CANON TRANSFERS IN THE ECONOMIC GROWTH OF THE DEPARTMENT OF HUANCAVELICA: PERIOD 2002-2019[232]

TRANSFERENCIAS DEL CANON EN EL CRECIMIENTO ECONÓMICO DEL DEPARTAMENTO DE HUANCAVELICA: PERÍODO 2002-2019

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22.CANON TRANSFERS IN THE ECONOMIC GROWTH OF THE DEPARTMENT OF HUANCAVELICA: PERIOD 2002-2019[239]

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RESUMEN

El objetivo del presente trabajo de investigación fue determinar la influencia de las transferencias por canon sobre el crecimiento económico del departamento de Huancavelica, cuyo periodo es 2002-2019, en este sentido, consideramos tomar como principal referencia la teoría de crecimiento económico basándonos en el modelo de Barro, el mencionado modelo nos permitió describir la realidad problemática aplicable al departamento de Huancavelica. La investigación se orientó al tipo aplicada y de nivel explicativo, ya que mediante ellos es posible analizar la causalidad entre la variable exógena sobre la endógena. La base de datos utilizada comprende desde el año 2002 al 2019 medidos de forma trimestral; asimismo, se tomaron fuentes secundarias para recabar los datos y para ello, se hizo uso de medios electrónicos como el internet y las unidades extraíbles, para el procesamiento y análisis de datos se utilizaron los softwares Microsoft Excel y R-studio; de igual forma, para la comprobación de la hipótesis planteada se hizo uso del modelo VAR y la Causalidad de Granger. Luego de haber estimado el modelo VAR, se determinó que las transferencias por canon– R (4) (hidro energético), R (2) y R (3) (minero); influyeron directamente en el crecimiento económico de la región Huancavelica durante el periodo 2002 al 2019; sin embargo, mediante la Causalidad de Granger no se evidencia la misma relación en el largo plazo.

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ABSTRACT

The objective of this research work was to determine the influence of canon transfers on the economic growth of the department of Huancavelica, whose period is 2002-2019, in this sense, we consider taking as the main reference the theory of economic growth based on the model de Barro, the aforementioned model allowed us to describe the problematic reality applicable to the department of Huancavelica. The research was oriented to the applied type and explanatory level, since through them it is possible to analyze the causality between the exogenous variable over the endogenous one. The database used comprises from 2002 to 2019 measured quarterly; Likewise, secondary sources were taken to collect the data and for this, electronic media such as the Internet and removable drives were used, for data processing and analysis Microsoft Excel and R-studio software were used; In the same way, for the verification of the proposed hypothesis, the VAR model and the Granger Causality were used. After having estimated the VAR model, it was determined that the transfers by canon – R (4) (hydro energy), R (2) and R (3) (mining); they directly influenced the economic growth of the Huancavelica region during the period 2002 to 2019; however, Granger Causality does not show the same relationship in the long term.

PALABRAS CLAVE: canon minero, canon hidroenergético, crecimiento económico, economía, transferencias.

Keywords: mining canon, hydroenergy canon, economic growth, economy, transfers.

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Eidec EDITORIAL

INTRODUCTION

Peru has shown solid and stable growth in the region, essentially due to the exploitation of its natural resources from 2002 to 2012; The mining sector plays a substantial role in the Peruvian trade balance, originating 59% of total exports, which in turn generates employment, higher tax collection, foreign exchange, among others; By 2005, a mining boom began in which income from mining amounted to 12.7% of Peru's total GDP. Although it is true, the transfer of the canon is highly concentrated in a few departments, which contemplate large projects; Regarding the transfers from the mining canon for the year 2019 for the department of Huancavelica, they ranked 16th compared to the other departments such as; Ancash, Arequipa, etc.

In this sense, mining canon transfers are focused on a few departments with large projects, at the same time that it is frequently commented that the spending capacity of local governments that receive canon transfers is not efficient or they misuse resources. this resource. Therefore, the objective of the research was to determine the effect of the transfers that come from the canon on the economic growth of Huancavelica during the period 2002-2019.

Following Sala (2002) it can be stated that economic growth as the ability of citizens to generate things, that is why economic growth is determined by the growth of the Gross Domestic Product (GDP) based on certain elements such as: human capital, physical capital, rules of the game-institutions and technology-knowledge. On the other hand, the theory of economic growth was marked by the Solow model (1956) with a neoclassical approach where it predicts the confluence of income for the countries; Likewise, we based ourselves on the Barro model (1990), which introduces the Solow- Swan growth model of government capacity and its relationship with public spending and its financing through. In this sense, the transfers that come from the canon, under its own rule, must be allocated to investment expenses as provided by the Ministry of Economy and Finance (MEF).

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Likewise, this research is oriented to be of an applied type based on the Barro growth model to explicitly publicize the detailed problem in the approach, in turn the explanatory method was used, since, through this, an analysis was carried out. on the causality between the exogenous variable (canon transfer) over the endogenous one (economic growth of the department of Huancavelica). The population and sample taken is constituted by the economic growth of the department of Huancavelica during the period (2002-2019), referred to and registered in the National Institute of Statistics and Informatics (INEI). The software used for data processing was Microsoft Excel and R- studio, in addition, for the contracting of hypotheses, the VAR (Autoregressive Vector) Models and Granger Causality were used.

Through the information collected and the data analyzed for the temporary space between the period 2002-2019, it was possible to conclude that the investments made by local governments for the transfer of the canon by the central government showed a constant growth during the period 2007-2019, It is observed that the behavior is similar on the part of the regional government of Huancavelica. Likewise, with respect to the transfers received in the region, it is shown that the levels of expenses from the mining canon exceeded six million for 2019, so that through the estimation of the VAR model, the significant relationship of the GDP (rate of growth) with the canon, mining canon and hydroenergy canon. Therefore, contrasting the proposed hypothesis, it was concluded that the transfers of resources by canon directly influenced the economic growth of the department of Huancavelica.

