Analysis of Causality between Variables of the Amount of Industry, Investment, and Minimum Wage of Province on the Labor Absorption of East Java Province

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Abstract. The East Java Province is one of the second-largest populations on the Island of Java, however the labor absorption in East Java tended to be lower by fifth place on the Island of Java. The aim of this research was to see how causality is related between the amount of industry, investment, and minimum wages of province on the labor absorption in East Java Province. The method used in this research is Vector Autoregression (VAR) with Granger's causality test and Vector Error Correction Model test, also using quantitative approach. The data used in this research is data time series from 2011 until 2021 was obtained from the Indonesia and East Java Province statistical center, investment and joint service one door of East Java Province, and also from another literature study. The result was that the amount of industry had two-way causality, while the minimum wage of the province had only one directional causality and both had negative impact on the labor absorption of the East Java Province. Meanwhile, investment had positive impact and had only one directional causality on the labor absorption of the East Java Province.
Keywords: Absorption of Labor; Industrial Amount; Investment; Minimum Wage.

I. Introduction

One of the provinces with the highest population is East Java Province by being ranked 2nd in Indonesia and also on the island of Java after West Java Province which is ranked first. But on other side, labor absorption in East Java tends to be lower and occupies the 5th position in Java Island with an average absorbed rate of only 1.08% for the period from 2011 to 2021, while in the first rank the province with the average rate of employment that dominates in Java Island is from West Java Province with a percentage of 2.63% from 2011 to 2021. This indicates that based on the data above, the regional government of East Java Province must immediately address and find a solution so that the number of workers absorbed in East Java is not too low compared to other provinces in Java Island. Absorption of labor is the large number of workers absorbed by certain businesses engaged in a sector of the economy in accordance with the demand from these workers. In addition, demand from workers is the number of workers requested or needed by a business unit or industry and/or by a certain sector that requires the services of these workers (Asmara, 2018).

East Java Province has a leading sector that has the most contributes to GRDP among other sectors, namely the manufacturing industry sector. In this industrial sector, it has contributed to East Java's Gross Regional Domestic Product of 434,114.1 billion rupiah in 2017 and from 2011 to 2021 this sector has the highest contribution in 2021 by contributings East Java's GRDP of 504,864. 5 billion rupiah with an average contribution percentage of 29.57% and continues to increase every year. The industrial sector itself can be said to be one of the sectors that has an important or main role in being able to increase the Gross Regional Domestic Product in an area, and this sector has been considered a leading sector (Arsyad, 2010). This is due to economic development occurring in an area, so that the industrial sector is expected to be able or able to encourage development in other superior sectors in East Java Provinces, namely: the agricultural sectorr and the trade sectors, so that later it can expand new job opportunities for workers to be able to much absorbed and increase the income and purchasing power of people in an area.

The large number of workers absorbed is inseparable from the investments made by investors from Domestic Investment and Foreign Investment. Investment is basically the first step of production activities and also activities in terms of sustainable economic development. In general, development and economic growth are influenced by high or low levels of invested capital in a business or industrial unit (Arliman S, 2018). The BKPM of the Republic of Indonesia revealed that East Java Province ranked first based on the Realization of Domestic Investment report for 2020, with investment realization of IDR 55.7 trillion. According to Lewis in Todaro (2006: 132), the affects of economical growths on the amount of labor absorbed begins with investment in the industrial sector and an overall increase in capital in the modern sector. Increased output and more employment in this modern sectors will result from the movement of workers from the agricultural sectors to the modern industrial sectors. (Rahmalida & Setya, 2020).

Based on this background, with the phenomenon of population, East Java Province ranks second most in Indonesia, but employment in East Java is classified as lower by occupying the fifth position among other provinces on Java Island. So that researchers are interested in further analyzing the causality

relationship and the influence of the number of industries, investment, and the provincial minimunn wage on the absorption of labors in East Java Provinces.

