

# Macroeconomic Determinants of Automobile Sales in Indonesia: An Empirical Study in 1986-2016

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## ABSTRACT

The aim of this research was to study the determinants of automobile sales in Indonesia. The automobile sales were the sales of car and motorcycle during 1986-2016. The research focused on five macroeconomics variables (exchange rate, Gross Domestic Product (GDP), growth of GDP, inflation, and interest rate). The total sample was 30 years of automobile sales in Indonesia. The researcher used the regression method with Statistical Package for the Social Sciences (SPSS) to test the research model. For a few variables, lag t-1 was used. The empirical results show that GDP and the growth of GDP have a significant influence on both car and motorcycle sales in Indonesia. The growth of GDP reaches a significant level at  $\alpha < 1\%$ . However, the exchange rate of USD to IDR, inflation, and interest rate do not influence automobile sales in Indonesia.

**Keywords:** macroeconomic determinants, automobile sales

## INTRODUCTION

The automotive industry is one of the main industries in enhancing the economic growth of a country. The industry contribute 10,16% to total GDP of Indonesia (Kementerian Perindustrian Republik Indonesia, n.d.). The automotive industry is supported by hundreds to thousands of companies in the value chain from spare parts to the seat leather producers. The automotive industry is also related to other industries such as banking, financing, insurance, and infrastructure. The automotive industry is the major contributors to the country income. However, the sales of automotive are unpredictable year on year. Consequently, the budget income of the country is unpredictable.

On the product side, Japan is the only Asian automotive manufacturing country which is recognized at the global level. The Japanese cars are synonymous with quality, reliability, and performance at a reasonable cost. In sale figures, it is in the top positions on all markets throughout the world. During recent years, South-Korean car manufacturers have

become a real force on the international market. They succeed in offering the Japanese automotive industry a run for its money (Cârstea, 2016).

The exchange rate of USD to IDR and interest rate influence automotive demand and selling. (Lee & Kang, 2015). Most of the automotive parts still heavily depend on import from other countries. Demand will be postponed due to the hike price of car and motorcycle. As it occurred in 1998-2000, the exchange rate of USD to IDR was devaluated from IDR2.200 to IDR14.400. Thus, the demands of motor vehicles, especially car and motorcycle sales, were decreased. After 2000, the number of car sales has been increased dramatically to more than 1.000.000 units. Meanwhile, motorcycle sales have reached the highest, which is more than 8.000.000 units per year.

Automotive sales, both motorcycles and cars have the trends that fluctuate in line with economic growth (Patra & Rao, 2017). Leasing companies finance most of automotive sales. These financing demands depend a lot on the charged interest rate (Lee & Kang, 2015). The interest rates charged by financing companies depend on the macro interest

rate level and inflation. The higher the inflation is, the higher the interest rate will be. Huda (2018) studied the influence of three macro variables (exchange rate, inflation, and Sertifikat Bank Indonesia (SBI – Bank Indonesia Certificate)) on Indonesia economic growth. The result from data analysis concluded that only SBI rate influenced economics growth. Exchange rate, inflation, and SBI rate in influencing economic growth equaled to 48,7%.

Several researchers focus on automotive sales determinant have been performed in several developing countries such as Malaysia, South Africa, Turkey, China, India, Mexico, Pakistan, and Brazil. Nawi *et al.* (2013) examined the passenger car sales determinants in Malaysia. This research found that the Gross Domestic Product (GDP), interest rate, inflation, exchange rate, and unemployment ratio affected the passenger car sales in Malaysia. This research utilized data from 1981- 2010. Then, Chifurira, Mudhombo, Chikobvu, and Dubihlela (2014) analyzed the relation between inflation and car sales in South Africa. This research used monthly data from 1960 to 2013. This research confirmed that inflation had influenced new car sales in South Africa with 5% significance rate.

Similarly, Kang and Lee (2014) found the factors that influenced the car sales in China. They discovered that the price of durable goods, interest rate, and income level had affected car sales. The higher the income increased, the higher the car sales in China were. Meanwhile, Kruger and Von Kristina (2015) noticed that the industry life cycle highlighted the role of knowledge in various forms on the durations in the survival of firms in the industry. The research excluded the influence of historical events, which were reflected in macroeconomic factors like income, inflation, exports, and interest rates on the industry lifecycle. They investigated the relationship between macroeconomic conditions and firm survival in the German automobile industry during 1886-1939. The results revealed that the macroeconomic conditions influenced firm survival in addition to the traditional knowledge variables and contributed to explanatory power substantially.

