

The Effect of Rice Price, Income Per Capita, Population on Rice Demand in Sulawesi Island using Panel Data Regression

Irwandi¹, Abd. Rahim², Astrid Rahmasari³, A. Rizqa Nurul Aulia⁴, Nurmi⁵, Aldha Rusman⁶

^{1,2,3,4,5,6} Universitas Negeri Makassar, Indonesia

*Corresponding email: irwandi@unm.ac.id

Article History

Received: February 02, 2023

Revised: March 02, 2023

Accepted: April 30, 2023

Abstract

Panel data regression analysis is a combination of cross section data and time series data. This study aims to analyze how the effect of rice prices, per capita income, population on the demand for rice on the island of Sulawesi. Using a combination of cross-sectional data, namely the six provinces on the island of Sulawesi and time series data from the 2017-2020 period. The results of the research show that the population and income per capita have a significant influence on the demand for rice on the island of Sulawesi. Meanwhile, the price of rice has no significant effect on the demand for rice on the island of Sulawesi. From the R² value, it is 95.1453%, which means the variance of rice prices, population, and per capita income to the demand for rice on Sulawesi Island, while the rest is influenced by other variables not included in the model.

Keywords: data panel, demand for rice, population, price of rice, income per capita

DOI:

10.46306/bbijbm.v3i1.51

Web:

<http://bbijbm.lppmbinabangsa.ac.id/index.php/home>

I. Introduction

Indonesia's geographical location located in the tropics, humid and equatorial regions is very suitable and supports the use of agriculture, especially food production. One of the food crops that plays an important role in agricultural development is rice. Indonesia is an agricultural country with diverse food sources.

The expected role of the sustainable agricultural sector in the development process involves at least four aspects, namely first, its ability to provide food for the community. Both provide employment opportunities for the community. Third, store and collect currency and energy. Fourth, as a support base for other sectors (Laksono, 2002).

In accordance with the food needs of the Indonesian people, rice in Indonesia has not decreased but its production and consumption increase every year in accordance with the increase in population. (Nizar and Abbas, 2019). In the production of rice that will be ground into rice, the most frequent problem faced by farmers in their production activities is the cost of inputs and inputs that must be produced so that farmers can realize net profits. Rice is a very important food ingredient to be grown for the national economy because it is the most important food ingredient for the people of Indonesia. (Sari, 2014).

The product must be distributed and distributed to the community to meet its needs. Rice produced in Indonesia has made Indonesia one of the largest rice producing and consuming countries in the world (Kurniyawan, 2013). Taking the third position as the largest rice producing country in the world after China and India with a rice contribution of 8.5% or reaching 54 million tons Indonesia's rice consumption can increase throughout the year, from the support of land in Indonesia. In the last two years, Indonesia's rice production has continued to grow steadily to reach 5.65 million tons in 2020.

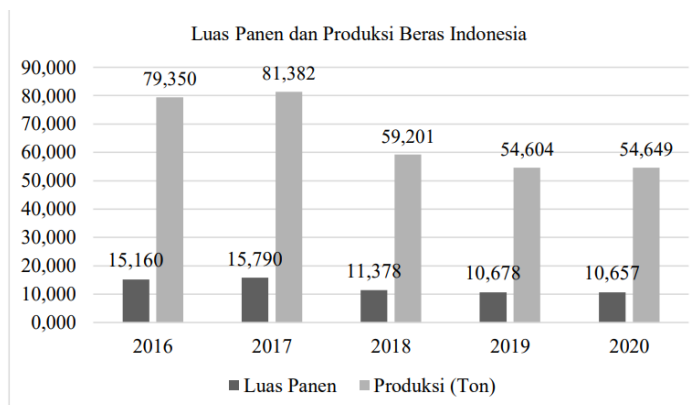
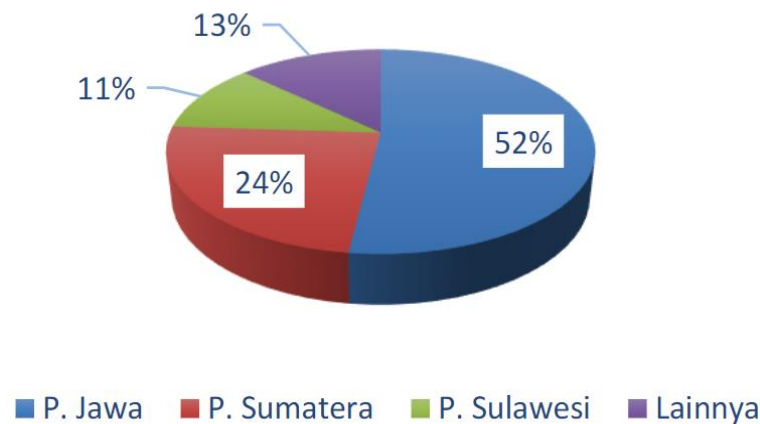


Figure 1. Harvest Area and Production of Indonesian Rice
Source: BPS Indonesia, 2022.