METHODOLOGY

This research is of an applied type; Due to the fact that the theory is applied to explain the determinants of economic growth, it also allowed us to identify if the canon transfers during the period of analysis influenced the dependent variable. Likewise, it is of an explanatory level because it was intended to determine the causality between the exogenous variable (transfer of the canon) over the endogenous one (economic growth of Huancavelica). Regarding the design, we can say that, following Hernández et al (2010), we took a non-experimental design, due to our observation of the indicators without manipulating them. For its part, the type of design used is that of time series since through this information was collected during the period 2002-2019.

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Population

The population is constituted by the macroeconomic indicators within the existing periods; within them is the economic growth of the Huancavelica region and the mining and hydro energy canon calculated by the INEI and the MEF respectively.

Sample

The sample is determined by the department of Huancavelica and its temporal space analyzed in the study in which the period 2002-2019 has been taken, in which the INEI registers.

Sample Unit

The sample unit is contemplated by the quarterly GDP per capita of the department of Huancavelica.

Data collection techniques and instruments

Technique

The development of this research already existing information was extracted based on processed secondary sources of the INEI. For this research, existing information (secondary sources) was extracted from the data of the INEI (National Institute of Statistics and Informatics) and friendly consultation of the MEF (Ministry of Economy and Finance).

Instrument

For the collection of data, the internet and a removable medium (USB) have been used as instruments; since, the information of the data is available to the general public on the web pages of the entities indicated above. For its part, there is no availability of extensive longitudinal data, since the statistics developed at the regional level have been working on the structure of the database for a few years, in short, it was important to complement the information with other sources such as research results, report, indexed journal publications.

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Data processing and analysis techniques

In order to have statistical data. Data on the study variables were collected; considering the following steps:

1. Collection of data from the web pages of each institution.
2. Failing to find the information, the competent institutions were visited in order to request the information.

The data was processed for the investigation at a quarterly level during the period 2002 - 2019. To process the collected data, the softwares used were: Microsoft Excel 2016 and R-Studio.

RESULTS

For the verification of hypotheses, it was carried out using Autoregressive Vectors (VAR); this type of econometrics, are expressed with simultaneous equations, made up of a set of equations in a reduced way. This type of econometric models is useful when there is simultaneity between groups of variables, where their relationships tend to be determined over a long period. It should be noted that VAR models occur when the error is white noise and efficient and consistent estimators are found.

VAR models are an extension of an AR(p), they allow a better understanding of the relationship that exists between a set of variables, no restrictions are imposed on the model coefficients. In this sense, its specification is more flexible compared to other types of models, very few variables could be genuinely classified as exogenous.

These types of models seek to identify the regularities that are empirical and interactions on the objective of analysis. When there are several series, they must take into account the dependency between them. VAR models are also models that are dynamic of simultaneous equations. To do this, a model is made based on several equations or also called simultaneous equations, but they are lags on all the variables. The key is to identify or classify

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according to their category: exogenous and endogenous, for which there must be some type of restriction on the parameters to be identified.

- **assumptions**

The VAR model assumes a set of statistical assumptions that allow it to be represented as a good approximation to the data generating process.

$$Y_t = A\,Y_{t-1} + U_t$$

Assumptions about the model

- $Ut\ \ N[0, \sum u\ ]$Normal
- $Var(Ut\ ) = \sum u$Constant
- $Cov(Ut\ Ut - i\ ) = 0\ i = 1,2,..$There is no autocorrelation
- Linear and constant parameters in time

- **Functional Equation**

Assuming that there is a relationship between two variables:

$$y_{1t}, y_{2t}$$

$$y_{1t} = a_{11}y_{1t-1} + a_{12}y_{2t-1} + u_{1t}$$
$$y_{2t} = a_{21}y_{1t-1} + a_{22}y_{2t-1} + u_{2t}$$

Matrix representation of the VAR model (1):

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix}$$

$$\mathbf{Y_t = AY_{t-1} + U_t}$$

- **Yt-1** lagged variables one period
- **Yt** Vector of variables considered in the model
- **To** array of parameters
- **ut** vector indicating the error term

- **unit root test**

Dickey Fuller Test (ADF) was used, in order to determine the stationarity of the series.

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Hypothesis testing:

- H_0 (θ =0): The series is non-stationary (there is a unit root in the series).
- H_1 ($\theta \neq 0$): The series is stationary.

Rule:

- |ADF | ≤ | 5% or 10% | H_0 is rejected, the series is stationary.
- |ADF | > | 5% or 10% | H_0 is not rejected, the series is non-stationary.

- **lag test**

To determine the multiequations and to be able to make the estimations, it is necessary to determine the number of lags optimally in the VAR model. When the lags are excessive, there is the possibility of losing degrees of freedom and a large number of parameters. On the contrary, with a smaller number of lags, the model tends to lose variability. According to Mata (2003), he states that, to determine the amount of lags (p), the following criteria can be used:

- Likelihood ratio statistic.
- Akaike Information Criterion (CIA).
- Schwarz.
- Hannan Quinn.
- Final prediction error.

In short, the average of the decisions will determine the minimum value of the considered lags.