Next, Lee and Kang (2015) analyzed the global crisis effect on motor vehicle sales in China. The main factors that influenced motor vehicle sales in China were motor vehicle price, fuel price, interest rate, and individual income before the global crisis. While the global crisis occurred, motor vehicle sales were influenced by motor vehicle sales, interest rate, and individual income. Then, individual income affected automotive sales after the global crisis in China. Moreover, Patra and Rao (2017) found evidence about a positive and long-run relationship between automobile sales, GDP per capita, and the remaining variables. They had the inverse relationship with automobile demand. As it could be seen, the higher GDP led to a higher volume of automobile sales. However, the interest rate and fuel price had a negative relationship with both passenger and

commercial vehicles sales. Each factor played a key role in determining the level of automobile demand. The model estimation of passenger and commercial vehicles demand through unit root test found that they had a long-term and positive equilibrium relationship with the GDP per-capita. The error correction term was negative and statistically significant.

Tshiakambila (2016) investigated whether the increase in the price of food products had a significant effect on passenger vehicle purchases in South Africa. This study concluded that economic factors, such as interest rate and fuel price, had an insignificant influence on passenger vehicle purchases in South Africa. However, the impact of inflation was found to be insignificant. Therefore, the increase in the price of food products will not play a considerable role in consumers' decisions regarding passenger vehicle purchase in South Africa. Moreover, Lee and Govindan (2014) argued on the influence of consumers' buying behavior on automotive sales in Malaysia. They performed a survey on 171 consumers by observing them from four dimensions. This research discovered that the vehicle's reliability, safety, and the price had a significant influence on consumers' buying behavior.

Kemal, Erkan, Muhsin, and Ömer (2015) did determinant factors research that influenced light commercial vehicles in developing countries. They performed a survey of 408 respondents in Turkey. They discovered that gender, age, monthly income, family size, driving license type, and fuel type had a significant influence on light commercial vehicles demand. On the contrary, Günşen (2015) studied the economic effects of Foreign Direct Investments (FDI) on the Turkish automotive industry. The researcher analyzed it between 1997 and 2010 in terms of export, productivity, and employment. The results showed a significant FDI contribution to the Turkish automotive industry in all three areas. The results also showed that FDI had a significant positive effect on the Turkish economy. Next, Benmelech, Meisenzahl, and Ramcharan (2017) found that the collapse of the asset-backed commercial paper market reduced the financing capacity of non-bank lenders as the captive leasing companies in the automobile industry. As a result, car sales in countries that traditionally depended on non-bank lenders declined sharply. They concluded that the decline in auto sales during the financial crisis was caused in part by a credit supply shock driven by the illiquidity of the most important providers of consumer finance in the auto loan market.

Meanwhile, Kaur and Kaur (2016) attempted to ascertain the determinants of profitability of automobile industry in India. It was done by taking a sample of all the automobile firms covering various segments of the automobile industry in India listed on Bombay Stock Exchange (BSE), for eleven years from 2003-04 to 2013-14. It included commercial vehicles, three-wheelers, two-wheelers, and passenger vehicles. To achieve the objectives of the study, firm-specific factors such as financial leverage, size of firm, tangibility of assets, growth of firm, liquidity, inventory

turnover ratio, debt-equity ratio, debtors turnover ratio, total assets turnover ratio, average payment period, and cash liquidity of firm were regressed on return on assets ratio. It was found that profitability of the automobile industry in India was significantly influenced by the liquidity position of the firm, growth of the firm, inventory turnover ratio, debt-equity ratio, and average payment period.

Altaf and Hashim (2016) identified and investigated the key factors which influenced intentions to purchase passenger cars among consumers in Pakistan. The findings of the study were useful to both managers in the auto industry as well as policymakers. It will help managers in the auto industry to gain a better understanding of consumer intentions and identify the factors which influence them. Policymakers in the auto sector in Pakistan would benefit from the insights of this study in developing the long-overdue auto policy. Analysis of the data collected revealed that the three key factors identified from studies in other Asian countries were also relevant for Pakistani auto consumers.

Furthermore, Demiroglu and Yunculer (2016) estimated the trend level of light-vehicle sales to be roughly 7% of the existing stock. A remarkable out-of-sample forecast performance was obtained for horizons up to nearly a decade by a regression equation using only a cyclical gap measure, the time trend, and obvious policy dummies. Various specifications suggested that the strong 2015 growth of light-vehicle sales was predictable in late 2014.