Based on the data above, it can be seen that the area of harvest in the last 5 years has continued to decline. Data shows that from 2017 to 2020 it continued to decline from 15,790 hectares to 10,657 hectares. One of the causes of the decline in rice acreage is land conversion, high rainfall and some of it has been diverted to various other foodstuffs. Although the harvest area has decreased, rice production has also changed in the last 5 years, which has decreased significantly in 2017-2018. However, in 2019-2020 rice production increased and Indonesia was able to import , but the increase in rice production was also followed by an increase in rice consumption which

varied from year to year. Most of the areas that experienced an increase in rice production were East Java, South Sumatra, Lampung, and Banten.



From the diagram above, the largest production is on the island of Java with a contribution rate in 2015 of 52%. The second largest contribution of rice production is Sumatra Island at 24% where production centers are in the provinces of North Sumatra, Lampung and West Sumatra. And the third largest amount of rice production is Sulawesi Island by 11% with the production center located in South Sulawesi Province.

Demand comes from desire, this shows that desire and demand are two different things. A wish is not a desire, just as a desire is not a demand. Although different, there is no denying that the two are closely related (Kotler, 2005). Based on the description above, it can be concluded that desire and demand are closely related, where the origin of desire is mentioned in the request and the origin of the request is due to the desire itself. When the price of goods rises, the desire to purchase such goods decreases so that the demand for such goods decreases and vice versa.

Consumer desires related to purchasing power or purchasing power are strongly influenced by people's income levels because at the income level increases demand. The ability of society to purchase products affects not only income, but also the high and low price level of products or goods.

Indonesia's high rice consumption must have sufficient rice production to meet national needs. Therefore, the government must pay full attention so that there is no food crisis (Zaeroni and Rustariyuni, 2016). This is inevitable if the consumption and demand for rice continues to increase at the rate of population increase every year. According to the 2020 census (SP), 270 million people live in Indonesia.

Indonesia still depends on the staple commodity as its staple food, namely rice. Rice is a relevant commodity because it can influence the policies of all countries that make rice a staple food (Rahmasuciana et al, 2015). For Indonesians, rice is not only a staple food according to Purwanto (2019), in economic studies and public policies, rice has a better food image, so Indonesians use rice as a staple food. The presence of rice greatly affects the state of the country's economy, because the Indonesian people love rice very much.

Based on the National Standardization Agency (BSN) in accordance with SNI 6128:2015, Rice is the main product obtained from the rice plant milling process (*Oryza sativa* L) where all husks are removed and part or all layers of plants and bran are separated into whole grains, rice grains, rice husks, broken rice and groats. Rice is a suitable commodity because it can influence all state policies that make rice a staple food (Rahmasuciana et al, 2015).

Rice has an important role in food security. The role of rice as a staple food in Indonesia is currently difficult to replace with other staple foods. Interest in rice is like an uncontrollable virus. Over time, regions in eastern Indonesia that produce non-rice staples, such as corn and sago, become rice as a staple food. Unexpectedly, now the number of consumers in Indonesia continues to grow and rice consumption in Indonesia is the largest in the world.

Price is one of the indicators of national and regional economic stability. The price increase is determined by the ratio of supply and demand. In economic theory it is seen that the demand for a product affects the price of the product itself assuming other factors do not change or *ceteris paribus* (Sugiarto, et al., 2017).

As with the law of demand, if the price of one good is high then the demand will fall on another good, which means that one of the factors that determine the magnitude of demand for an item is the value of the goods. self., If the price of the goods themselves is high or far from equilibrium, the demand will decrease. Conversely, if the price of an item falls, then its demand will increase. This is because the abilities and wishes of the community are as expected.