- **Granger causality**

Under the assumption, that we seek to explain the behavior of the variable (y) based on its lags (using its own past). Variable (z) is said not to cause variable (y) if adding the past of (z) to the above equations does not add explanatory power to the model. What is intended is to analyze the significance that adding the past of (z) to the equation does not allow predicting the explanatory capacity. The test seeks to analyze the statistical significance of a block of delays of the variable (z) within the proposed equation, and that the null hypothesis is described as the variable (z) does not cause, in the sense of Granger. In short, the proposal

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developed by Granger refers that the prediction of (y) based on the delays of the two variables (y) and (z) based exclusively on their pasts has a better error than the prediction that was proposed with (y) based on on their own delays. So it would be said that the variable (z) does not cause the variable (y) having the following equation as:

$$E(y_t \ / \ y_{t-1}, y_{t-2}, \ldots; \ z_{t-1}, z_{t-2}, \ldots) = E(y_t \ / \ y_{t-1}, y_{t-2}, \ldots)$$

Using the F – statistic or likelihood ratio, a block of variables can be contrasted. Given the existence of more than two variables, there are several possible causality tests, determining that the likelihood ratio can be more effective than the F - statistic ; This is because it allows the exclusion of a block of delays from several simultaneous equations. In short, the significance test or also called the causality test of a block of lags can be carried out using the likelihood ratio statistic, where the restricted model tends to exclude a group of lags from the proposed equation.

- **Impulse Response Test**

The impulse-response test makes it possible to measure the behavior of the variables in the face of a shock of structural innovations. Given the existence of interrelationships, the variables tend to react to a shock; what is more, in the face of a dynamic model, contemporary reactions and subsequent periods can be generated. Failing that, innovations exist as many impulse-response functions as an endogenous variable; each function depends on the temporary space that occurs as a result of the shock.

Annual time series data were used to determine the long-term relationship of the variables. In this sense, the economic growth of Huancavelica is represented by the GDP and its relationship with the canon, mining canon and hydro-energy canon. The data was collected from the statistical series of the INEI, BCRP and MEF, which were processed in the R program. A unit root test is proposed to check the seasonality of the series. With this estimate a VAR model with optimal lags. Subsequently, the Granger causality model will be estimated in the analysis of the relationship between the variables. We observe that the behavior of the series through the trend graphs of the variables and to be able to detect structural changes. The variables GDP, canon, mining canon and hydroenergy canon show marked fluctuations in their behavior through the years.

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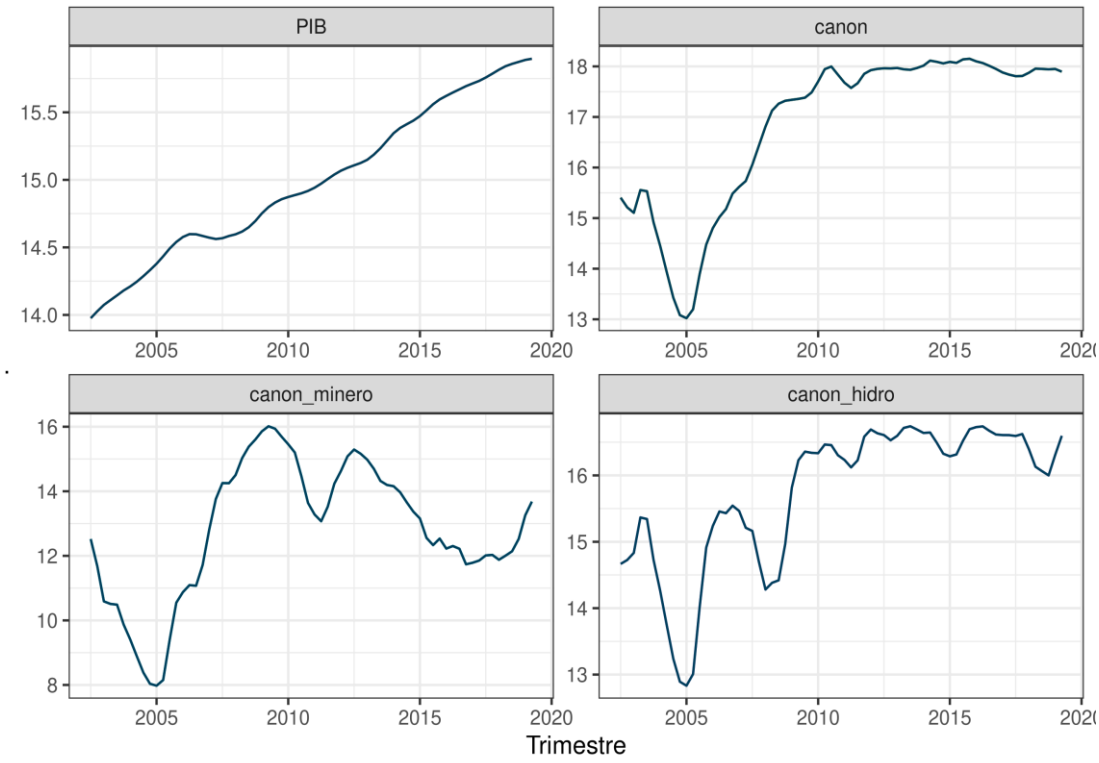
Figure 1 shows variables with variations that make it impossible to clearly observe the behavior of the trend in the short term. For this reason, the time series is broken down and those elements that hinder its analysis are removed. It is correct to follow a data trajectory with these reduced oscillations. Deseasonalization eliminates the seasonal component of a time series. Figure 2 shows the deseasonalized variables using the TRAMO-SEATS procedure. The result, seasonally adjusted data for a better analysis.

Figure 1. Seasonally adjusted study variables



Note: Data analysis in R.