Gaddam (2016) studied the export and output relationship of the automobile industry. The researcher focused on the geographic concentration of automobile industry exports from India to other countries. This study revealed that there was a significant impact on automobile industry output on its exports. The analysis of the geographic concentration of automobile industry exports from India to other countries showed that there was an improvement in automobile industry exports to other countries. Next, Bach, Machado, Kudlawicz-Franco, Martins, and Da Veiga (2017) analyzed the performance of the retail automotive industry by considering the monetary policy by the Brazilian government from 1994 to 2014. Since the research area lacked empirical evidence, they decided to use econometric methods leading to estimation models based on regression and correlation. It was to check the relation between monetary policy and sector performance. The research found out that the performance of the sector represented by production and export level was connected to the variables related to the monetary policy. When the performance was measured using exports, the economic variables acted as expansion or constrained mechanisms.

Moreover, Chouksey, Deshpande, Agarwal, and Gupta (2018) identified various critical success factors on sales forecasting. It was determined based on real-time primary data and secondary data of the automobile firm situated at Pithampur, specifically in the commercial vehicle segment study. In this

research, an attempt was made to apply regression analysis on external and internal factors to forecast sales of the company. They added an approach that analyzed and compared various macro and micro factor sensitivity towards the forecasting accuracy to the literature of sales forecasting. Meanwhile, Zhang, Zhong, Geng, and Jiang (2017) presented a Singular Spectrum Analysis (SSA) as a univariate time-series model and Vector Autoregressive (VAR) model as a multivariate model. Empirical results suggested that SSA indicated the evolving trend and provided reasonable results satisfactorily. The VAR model, which comprised of exogenous parameters related to the market on a monthly basis, could significantly improve the prediction accuracy. The Electric Vehicle (EV) sales in China categorized into the battery and plug-in EV were predicted in both short term (up to December 2017) and long term (up to 2020) as the statistical proofs of the growth of the Chinese EV industry.

Albors-Garrigos, Frass, Schoeneberg, and Signes (2017) clarified the impact of national culture in the after sales service in the automotive sector. The research provided a guideline to how the entire process chain of after-sales services could be researched and applied successfully in the individual level value theory by Schwartz. Then, Kim and Kim (2018) identified the opportunities for improving supply chain performance by quantifying the impact of suppliers on the supply chain. The results showed that the efficient operation of partners hampered the efficiency of the total supply chain. Thus, there might be several partners that were not committed to quality improvement. Consequently, automakers had to review its partner management system, including its performance measurement and incentive systems.

Next, Imran, Jian, Haque, Urbański, and Nair (2018) explored the roles of Total Quality Management (TQM), Entrepreneurial Orientation (EO), Export Market Orientation (EMO), Brand Orientation (BO), and Cleaner Production (CP) in Firm Export Performance (FEP). The research eminently contributed to the export performance of the automobile industry, especially in China. It is very beneficial to practitioners in the Chinese automobile industry as it would assist them in regaining and exceeding their record export performance. It also contributed to resource-based-view theory.

Jayaraman, Arumugam, Kumar, and Kiumarsi (2018) examined the influencing factors for the usage of non-national cars in Malaysia. Based on the significant findings and results, non-national cars were perceived as having certain salient features, superior fuel consumption, and commendable maintenance and repair after-sales services. The respondents opined that manufactures of non-national cars conducted regular Research & Development (R&D) activity, and continuously respond to market tastes and preferences. Thus, it enhanced consumers' propensity to purchase non-national cars.

Tuman (2019) examined the variation in the

number of strikes, and days lost to strikes in the Mexican automobile industry. The findings of the study provided empirical support for perspectives emphasizing the legacies of state corporatism, and theories focusing on the effects of regional integration. Unions that were independent of the Confederation of Mexican Workers, and democratic unions, were associated with a higher count of strikes and strikes with longer duration in each plant. Higher tariffs on imported vehicles also had a positive effect on strikes. However, the ratio of exports to national production in each firm was associated with a reduction in the number and duration of strikes. After adjusting for these influences, lagged real wage changes in each plant, local unemployment rates, and other factors had no influence. Then, Chakraborty and Chattopadhyay (2019) confirmed the validity of the structure-conduct-performance hypothesis. The finding emphasized debt-equity ratio, advertising intensity, and return on net worth as the key influencers of the concentrated market structure for the chosen automobile segment in India.

This research studies five macroeconomic variables. Those are USD to IDR exchange rates, inflations, interest rate, GDP, and the growth of GDP. The research is divided into car and motorcycle sales determinants in 1986-2016. The car price is more than ten times of the motorcycle price. The motorcycle and the car consumer have different sensitivity to the macroeconomic variables in purchasing automobiles. In this study, there are five research questions. Those are (1) Does GDP influence on car and motorcycle sales?, (2) Does the growth of GDP influence on car and motorcycle sales?, (3) Does inflation rate influence the car and motorcycle sales?, (4) Does interest rate influence the car and motorcycle sales?, and (5) Does exchange rate of USD to IDR influence the car and motorcycle sales?