II. Literature Review

Amount of Industry

According to Theory of Matz (2003) in Trisa Darma's thesis (2021), the increasing number of industrial units will also increase the number of output produced in the production period, in other words new jobs will increase as increased of labor absorption required by an industry. But on other sides, according to (Rakhmawati & Boedirochminarni, 2018) as the previous research, has the result that the amount of industries has a negative impact on labor absorption. This indicates that if there is an increase in the amount of industries, so labor absorption will decrease, and vice versa. This can happen because the industrial sector in an area is more oriented towards capital-intensive industries rather than labor-intensive, so that it can result in decreased labor absorption and all forms of industrial operations will be replaced with sophisticated machine technology.

Investment

According to the Harrod-Domar theory, investment has a positive relationship with labor absorption, namely investment is not only the creation of a existing demand in the market, but also investment can increase production capacity so as to make the quantity of output to be produced a lot and also quality. The greater the capital invested by investors will affect the large number of labor absorbed and can be a parameter for the success of investment projects. This theory is also in line with previous research from (Asmara, 2018), has result show that investment has a positive relationship on labor absorption. This indicates that if investment rises, labor absorption will also rise.

Minimum Wage of Province

According to Mankiw's theory (2003) in Nurliana Mufida's thesis (2021) to create an equilibrium point in the demand or supply of labor, wages for the the workforce must always be adjusted (balancing) according to the point equilibrium that exists in the labor market. Economist Thomas Malthus argues that if the real wages increased, the number of labor will automatically reduced by an industry (Hartanto & Masjkuri, 2017). This theory is in line with previous research from (Ardiansyah et al., 2018), has result show that minimum wages has a negative relationship on labor absorption. This means that if an industry still wants to maintain profits maximum resulting from production output, hence the use of labor that is relatively expensive will be reduced and will be replaced with other production inputs are relatively cheaper.

Based on the theoretical basis that has been explained above, the hypothesis of this research can be explained, namely:

1. It is suspected that there is has a causality relationship and the effect between the number of industries on labor absorption of East Java Province.
2. It is suspected that there is has a causality relationship and the effect between investment on labor absorption of East Java Province.
3. It is suspected that there is has a causality relationship and the effect between minimum wage of province on labor absorption of East Java Province.

III. Research Method

The type of data in this research is secondary times series data for the last 11 years, from 2011 to 2021. The dataa sources used in this research were obtained from several sources, namely: the Indonesian Central Bureau of Statistiics and East Javaa Provinces, the Ministry of Agriculturess capital and one-door integrated services in East Java, and other literature studies.

Analysis Methods

The method used in this research used Vector Auto Regression test and subsequent testing with the Grangers causality test and the Vector Erorr Corection Models test which aims to see whether there is a causal relationship and its influence between the independent variables namely Amount of Industries (X1), Investment (X2), Minimum Wage of Province (X3) to the dependent variable, namely the Labor Force (Y). In processing research data using Eviews version 10 as software analysis. The equation model of Vector Auto Regression is:

$$Yt = α_0 + α_1(X1) + α_2(X2) + α_3(X3) + u_t$$

Notes:

Yt : Dependent Variable (Labor Force)

$α_0$: Constant

$α_1\ α_2\ α_3$: Coefficient Regression

X1 X2 X3 : Independent Variable (Amount of Industries, Investment, Minimum Wage of Province)

u_t : Confounding Variable

IV. Results and Discussion

Table 1. Data Stationarity Test

Variabel	Level (P-Value)	Diferensiasi (P-Value)	Keterangan
		Augmented Dickey-Fuller Test	
AK	0.8625	0.0001	Stasioner pada diferensiasi tingkat 2
IND	0.9695	0.0000	Stasioner pada diferensiasi tingkat 2
INV	0.2578	0.0000	Stasioner pada diferensiasi tingkat 2
UMP	0.8321	0.0018	Stasioner pada diferensiasi tingkat 2

Sources: Secondary Data (processed).

