351	0.568*	0.342	0.561*	0.335
Sensitization of RC pastors on the harmful effect of noise pollution (Ref: No)	0.432**	0.203	0.322**	0.144	0.296**	0.136	0.271**	0.113	0.268***	0.092
Cost	0.927***	0.356	0.704**	0.218	0.648***	0.210	0.598***	0.143	0.590***	0.065
Equation type										
Religiosity level (Ref: low level of religious participation)	–0.235	0.278	–0.232	0.278	–0.229	0.278	–0.234	0.278	–	–
Monetary well-being (Ref: quartile of order 1)	–	–	–	–	–	–	–	–	–	–
quartile of order 2	0.127	0.338	0.110	0.337	0.120	0.337	0.129	0.336	–	–
quartile of order 3	0.273*	0.165	0.245*	0.147	0.275*	0.166	0.272*	0.164	–	–
quartile of order 4	0.211*	0.127	0.163*	0.099	0.251*	0.152	0.251*	0.152	–	–
Exact knowledge of secularism (Ref: Not exactly knowing)	–0.163*	0.098	–0.164*	0.098	–0.164*	0.098	–0.162*	0.096	–	–
Gender (Ref: masculine)	0.072	0.238	0.091	0.237	0.087	0.236	0.093	0.235	–	–
Health status (Ref: not fine)	–0.114*	0.069	–0.073*	0.044	–0.135*	0.081	–	–	–	–
Matrimonial situation (Ref: not married)	–0.392	0.308	–0.254	0.253	–	–	–	–	–	–
Age	–0.014	0.017	–	–	–	–	–	–	–	–
Parameters of dissimilarity										
Preferring a control apparatus against noise pollution – tau	–0.678	0.784	–0.640	0.776	–0.593	0.769	–0.594	0.772	–0.585	0.761
LR test for IIA (tau = 1):	chi2(1) = 3.94**		chi2(1) = 3.76*		chi2(1) = 3.53*		chi2(1) = 3.51*		chi2(1) = 3.53*	

Note: ***, ** and * correspond to the significance at the threshold of 1%, 5%, and 10%.

Table 6. Willingness to pay

Source: Author.

	Results	WTP (USD)	WTP (CFA)	Share of WTP	Min	Max	Standard error
Model 1	Regulation fixing the hours of worship between 6 a.m. and 8 p.m.	–0.889	–444.5	–22.225	–1.783	0.005	0.456**
	Construction of sound-proof walls	–0.831	–415.5	–20.775	–1.516	–0.146	0.349**
	Sensitization of RC pastor on the harmful effect of noise pollution	–0.466	–233	–11.65	–0.685	–0.247	0.111***
Model 2	Regulation fixing the hours of worship between 6 a.m. and 8 p.m.	–0.982	–491	–24.55	–2.132	0.166	0.586*
	Construction of sound-proof walls	–0.912	–456	–22.8	–1.792	–0.032	0.448**
	Sensitization of RC pastor on the harmful effect of noise pollution	0.458	229	11.45	–0.73	–0.185	0.139***
Model 3	Regulation fixing the hours of worship between 6 a.m. and 8 p.m.	–0.986	–493	24.65%	–2.235	0.262	0.636
	Construction of sound-proof walls	–0.915	–457.5	22.87%	–1.868	0.037	0.485*
	Sensitization of RC pastor on the harmful effect of noise pollution	–0.457	–228.5	11.42%	–0.733	–0.181	0.140***
Model 4	Regulation fixing the hours of worship between 6 a.m. and 8 p.m.	–1.028	–514	25.7%	–2.364	0.306	0.681
	Construction of sound-proof walls	–0.949	–474.5	23.72%	–1.959	0.06	0.515*
	Sensitization of RC pastor on the harmful effect of noise pollution	–0.454	–227	11.35%	–0.753	–0.155	0.152***
Model 5	Regulation fixing the hours of worship between 6 a.m. and 8 p.m.	–1.026	–513	25.65%	–2.331	0.279	0.665
	Construction of sound-proof walls	–0.95	–475	23.75%	–1.946	0.045	0.507*
	Sensitization of RC pastor on the harmful effect of noise pollution	–0.454	–227	11.35%	–0.751	–0.156	0.151***

Note: ***, ** and * correspond to the significance at the threshold of 1%, 5%, and 10%.