To measure the correlation of the variables of interest we used the Spearman correlation coefficient. Figure 2 shows that the Spearman correlation coefficient between the GDP and the canon, being 0.7830164, which indicates that it has a high positive correlation and with this, we can say that the level of correlation of the canon variable affects the economic growth of the department of Huancavelica. On the other hand, it is shown that the Spearman correlation coefficient between the GDP and the mining canon is 0.2878601,

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indicating a low positive correlation, and we can affirm that the canon from mining affects the economic growth of the department of Huancavelica. Finally, the Spearman correlation coefficient between the GDP and the hydropower canon is 0.7439567, indicating a high positive correlation. It can be affirmed that the level of correlation of the hydropower canon variable affects the economic growth of Huancavelica (see table 1).

Table 1. Correlation matrix between the variables

	GDP	Canyon	mining_canon	canon_hydro
GDP	1,0000000	0.7830164	0.2878601	0.7439567
Canyon	0.7830164	1,0000000	0.7471080	0.8985414
mining_canon	0.2878601	0.7471080	1,0000000	0.6087772
canon_hydro	0.7439567	0.8985414	0.6087772	1,0000000

Note: Data analysis in R

Figure 2 allows us to visualize and interpret the relationship between the variables through the dispersion diagram. The scatter diagrams shown have a positive global trend, the point cloud between the variables GDP and canon, mining canon and hydroenergy canon presents a positive linear relationship, that is, as the value of the variables canon, canon increases. mining or hydro-energy canon also increases the value of the *GDP variable.*

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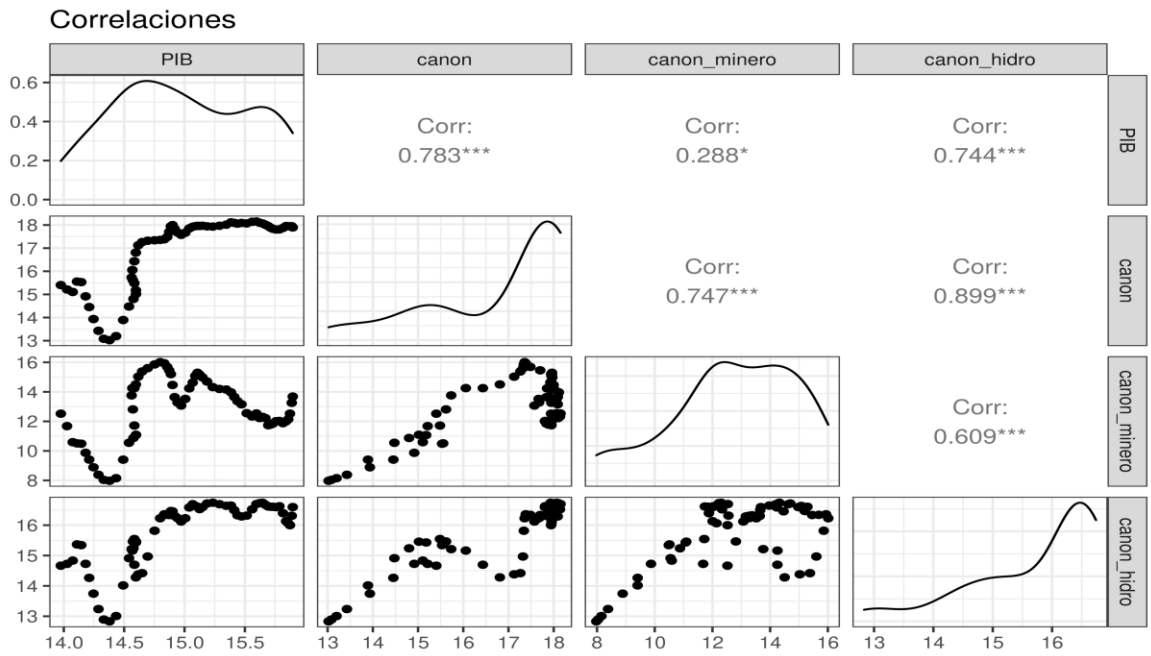
Figure 2. Correlation between variables



Note: Data analysis in R

Our system of hypotheses for the unit root test is:

Ho: p > 0.05, presents a unit root.

Ha: p < 0.05 does not present a unit root.

Table 2 presents the unit root test, as the p- value < 0.05 in the second difference is observed, we reject the null hypothesis, that is, it does not present a unit root. The variables in the second difference do not present the unit root, therefore, the series are of second order I (2). The importance of taking out the second difference is that the series becomes seasonal to later assign an order of the variables to include in the VAR model.

Table 2. Unit Root Test (ADF) of the study variables

Variable form	variable	statistics	p.value
Transformation logarithmic	GDP	-2,157	**0.511**
	Canyon	-1,259	**0.876**
	mining_canon	-1,932	**0.603**
	canon_hydro	-2,361	**0.429**
first difference	GDP	-2,492	0.375

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Variable form	variable	statistics	p.value
	Canyon	-3,984	0.016
	mining_canon	-2,460	0.389
	canon_hydro	-3,922	0.019
	GDP	-3,397	0.064
second difference	Canyon	-4,808	0.010
	mining_canon	-4,151	0.010
	canon_hydro	-4,194	0.010

Note: Data analysis in R.

Next, the optimal lag for our VAR model is selected. It should be taken into account that choosing a high number of lags would cause the model to lose the degrees of freedom, estimating a high number of parameters and, on the contrary, a reduced number would cause the model to lose dynamics.

Table 3 shows us the results of the estimation for the number of optimal lags of our investigation. Taking into account the number of variables in the model and the minimum values of the information criteria AIC, HQ, SC and FPE, they respond to four lags (P=4) as the optimal value for this model.

Table 3. P-VAR Order Selection

	1	two	3	4	lag order
ICA(n)	-20.26309	-20.30388	-20.02787	-21.03089	4
HQ(n)	-19.99368	-19.81894	-19.32741	-20.11490	4
SC(n)	-19.57691	-19.06877	-18.24382	-18.69790	1
FPE(n)	0.00000	0.00000	0.00000	0.00000	4

Note: Data analysis in R.