Notes: Labor Force (AK)

Amount of Industries (IND)

Investment (INV)

Minimum Wage of Province (UMP)

Table 1 is the data stationarity test, namely testing the data that is carried out so that later the estimated data is carried out so that later the estimated data obtained will be good, accurate, and stationary. The table above shows the results that AK, IND, INV, UMP data at order 0 (level) are not stationary because the p-value > of $α = 0.05$ so it needs testing at the levels of diferentiations. In the differentiation test, the data is stationarry at 2nd differences because the order of differentiation (p-value) has a value of $< α = 0.05$ so that it rejects hypothesis 0 (H0) and these data do not have a unit root and can be continued to the test to determine the optimum lag length.

Table 2. Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1454.476	NA	1.82e+30	81.02643	81.20238	81.08784
1	-1409.455	77.53584	3.65e+29	79.41416	80.29390	79.72121
2	-1408.837	0.927301	8.90e+29	80.26871	81.85223	80.82140
3	-1404.879	5.056995	1.91e+30	80.93773	83.22503	81.73606
4	-1328.008	81.14224	7.83e+28	77.55597	80.54706	78.59994
5	-1278.668	**41.11648***	**1.74e+28***	**75.70376***	**79.39864***	**76.99337***
6	-1271.293	4.506925	5.24e+28	76.18293	80.58159	77.71818
7	-1262.312	3.492458	2.50e+29	76.57290	81.67535	78.35379

Sources: Secondary Data (processed)

Table 2 is the optimum lag test, namely testing the data carried out with the aim of knowing the length of time period (lag) of a variable in response to changes that are influenced by other variables. The table above shows the results that the optimum lag is at the 5th lag because each value from FPE, AIC, SC, and HQ has the lowest (minimum) value and is marked with the number of * signs in the 5th row. This indicates that the length of time for the response to changes in labor force variables that are optimally influenced by the variables of the number of industries, investment, and new wages occurs in the 5th lag or the 5th year time period (medium-long term). This means that Lag 5 is used in the estimation of the Vector Error Correction Models.

Table 3. VAR Stability Test

Root	Modulus
0.952569 - 0.199938i	0.973326
0.952569 + 0.199938i	0.973326
0.743283 - 0.595457i	0.952386
0.743283 + 0.595457i	0.952386
0.627466 - 0.714748i	0.951093
0.627466 + 0.714748i	0.951093
-0.586323 - 0.735037i	0.940242
-0.586323 + 0.735037i	0.940242
-0.713424 + 0.575144i	0.916387
-0.713424 - 0.575144i	0.916387
-0.652981 - 0.623107i	0.902578
-0.652981 + 0.623107i	0.902578
0.713896 - 0.490052i	0.865909
0.713896 + 0.490052i	0.865909
-0.845571	0.845571
0.827076	0.827076
-0.065679 - 0.810875i	0.813531
-0.065679 + 0.810875i	0.813531
0.295571 - 0.337874i	0.448911
0.295571 + 0.337874i	0.448911

Sources: Secondary Data (processed)

Table 3 is a VAR stability test with the aim of testing whether or not the estimation of the VAR model is stable with the condition that the VAR estimation can be said to be stable if the modulus value is less than one. The table above shows the results that all roots have a modulus value of less than 1 (one), so the tested data is stable at the VAR level.