National settlement policy, which is contained in Presidential Instruction (Inpres) Number 13 2005. Some items are indeed quite good because they explicitly include the commitment or support of the production system, diversification, postharvest, and so on. However, when it comes to the "politics of rice prices", the government now seems unable to guarantee the selling price of farmers' rice. The term used is the Government Purchase Price (COGS), which of course has implications only in the form of a benchmark price, not the basis that should get a guarantee from the government. Meanwhile, Bulog has turned into a State-Owned Enterprise (BUMN) that must seek profits to contribute to state revenues so that it does not directly have the obligation to guarantee farmers' grain prices (Arifin, 2007).

Sukirno (2004) said that per capita income is in the form of the average income of the population of a country or region in a certain period which is usually one year. Per capita income is calculated based on regional income divided by the number of inhabitants. Income level is often used as an indicator or clue to measure the level of well-being of a family or society. The higher the income, the better. Revenue is a very important factor in determining the structure of demand for different types of products.

According to Smith, the population increases when the prevailing wage rate is higher than the subsistence wage rate, which is the level of wages that can only be used to make ends meet. Due to the increasing population, the need for goods and services is increasing, including the large need for staples that must be met every day. The increase in this amount will increase the amount of production to meet the needs of increasing food consumption, including rice.

II. Material and Method

Researchers used statistical analysis and regression analysis of panel data using the help of the Eviews 10 program. Panel data is a combination of cross section data and time series data. The cross section data is six provinces of Sulawesi island, namely, South Sulawesi province, Southeast Sulawesi province, Central Sulawesi province, North Sulawesi province, West Sulawesi, and Gorontalo. Meanwhile, for the time series data for the 2017-2020 period from the Central Statistics Agency. The data taken includes information on rice prices, per capita income, rice imports, population which is an independent variable and rice demand is a dependent variable.

III. Results and Discussion

a. Selection of Panel Data Regression Model

In determining the best estimation model in the panel data, namely by estimating the *Common Effect* (CEM), *Fixed Effect* (FEM), and *Random Effect* (REM) models.

1) Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	11.919828	(5,15)	0.0001
Cross-section Chi-square	38.497890	5	0.0000

Source: Eviews 10 (processed data)

The chow test is used to determine which model is more used between the *Common Effect* (CEM) and *Fixed Effect* (FEM) models. Based on the tabel in the chi-square cross-section p-value of 0.0000 < 0.005, then H_0 is rejected which means that the *fixed* effect model is better than the *common effect* model.

2) Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	30.055599	3	0.0000

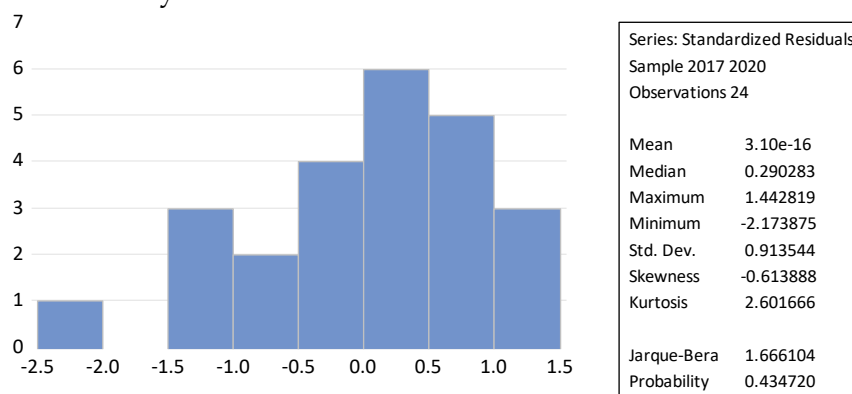
Source: Eviews 10 (processed data)

The thirst test is used to determine which model is more used between the *Random Effect* (REM) and *Fixed Effect* (FEM) models. Based on the tabe in the random cross-section p-value value of $0.0000 < 0.005$, then H_0 is rejected which means that the fixed effect model is better than the *random effect model*.

b. Test Classical Assumptions

By using the *Fixed Effect* (FEM) method, classical assumption testing is very willing to be carried out. The classical assumption tests that will be carried out are normality tests, multicholnearity tests, and heteroskedasticity tests.

1) Normality Test



Source: Eviews 10 (processed data)

In the normality test above, it can be seen that the probability value obtained a result of 0.434720 which means it exceeds 0.05, so it can be interpreted that the data is distributed normally.