After identifying that the variables do not present inconveniences with respect to the unit root and in addition to this, the number of optimal lags is known, the VAR model was estimated for our research, and that this describes the relationships of the variables such as:

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GDP , CANON, MINING CANON and HYDROENERGY CANON, which are represented as follows.

Table 3 shows us the VAR model, which was estimated with 4 lags, the result was a significant relationship of the GDP growth rate, canon, mining canon and significant hydroenergy canon, the result of the tests elaborated to the residuals of this model, it was found that said residuals do not have problems of normality, autocorrelation and heteroskedasticity . The R-squared of our research is significant with 70% acceptance, which means that the model explains 70% of the econometric model, and that this is high; therefore, it adequately explains the independent variable GDP. The variations of the independent variables explain up to 70% of the variations of the dependent variable.

Table 3 shows that:

Regarding the first lag:

- At a 1% level, GDP (1) is positively influencing GDP
- At a level of 10%, the GDP (1) positively affects the canon.
- At a level of 1%, the mining canon (1) negatively affects the canon.
- At a level of 10%, the hydropower canon (1) negatively affects the canon.

Regarding the second lag:

- At a 5% level, GDP (2) is having a positive effect on GDP.
- At a level of 10%, the mining canon (2) is having a positive effect on GDP.
- At a level of 5%, the mining canon (2) is having a negative impact on the mining canon.
- At a level of 1%, the hydroenergy canon (2) is having a negative impact on the hydroenergy canon.

Regarding the third lag:

- At a level of 5%, the mining canon (3) is having a negative impact on GDP.

Regarding the fourth lag:

- At a level of 5%, the canon (4) is having a negative impact on GDP.
- At a level of 10%, the hydroelectric canon (4) is having a positive impact on GDP.
- At a level of 5%, the fee (4) is having a negative impact on the fee.

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- At a level of 1%, the hydroenergy canon (4) is having a negative impact on the hydroenergy canon.
- At a level of 10%, the GDP (4) is having a positive impact on the hydroenergy canon.

Table 2. VAR Model Estimation

	Dependent variable:			
	GDP	Canyon	mining canon	hydroelectric canon
	(1)	(two)	(3)	(4)
GDP.l1	0.857 ***	5,391 *	3,924	6,985
	(0.138)	(3,025)	(8,382)	(5,622)
canon.l1	0.008	0.525 ***	0.624	0.218
	(0.008)	(0.177)	(0.491)	(0.329)
mining_canon.l1	-0.002	-0.010	0.083	-0.008
	(0.003)	(0.063)	(0.175)	(0.117)
canon_hydro.l1	-0.001	-0.234 **	-0.253	-0.021
	(0.005)	(0.106)	(0.293)	(0.196)
GDP.l2	-0.429 **	-1,023	-9,570	5,004
	(0.176)	(3,871)	(10,727)	(7,195)

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canon.l2	-0.011	-0.321	-0.775	-0.002
	(0.009)	(0.197)	(0.547)	(0.367)
mining_canon.l2	0.005 *	0.092	-0.312 *	0.020
	(0.003)	(0.061)	(0.169)	(0.114)
canon_hydro.l2	-0.004	-0.032	0.314	-0.388 *
	(0.005)	(0.114)	(0.316)	(0.212)
GDP.l3	0.210	-0.221	15,359	-5,598
	(0.171)	(3,740)	(10,364)	(6,951)
canon.l3	-0.003	0.199	0.672	0.020
	(0.008)	(0.179)	(0.497)	(0.333)
mining_canon.l3	-0.006 **	-0.012	-0.017	-0.087
	(0.003)	(0.065)	(0.180)	(0.121)
canon_hydro.l3	0.004	-0.068	-0.349	0.125
	(0.005)	(0.105)	(0.291)	(0.196)
GDP.l4	-0.126	0.155	-4,807	10,160 *
	(0.132)	(2,889)	(8,005)	(5,369)
canon.l4	0.019 **	-0.349 **	-0.505	0.474

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	(0.007)	(0.160)	(0.442)	(0.297)
mining_canon.l4	-0.002	0.026	-0.236	-0.090
	(0.003)	(0.065)	(0.180)	(0.120)
canon_hydro.l4	-0.018 ***	0.138	-0.016	-0.610 ***
	(0.005)	(0.106)	(0.293)	(0.197)
build	-0.0004	0.010	0.024	0.014
	(0.001)	(0.015)	(0.040)	(0.027)
Remarks	62	62	62	62
R2 _	0.709	0.368	0.329	0.366
R2 _ Tight	0.606	0.144	0.091	0.141
Mistakes Standard Residuals (df = 45)	0.005	0.114	0.315	0.211
F- Statistic (df = 16; 45)	6,863 ***	1,640 *	1,380	1,625
Note:	*p<0.1*;* **p<0.05**;** p<0.01***			

Note: Data analysis in R.

The next test that was applied is the Granger causality test, which will allow us to check if a time series can predict another in the long term, unidirectionally or bidirectionally. Comparing if the behavior of one series predicts the behavior of another.

Table 4 shows us the Granger causality, for its contrast the hypothesis system:

Ho: p > 0.05, Ho is accepted.

Ha: p < 0.05, Ho is rejected.

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Table 3. Granger causality test

Cause	Effect	statistics	p.value
GDP	Canyon	2,224	0.141
	mining_canon	0.110	0.742
	canon_hydro	2,920	0.092
Canyon	GDP	0.008	0.930
	mining_canon	3,103	0.083
	canon_hydro	0.007	0.935
mining_canon	GDP	0.136	0.714
	Canyon	7,866	0.007
	canon_hydro	1,010	0.319
canon_hydro	GDP	0.185	0.669
	Canyon	1,063	0.307
	mining_canon	0.249	0.620

Note: Data analysis in R.