Table 4. Granger Causality Test

Hubungan	Hubungan I	Hubungan II	Hasil Kausalitas
IND dan AK	0.0469	0.0268	Hubungan Dua Arah (IND ←→ AK)
INV dan AK	0.0042	0.6481	Hubungan Satu Arah (INV → AK)
UMP dan AK	0.0379	0.3599	Hubungan Satu Arah (UMP → AK)

Sources: Secondary Data (processed)

Table 4 is the Granger causality test, which is a test that has the objective of seeing whether or not there is a causal relationship (reciprocal) between the independents and dependents variable or vice versa, with the condition that the significance is a probability value < than $\alpha = 0.05$, therefore a variable can influence the variable other. The table above shows the results that:

1. The amount of industries and the labor force has a two-way causality relationship, as evidenced by the probability value in relationship I is 0.0469 and relationship II is 0.0268. This means that the number of industries significantly affects the absorption of workers, and vice versa.
2. There is a one-way causality relationship between Investment and Labor Force, as evidenced by the probability value in the first relationship of 0.0042. This implies that investment has significant impact on the labors absorptions, but vice versa does not.
3. The Provincial Minimums Wages and the Labor Force have a one-way causality relationship, as evidenced by the probability value in the first relationship of 0.0379. This demonstrates that the Provincial Minimums Wages has a significants affects the absorption of labor, but not vice versa.

Table 5. Johansen Fisher's Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.457383	57.01746	47.85613	0.0055
At most 1 *	0.331387	34.39746	29.79707	0.0138
At most 2 *	0.278276	19.50311	15.49471	0.0118
At most 3 *	0.182086	7.436947	3.841466	0.0064

Sources: Secondary Data (processed)

To determine whether some of these variables have a llong-terms or shortt-terms balance relationships, Table 5 is a cointegration test that is conducted, with the condition that if the probability value is < than α = 0.05, then the hypothesis has cointegration and long-term balance. The table above shows the results that each of these hypotheses has a probability value of < α = 0.05, which indicates that the quantity of industries, investments, provincial minimum wages, and the labor force are in an equilibrium over the long-terms.

Table 6. Long Term VECM Test

Cointegrating Eq:	CointEq1
AK (-1)	1.000000
IND (-1)	-1.514418 (0.37833) [-4.00295]
INV (-1)	6.254999 (2.36523) [2.64456]
UMP (-1)	-2.264496 (0.30937) [-7.31981]
C	-0.022073

Sources: Secondary Data (processed)

Table 6 is the VECM test, which is a test carried out when the data is stationary at different levels and there is a cointegration relationship. In this test the aim is to estimating the medium long-terms and short-terms relationships of the independent or dependent variables. The significance requirement in the VECM test is by looking at $t_{value} > t_{table}$. The formula for finding t_{table} is 1/2 α ; (n-k-1) → 0.05/2 ; (44-3-1) → 0.025 ; 40 → t_{table} = 2.02108. Considering the outcomes in the above table, get the following equation model:

AK(-1) = -0.022073 – 1.514418 IND(-1) +6.254999 INV(-1) – 2.264496 UMP (-1)

The above equation provides the following explanation:

1. In the medium-long term, every 1% change in the constant will result in a change in Y (Labor Force) of -0.022073 provided that X1 (Amount of Industries), X2 (Investment), X3 (Provincial Minimum Wage) are constant.

2. In the medium-long term, the amounts of industries has a significanttly negatives impacts on the labors absorptions. This is evidenced by the statistical t value |-4.00295| > t table |2.02108|. This means that if the number of industries increases by 1 unit, it will cause a change in the absorption of labor to decrease by 1.514418 people.

3. In the medium-long term, investment has a significanttly positives impacts on the labors absorptions. This is evidenced by the statistical t value |2.64456| > t table |2.02108|. This implies that if investments increasees by 1 billion rupiah, it will cause a change in the labors absorptions to increaseed by 6.254999 people.

4. In the medium-long term, the Provincial Minimunn Wages has a significants impacts on the absorption of labor. This is evidenced by the statistical t value |-7.31981| > t table |2.02108|. This means that if the UMP increases by 1 rupiah, it will cause a change in the absorption of labor to decrease by 2.264496 people.