Hence, looking at the results of model 1 of Table 6, the marginal willingness to pay for the attribute "regulation of worship hours" is about USD 0.889 or FCFA 444.5. This shows that the implicit price for a regulation device having these attributes is FCFA 444.5 higher than the control device that does not possess it.

The marginal willingness to pay for the attribute "construction of sound-proof worship houses" is about USD 0.831 or FCFA 415.5. This result reveals that the willingness to pay for a regulation device having this attribute is FCFA 415.5 higher than that of the control device not possessing it.

The marginal willingness to pay for the attribute "regular sensitization of RC officials on the harmful effects of noise pollution" amounts to USD 0.466, worth FCFA 233. This result indicates that the willingness to pay for a control device having this attribute is FCFA 233 higher than that of the regulation device not possessing it.

5. DISCUSSION

The lower part of Table 5 gives the dissimilarity parameter value and the result of the hypothesis IIA test. With a 10% significant coefficient, the hypothesis IIA is rejected. The rejection of this hypothesis implies that it is preferable to use a nested logit model rather than a conditional logit model or a multinomial logit model (Heiss, 2002; Hensher, Rose, & Greene, 2005). Moreover, it is noticed that the dissimilarity parameter is less than 1.

The dissimilarity parameter in econometric analysis takes a dual interest. According to Daly and Zachary (1979), on the one hand, the dissimilarity parameter shows an inversely related relationship to the variances of indirect utility differences. It provides a basis for identifying the relationship between the alternatives at a different nestled level. On the other hand, it permits noticing the compatibility of the nested logit with the utility maximization principle. According to Daly and Zachary (1979) and Mc Fadden (1981), the decision tree structure is judged compatible with the utility maximization principle only when the coefficients of the dissimilarity parameter are between 0 and 1.

The estimated coefficients are significant for 4 attributes of the regulatory device to reduce noise pollution emitted by RCs. Therefore, "worship hour's regulation," "the construction of sound-proof places of worship," "regular sensitization of RC officials on noise pollution harmful effect," and "the cost of the regulatory device aiming at the reduction of RCs noise pollution" significantly influence individual's choices. The victims of noise pollution did not choose to close down revival churches for several reasons:

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1) economic issue (presence of RCs increases sales in local shops);

2) cultural issue (RCs do not foster communitarianism, but allows individuals from various origins to meet and exchange; and

3) social issue.

Otherwise, in the past, Cameroon's public authorities had taken the initiative to close these incriminated places of worship, but this was unsuccessful. There is, therefore, an administrative tolerance on this subject that can be explained by the proximity between the promoters of RCs and public authorities (Mpabe & Abba, 2018) to the detriment of compliance with Decree No. 2011/2583/PM of 23 August 2011 laying down rules for noise and odor nuisances. This legal text only provides a limit value expressed in decibels by the organ in charge of standardization and quality. Residents, pastors of revival churches, and the police do not know this threshold value and do not possess sound level meters to measure the level of noise emitted by revival churches (Mpabe, 2015).

The attribute "regulation of worship hours" coefficient is positive and significant at the 10% threshold level. This means that residents would find it appropriate to regulate worship hours to reduce noise pollution. A regulation fixing worship hours between 6 a.m. and 8 p.m. can certainly only reduce the noise pollution emitted by RCs partially. However, such a measure is likely to abolish "nights' deliverance prayer."

The coefficient of the attribute "construction of sound-proof places of worship" is positive and significant at a 10% threshold level. Therefore, residents would appreciate the construction of sound-proof places of worship by RCs to reduce noise pollution. The construction of sound-proof places of worship is an instrument that requires RC officials to build temples that prevent the spread of noises made during worship in the neighborhood. The strict application of this measure imposes on RCs an additional cost. Consequently, they behave like companies today (Mpabe, 2015; Stolz & Usunier, 2018; Rinallo & Alemany, 2019). Such a measure had been successfully imposed on nightclubs in Cameroon.

Moreover, individuals positively value the regular sensitization of RCs managers on the harmful effects of noise pollution. This awareness-raising option could gradually reduce noise pollution. The attribute's coefficient "regular sensitization of RCs administrators on the harmful effects of noise pollution" is significant at a 5% threshold level. In France, for example, under the government of Lionel Jospin in 2002, it was decided to strengthen dialogue between the Government and religious denominations by establishing a framework for consultation and exchanges to solve the problems that could tense relations between these two institutions.