Regarding the GDP: the probability of the test was less than 0.05 (5%), therefore, the $H_{0 \text{ is rejected}}$. In other words, there is a causal relationship between the mining canon and the *canon.* Said causality is unidirectional from mining canon to canon. The past and present value of the mining canon variable contributes to the prediction of the canon variable.

Causality from GDP to the other variables:

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship between Canon and *GDP.*

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship from the Canon to *the mining canon.*

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- The probability of the test is less than 0.05 (5%), therefore, the $H_{0 \text{ is rejected}}$. In other words, there is a causal relationship from the Canon to *the hydroenergy canon.*

Causality from CANON to variables:

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship from the GDP to *the total canon.*

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship between the GDP and *the mining canon.*

- The probability of the test is less than 0.05 (5%), therefore, the $H_{0 \text{ is rejected}}$. In other words, there is a causal relationship from the GDP to *the hydroenergy canon.*

Causality from the MINING CANON to the variables:

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship between the Mining Canon and *GDP.*

- The probability of the test is less than 0.05 (5%), therefore, the $H_{0 \text{ is rejected}}$. In other words, there is a causal relationship from the Mining Canon to *the canon.*

- The probability of the test is less than 0.05 (5%), therefore, the $H_{0 \text{ is rejected}}$. In other words, there is a causal relationship from the Mining Canon to *the hydroenergy canon.*

Causality from CANON HYDROENERGETIC to the variables:

- The probability of the test is greater than 0.05 (5%), therefore, the $H_{0 \text{ is accepted}}$. In other words, there is no causal relationship between the *Hydroenergy Canon* and *GDP.*

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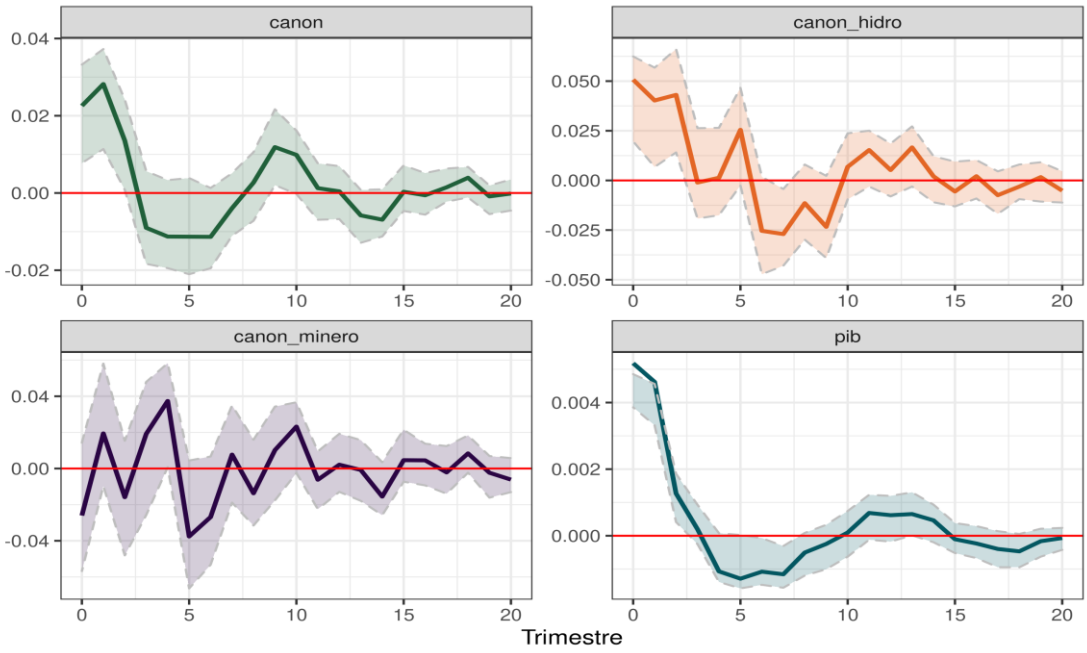
- The probability of the test is less than 0.05 (5%), therefore, the H $_{0 \text{ is rejected}}$. In other words, there is a causal relationship from the *hydroenergetic canon* to *the canon.*

- The probability of the test is less than 0.05 (5%), therefore, the H $_{0 \text{ is rejected}}$. In other words, there is a causal relationship between the *hydro* - energy *canon and the mining canon.*

The impulse response tests are shown in the following figures:

Figure 4 shows the reaction of GDP to a one percent change in canon. This shock causes an initial decrease in GDP of a magnitude of -0.002%, a recovery of the same magnitude is observed in the subsequent periods, with a tendency towards equilibrium in the last section.

Figure 3. GDP impulse response test



Note: Data analysis in R.