2) Multicholnearity Test

	HABE	JUPE	PPK
HABE	1.000000	0.125705	-0.312111
JUPE	0.125705	1.000000	0.581369
PPK	-0.312111	0.581369	1.000000

Source: Eviews 10 (processed data)

In the table above, the value of the correlation coefficient between fellow independent variables is in the range below 0.08. which means that this data is free from multicholnearity.

3) Heteroskedasticity Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-9.013915	5.087711	-1.771703	0.0968
HABE	0.000270	0.000114	2.378792	0.0311
JUPE	1.55E-06	1.34E-06	1.159331	0.2644
PPK	0.013688	0.028696	0.477010	0.6402

Source: Eviews 10 (processed data)

In the table above, the probability value of the JUPE and PPK variables is above the value of 0.05 which means that heteroskedasticity does not occur. However, in the HABE variable, the probability value is below 0.05 which indicates heteroskedasticity.

c. Test Goodnes Of Fit

Using the *fixed effect* model, the Goodness of Fit test was carried out in this study consisting of a statistical F test, a statistical t test and a coefficient of determination test (R^2).

1) Test F

	F-Statistics	P-Value
Value	36.74734	0.000000

Source: Eviews 10 (processed data)

The table above shows that the p-value is $0.000000 < 0.05$ then H_0 is rejected. In conclusion, independent variables together affect dependent variables.

2) t-test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	158.0823	12.60138	12.54483	0.0000
HABE	-0.000246	0.000282	-0.875230	0.3952
JUPE	-7.53E-06	3.32E-06	-2.267371	0.0386
PPK	-0.476970	0.071076	-6.710705	0.0000

Source: Eviews 10 (processed data)

Variabel JUPE and PPK have a probability value below 0.05 which means that both variables have a significant influence on rice demand on Sulawesi Island. Meanwhile, the probability value of the HABE variable is above 0.05, which means that the HABE variable is not significant to the demand for rice on Sulawesi Island.

3) Coefficient of Determination (R^2)

R-squared	0.951453
Adjusted R-squared	0.925561

Source: Eviews 10 (processed data)

Based on the figure above, it shows that R^2 is 95.1453 percent of the Rice Demand in Sulawesi Island, which can be explained by the variables of Rice Price, Total Population and Per Capita Income. And the remaining 4.6547 percent is explained by variables outside the model.

d. Interpretation of Analysis Results

Variable	Coefficient
C	158.0823
HABE	-0.000246
JUPE	-7.53E-06
PPK	-0.476970

Source: Eviews 10 (processed data)

Based on the table above, the results of the estimation using the *fixed effect* model, the regression equation is obtained as follows:

$$\hat{Y}_{it} = 158,0823 - 0,000246HABE_{it} - 0,00075JUPE_{it} - 0,476970PPK_{it}$$

- A constant value of magnitude indicates the magnitude of the constant value of the Rice Demand (PEBE). Assuming that if the variables of Rice Price (HABE), Total Population (JUPE), and Per Capita Income (PPK) are equal to zero or constant then the demand for rice will be of a constant (fixed) value of . **158,0823158,0823**
- The Rice Price Coefficient (HABE) **-0,000246** means that if other independent variables are fixed in value and the price of rice increases by 1%, then rice demand will decrease by . A negative coefficient means that there is a negative relationship between the price of rice and the demand for rice. **0,000246**
- The Coefficient of Population (JUPE) is as **-0,00075** large as it means that if other independent variables are fixed in value and the number of inhabitants increases by 1%, then the demand for rice will decrease by . A negative coefficient means that there is a negative relationship between the population and the demand for rice. **0,00075**

The Coefficient of Per Capita Income (PPK) **-0,476970** means that if other independent variables are fixed in value and per capita income increases by 1%, then the demand for rice will decrease by . A negative coefficient means that there is a negative relationship between per capita income and rice demand. **0,476970**

IV. Conclusion

Based on the discussion in this study, the researcher concluded several research results as follows:

1. There is a relationship between the influence of the variables in rice prices, population, average food expenditure and rice imports on the demand for rice on the island of Sulawesi by 95.1453% and the rest is explained by other variables.
2. The variables of population and per capita income have a negative and significant effect on the demand for rice in Sulawesi Island. The price of rice has a negative and insignificant effect on the demand for rice on Sulawesi Island. This is because rice is a primary and inelastic item, so consumers still have to buy rice regardless of the prevailing price level

References

- Amir, R. S. (2017). Analisis Pengaruh Harga Beras Terhadap Permintaan Beras Di Kecamatan Johan Pahlawan Kabupaten Aceh Barat. Doctoral dissertation, Universitas Teuku Umar Meulaboh.