The positive sign of the attribute's coefficient "cost of the regulating system" indicates that the probability of preferring a regulatory device aimed at reducing noise pollution emitted by RCs increases with its cost. This regulatory device can then be considered as a "Giffen good." This is because there is currently no substitute service. Besides, it is noted that people who have a high income favor the implementation of a device to reduce the noise pollution emitted by RCs.

The state of health of the individual (EDS) and his level of religious participation (IDR) significantly influence the choice of regulation of noise pollution. This device seems important for unhealthy people, but this is not the case for people who have a high level of religiosity. People of high religiosity believe that the Bible in the book of Psalms, notably in chapter 150, orders faithful Christians to worship the Lord with trumpets and lute, tambourine, dances, string instruments, blowpipe, resounding cymbals. This praise must be done according to them every time and everywhere.

However, other variables like the individual's gender (*GENDER*), individual's age (*AGE*), individual's knowledge of secularism (*LAIC*), and his matrimonial situation (*SM*) are insignificant.

Table 6 shows that each instrument's willingness to pay varies according to the estimated econometric models (Models 1 to 5). These variations in the willingness to pay for each instrument are not high. These values reflect the average gains, in monetary value, of an individual not belonging to RCs concerning implementing a regulatory de-

vice against noise pollution emitted by RC. When looking at the values of WTP share compared to USD 4 allocated, it means that implementing a regulation device against noise pollution is important enough for individuals not belonging to RCs. These values of the willingness to pay share could not exceed 26%. This result can find an explanation in the underdevelopment context in which Cameroon is found. Indeed, Cameroon's monetary poverty rate still seems relatively high (National Institute of Statistics, 2007).

CONCLUSION

This study proposes to carry out economic analysis on the influence of noise pollution regulations emitted by RCs on surrounding populations' well-being in Cameroon's urban areas. To achieve this goal, the adopted approach was made in three steps.

In the first step, the author highlighted the debate on the choice of environmental regulation instruments. In the second step, a formal framework to model the choice of preferences of noise pollution regulatory devices emitted by RCs was elaborated. In the third step, the estimation of the nested logit model in section three of this paper reveals that the regulation on the hours of worship of RCs, the sensitization of RC officials on the harmful effects of the noise pollution they emit and the construction of sound-proof worship areas significantly favor the reduction of noise pollution and consequently the improvement of surrounding populations' well-being.

These results show that closing the place of worship belonging to Pentecostal RCs is not an optimal solution for reducing noise pollution. Public authorities can revise Decree No. 2011/2583/PM of 23 August 2011 regulating noise and olfactory nuisances in Cameroon by adding provisions relating to:

1) the regulation of worship hours;

2) the sound-proofing of places of worship; and

3) creating a regular framework for concerted action and exchanges between the state and revival churches to sensitize their leaders on the harmful effects of noise pollution.

Otherwise, these results could be improved in future research if they take into account certain factors:

1) dwellings characteristics of the neighboring populations;

2) the distance between their residences and the nearest RC.

Subsequent research works could focus on the willingness to receive RC members for setting up regulations against noise pollution they emit. Furthermore, a comparative analysis of noise pollution effects emitted by off-licenses, mosques, and RC could be interesting.

AUTHOR CONTRIBUTIONS

Conceptualization: Mathieu Juliot Mpabe Bodjongo.
Data curation: Mathieu Juliot Mpabe Bodjongo.
Formal analysis: Mathieu Juliot Mpabe Bodjongo.
Funding acquisition: Mathieu Juliot Mpabe Bodjongo.
Investigation: Mathieu Juliot Mpabe Bodjongo.
Methodology: Mathieu Juliot Mpabe Bodjongo.

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Project administration: Mathieu Juliot Mpabe Bodjongo.
Resources: Mathieu Juliot Mpabe Bodjongo.
Software: Mathieu Juliot Mpabe Bodjongo.
Supervision: Mathieu Juliot Mpabe Bodjongo.
Validation: Mathieu Juliot Mpabe Bodjongo.
Visualization: Mathieu Juliot Mpabe Bodjongo.
Writing – original draft: Mathieu Juliot Mpabe Bodjongo.
Writing – review & editing: Mathieu Juliot Mpabe Bodjongo.

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