Figure 5 shows us the reaction of the GDP to a one percent change in the hydroenergy canon. This shock causes an initial decrease in GDP of a magnitude of -0.002%, this effect

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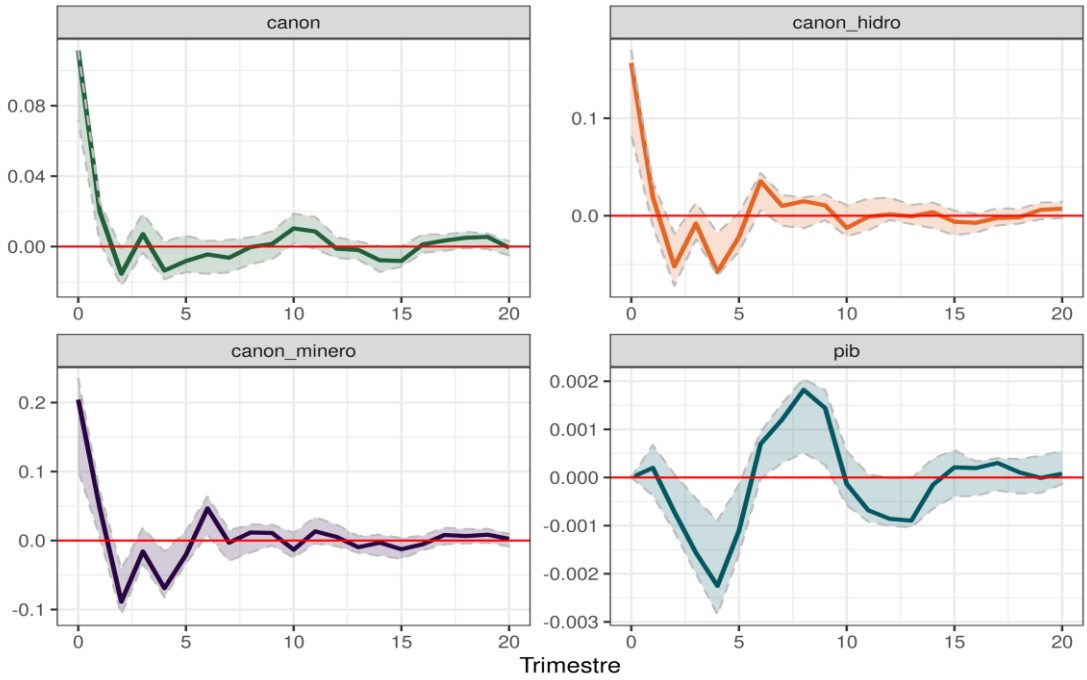
presents a recovery of 0.01% during consecutive periods, finally with a downward trend following the equilibrium path.

Figure 3. Impulse response test of the canon expenditure execution



Note: Data analysis in R.

Figure 4 presents the GDP reaction to a one percent change in the mining canon. This shock begins with a deep decrease in the first five periods of a magnitude of -0.02%, followed by an increase of around 0.01%, finally stabilizes and this effect continues to fluctuate during the subsequent periods, with a tendency to the path of balance.

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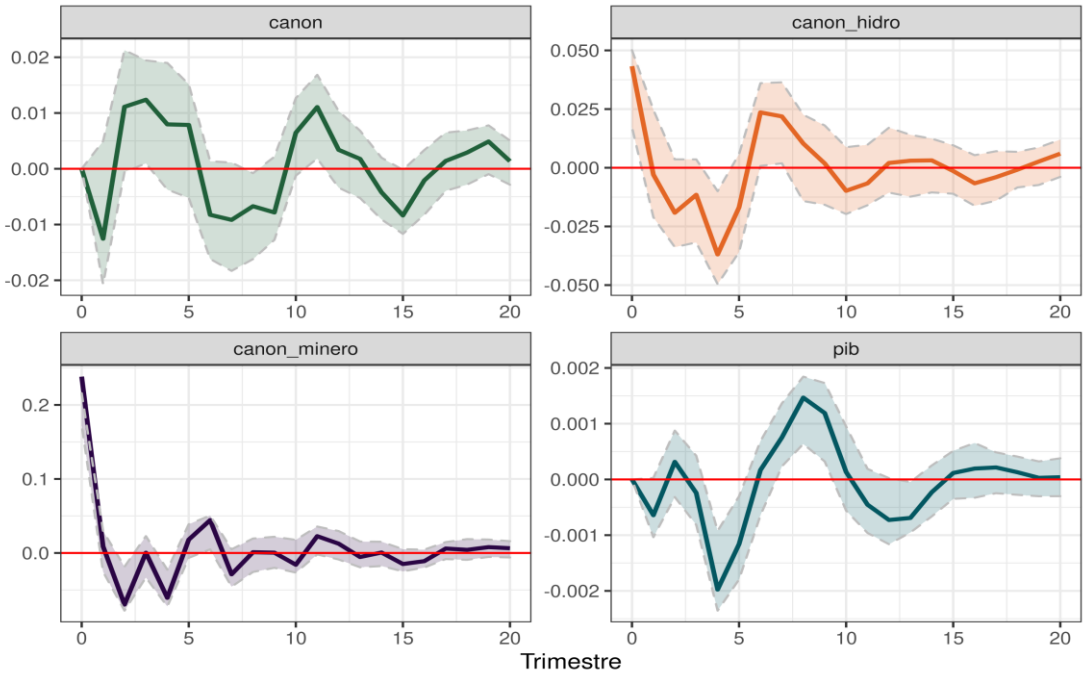
Figure 4. Test of impulse response of the execution of the expenditure of the mining canon



Note: Data analysis in R.

Figure 5 presents the reaction of GDP to a one percent change in the hydropower canon. This shock begins with a deep decrease in the first five periods of a magnitude of -0.02%, followed by an increase of around 0.01%, finally stabilizes and this effect continues to fluctuate during the subsequent periods, with a tendency to the path of balance.