- Angraini, R., Amaliah, I., & Haviz, M. (2022). Pengaruh Harga Beras, Pendapatan Perkapita, Jumlah Penduduk dan Impor Beras terhadap Permintaan Beras di Indonesia Tahun 2010-2020. In Bandung Conference Series: Economics Studies, 2(1).
- Arifin. (2007). Teori Keuangan dan Pasar Modal. Yogyakarta: Ekonisia.
- Kurniawan A, 2013. Akuaponik Sederhana Berhasil Ganda. UBBPress, Pangkal Pinang.
- Laksono. (2002). Pembangunan Pertanian. Jakarta: Gramedia.
- Nizar, J., & Abbas, T. (2019). Faktor – Faktor Yang Mempengaruhi Impor Beras Di Indonesia Tahun 1980-2009. Economics Development Analysis Journal, 3(3), 31–47.
- Kotler, Philip. (2005) Manajemen Pemasaran. edisi kesebelas Jakarta : PT. Indeks Kelompok Gramedia.
- Purwanto, P. (2019). Strategi dan Bentuk-bentuk Informasi Transmigrasi pada Masa Orde Baru dalam Rangka Mensukseskan Program Pembangunan Nasional. Jurnal Kepustakawanan dan Masyarakat Membaca, 35(2), 1-15.
- Poli, Carla. (2002). Pengantar Ilmu Ekonomi, PT Prenhallindo, Jakarta.
- Rahmah, U.I.L. (2015). Analisis Pendapatan Usaha Ternak Ayam Ras Pedaging pada Pola Usaha yang Berbeda di Kecamatan Cingambul Kabupaten Majalengka. Jurnal Ilmu Pertanian dan Peternakan, 3(1):1-15.
- Rahmasuciana, D. Y., Mulyo, D. H., & Masyhuri, M. A. S. Y. (2015). Pengaruh Pengadaan Beras dan Operasi Pasar terhadap Harga Beras dalam Negeri. Agro Ekonomi, 26(2), 129-138.
- Rosyidi, Suherman. (2009). Pengantar Teori ekonomi: Pendekatan Teori Ekonomi Mikro dan Makro. Ed. Revisi, Rajawali Pers, Jakarta.
- Sari, R. K. (2014). Analisis impor beras di Indonesia. Economics Development Analysis Journal, 3(2).
- Septiadi, D., & Joka, U. (2019). Analisis Respon dan Faktor-Faktor yang Mempengaruhi Permintaan Beras Indonesia. AGRIMOR, 4(3), 42-44.
- Setianingsih, A., Halid, A., & Imran, S. (2021). Faktor-Faktor yang Mempengaruhi Permintaan Beras di Kota Gorontalo. AGRINESIA: Jurnal Ilmiah Agribisnis, 5(2), 101-109.
- Solikah, T. R. D. U. N. (2016). Analisis Faktor-Faktor yang Mempengaruhi Permintaan Beras di Kota Surakarta. Jurnal Agronomika, 10(02), 46-58.
- Sugiarto., Herlambang, Tedy., Kelana, Said., Brastoro., Sudjana, Rachmat. (2002), Ekonomi Mikro sebuah kajian komprehensif, PT Gramedia Pustaka Utama, Alfa Beta, Bandung.
- Sugiarto, Y., Estiningtyas, W., & Dewi, W. S. (2017). Analisis Indeks Iklim dengan Metode Historical Burn Analysis untuk Adaptasi Perubahan Iklim (Studi Kasus di

- Kabupaten Pacitan, Jawa Timur). Jurnal Agromet, 31(1), 1-10.
- Sukirno, Sadono. (2004). Makroekonomi, Teori Pengantar, PT Raja Grafindo. Persada, Jakarta.
- Zaeroni, R., & Rustariyuni, S. D. (2016). Pengaruh Produksi Beras, Konsumsi Beras, dan Cadangan Devisa terhadap Impor Beras di Indonesia. E-Jurnal Ekonomi Pembangunan Universitas Udayana, 5(9), 993-1010.