The Effect of Amount of Industries on Labor Absorption in East Java Province

In the Grangers causality test, the results show that there's a two-way causality relationships betweens the amount of industries and employment (AK) with a probability value of < α = 0.05, namely: the relationships between the amounts of industriies and the workforce with a probability values of 0.0469, and vice versa. Labor force to the amounts of industries with a probability value of 0.0268. On the other side, in the VECM test on the medium-long term the amount of industries has a significants negatives impacts on absorption of labor, this is evidenced by the statistical t-values |-4.00295| > t table |2.02108|. That is, if the amount of industries increases, it will be able to reduce the labors absorptions in Eastt Java Provinces. These findings are in line with earlier studies carried out by (Rakhmawati & Boedirochminarni, 2018), as well as research conducted by (Mahendra, 2012), with research results showing that the amounts of

industriies has a negative and significanttly impacts on labors absorptions. This indicates that the industrials sectorr in East Java is more oriented towards capitall-intensives industriee than labors-intensives industriees, so thats in all forms of operation it uses advanced machine technology and has an impact on reducing the absorbed workforce.

The Effect of Investment on Labor Absorption in East Java Province

In the Grangers causality test, the results show that there's a one-way causality relationshipp betweens investment and employment (AK) with a probability value of 0.0042 < the degree of confidence α = 0.05. On the other hand, the VECM test in the medium-long term investment has a significanttly positives impacts on employment (AK), as demonstrated by the t statistic |2.64456| > t table |2.02108|. That is, if investment increases, the absorption of workers in East Java Province will also increase. These findings are in line with earlier studies carried out by (Asmara, 2018) and studies carried out by (Romdhoni, 2017), with research results showing that investments has a positives and significanttly impacts on labors absorptions. Based on previous research and the results obtained from this researches is consistents with economic theoriees expressed by Harrod and Domar, namely in the economic process that has an important role is investment, especially in the two things that are the goal of investment, namely increasing income and increasing production capacity economy (Jhingan, 2016). This indicates that if there is an increase in production capacity, it will be possible to open new jobs in the form of branch companies that are experiencing expansion from the central company in an area, so that the company's stakeholders will certainly require high demand for workers and absorption of workers in a region area will also increased.

The Effect of Provincial Minimum Wage on Labor Absorption in East Java Province

In the Grangers causality test, the results show that there's a one-way causality relationships betweens the Provincial Minimum Wage (UMP) and Labor Force (AK) with a probability value of 0.0379 < the degree of confidence α = 0.05. On the other hand, the VECM test in the medium to long term has a significanttly negatives impacts on labors absorptions (AK), this is evidenced by the statistical t-valuee |-7.31981| > t table |2.02108|. This means that if the UMP increases, it will be able to reduce the labors absorptions in East Java Provinces. These findings are in line with earlier studies carried out by (Ardiansyah et al., 2018) with research results showing that labors absorptions is negativelly and significantly impacted by the provincial minimunn wages.

Based on previous research and the results obtained from this researches are in acordances withs the theorry explained by one of the economists, namely Ehrenberg (2002) in (Maya & Yulhendri, 2019) who argues that employment has an inverse relationship with the minimum wage, if the provincial minimunn wages increasess, it will also reduces the numberr of labor, and vice versa. This can happen because according to the author's opinion that the wage for labor for business actors or an industry is a production cost, this means that if the Provincial Minimunn Wages increasess, it will certainly reduces the profits of a business itself. So that it is necessary to make adjustments by reducing the number of workers absorbed in order to optimize production inputs and maximize the profits derived from production output.

V. Conclusion

According to the results of this researches, it was found thats the number of industries had a significantts negative impacts on labors absorptions in East Java's Province and there was a two-way causality relationship. Meanwhile, investments has a significantts positives impacts on labors absorptions in East Java's Province and there is a one-way causality relationship, namely investment on labor absorption. On the other side, the Provincial Minimunn Wages has a significant negatives impacts on labors absorptions in East Java's Provinces and there is a one-way causal relationship, namely the Provincials Minimunn Wages on labors absorptions.

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