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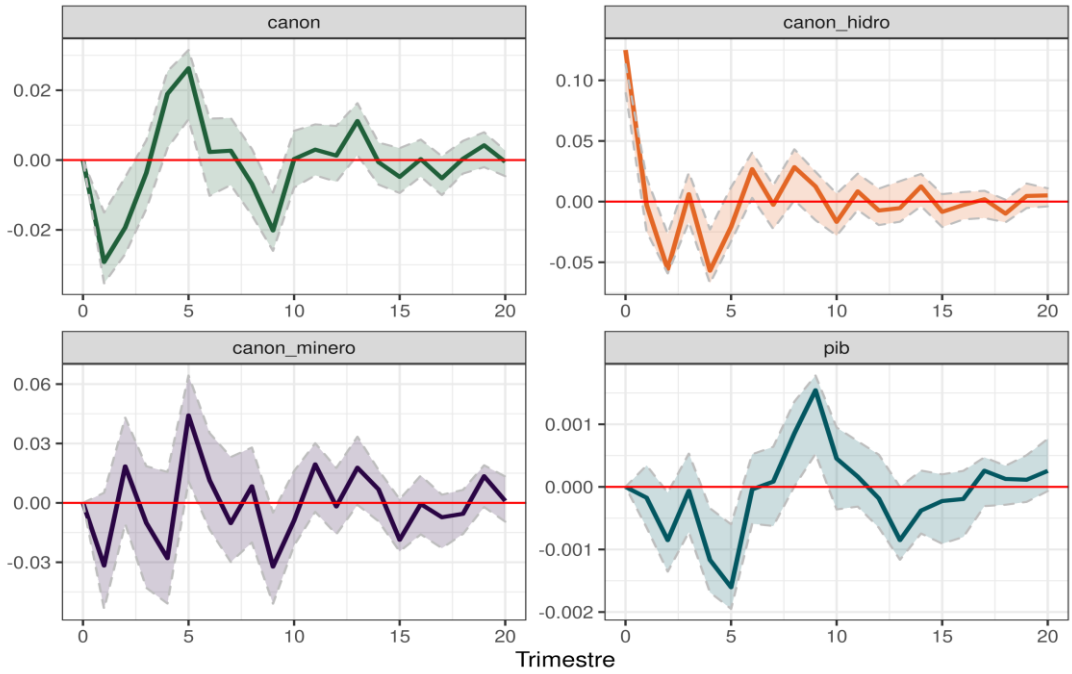
Figure 5. Impulse response test of the execution of the expenditure of the hydroenergy canon.



Note: Data analysis in R.

After having estimated the VAR model with lag (4), the general hypothesis proposed called *"Transfers by canon directly influenced the economic growth of the department of Huancavelica, during the period 2002-2019* " is contrasted. However, through Granger causality, GDP cannot predict the other variables in the long run.

After having estimated the VAR model with lags (2) and (3), the first specific hypothesis proposed is accepted, called *"Transfers by mining canon directly influenced the economic growth of the department of Huancavelica, during the period 2002-2019".* However , the mining canon (p - value = 0.714>0.05) cannot predict GDP in the long term.

After having estimated the VAR model with a lag (4), the second specific hypothesis proposed is contrasted, called *"Transfers by hydroenergy canon directly influenced the economic growth of the department of Huancavelica, during the period 2002-2019."* However , the mining canon (p - value = 0.699>0.05) cannot predict GDP in the long term.

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1.1 Discussion

Following Robles (2018) in his study he concluded that the mining canon is not a determinant of economic growth in the period and city of study that was Arequipa, likewise the mining canon had an adverse behavior; since, if it decreases, the region's GDP tends to rise. According to the results obtained, the investment made by the transfer of canon to local governments has shown constant growth during 2007 to 2019. For its part, Macroconsult (2012) determines, mentioning that the mining sector has a relevant role in the economy of Peru through the generation of added value, taxes, foreign exchange, among others that favors the national GDP, likewise, highlighting the transfers received in the Huancavelica region, it is shown that by 2019 it was possible to reach more than 6 million which the lowest well-being indices are observed, accumulating 0.3% of total transfers.

In addition, Llanos (2018) concludes that there is an indirect relationship between the growth of GDP per capita and mining dependency in the regions of Peru. Being Huancavelica one of the regions that occupies the first places in mining investment, reaching 34% of its surface to the mining concession, this being approximately 760 thousand hectares; although it is true, in our country the mining deposits have an extremely important role in the economy. And referring to Córdova (2010) determines that the canon from mining was one of the relevant budget revenues received by regional governments, seeing an increase in the infrastructure sector; however, the great effect of the mining activity in Huancavelica up to now has not been able to promote any development and no improvement in the quality of its inhabitants is appreciated.

Referring to Yujra (2018), I was able to conclude that the impact of the mining canon on regional economic growth is direct and significant. In our research for the year 2019, the mining investment registered a figure of 431 million, showing a year-on-year growth of 17.2%, achieving a rise of 31.2% with respect to the year 2018, during the year 2015 onwards a repetitive trend is shown in what concerns the mining investment in Huancavelica that achieves the fifteenth at the national level. According to Ortiz (2015), he determined that the transfers from the mining canon have a direct relationship with the regional GDP.

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CONCLUSIONS

The main objective of the research was to identify the influence of canon transfers on the economic growth of the department of Huancavelica, between the years 2002-2019. After estimating the VAR model with lag (4), the general hypothesis is tested. However, through Granger causality, GDP cannot predict the other variables in the long run.

The first specific objective is to determine the influence of transfers from the mining canon on economic growth within the jurisdiction of the regional government of Huancavelica, during the years 2002-2019. After having estimated the VAR model with lags (2) and (3), the first specific hypothesis proposed is not rejected. However, the mining canon (p - value = 0.714>0.05) cannot predict GDP in the long term.

The second specific objective was to evaluate the influence of transfers from the hydroenergy canon on economic growth within the jurisdiction of the regional government of Huancavelica, between the years 2002-2019. Using the VAR model with a lag (4), the second specific hypothesis is contrasted. However, the mining canon (p - value = 0.699>0.05) cannot predict GDP in the long term.

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