The hypotheses of the research are as follow:

- H<sub>1</sub> : Exchange rate of USD to IDR influences car sales
- H<sub>2</sub> : GDP influences car sales
- H<sub>3</sub> : The growth of GDP influences car sales
- H<sub>4</sub> : Inflation influences car sales
- H<sub>5</sub> : Interest rate influences car sales
- H<sub>6</sub> : Exchange rate of USD to IDR influences motorcycle sales
- H<sub>7</sub> : GDP influences motorcycle sales
- H<sub>8</sub> : The growth of GDP influences motorcycle sales
- H<sub>9</sub> : Inflation influences motorcycle sales
- H<sub>10</sub> : Interest rate influences motorcycle sales

## METHODS

The framework is illustrated in Figure 1. The researcher tests the influence of macroeconomics variable on automobile sales in Indonesia. The macroeconomics variables are USD to IDR exchange rate, GDP, the growth of GDP, inflation, and interest

rate. The USD to IDR exchange rate is the year-end rate published by the department of treasury in Indonesia. Then, the inflation rate is the rate announced by the government by the end of the year. Next, the interest rate used is SBI.

This research is performed using regression model which is stated as follows:

$$Y_{it} = \beta_0 + \beta_1 USD_{it-1} + \beta_2 GDP_{it} + \beta_3 \Delta GDP_{it} + \beta_4 Inf_{it-1} + \beta_5 SB_{it-1} + e_{it}$$

Where:

- Y = Car Sales or Motorcycle Sales
- B<sub>0</sub> = Constanta
- B<sub>1</sub> ... β<sub>i</sub> = Coeficient Regression
- USD<sub>it-1</sub> = Exchange Rate of USD to IDR
- GDP<sub>it</sub> = Gross Domestic Product
- ΔGDP<sub>it</sub> = The growth of Gross Domestic Product
- Inf<sub>it-1</sub> = Inflation
- SB<sub>it-1</sub> = Interest Rate
- ε = Error Term

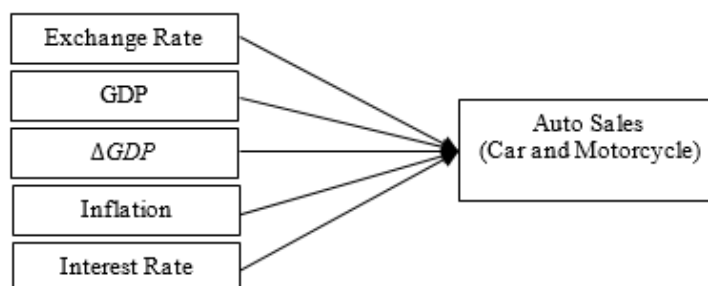


Figure 1 Research Framework

In this research, five macroeconomic variables are used (Table 1). In this research, the researcher uses the regression method with Statistical Package for the Social Sciences (SPSS) Software to test the research model. This study uses secondary data collected from various institutes and officially published information. The data are cross-section data from the observed period of 1986-2016. The independent variables in this research are five macroeconomic variables from 1986 to 2016. Dependent variables are a motorcycle and car sales in a unit from 1986 to 2016. The data are collected from several independent sources such as Gabungan Industri Kendaraan Bermotor Indonesia (GAIKINDO - The Association of Indonesia Automotive Industries), Asosiasi Industri Sepeda Motor Indonesia (AISI - Indonesian Motorcycle Industry Association), Biro Pusat Statistik (BPS - Central of Bureau Statistic), and Bank Indonesia.

Table 1 Research Variable

No	Variable	Symbol	Formula
1	Car Sales	MOB	car sales in year $t$
2	Motorcycle Sales	MOT	motorcycle sales in year $t$
3	Exchange Rate of USD to IDR Lag -1	USD <sub><math>t-1</math></sub>	Exchange rate USD to IDR in year $t-1$
4	GDP	GDP	GDP in year $t$
5	Growth of GDP	$\Delta$ GDP	$GDP_t - GDP_{t-1}$
6	Inflation Lag -1	Inf <sub><math>t-1</math></sub>	inflation in year $t-1$
7	Interest Rate Lag -1	SB <sub><math>t-1</math></sub>	interest rate year $t-1$

(Source: Research Data)

Table 2 Statistic Description

	Car Sales (unit)	Motorcycle Sales (unit)	Exchange Rate (IDR/USD)	GDP (%)	Growth of GDP (%)	Inflation (%)	Interest Rate (%)
Mean	479.032	3.239.913	7.070	7,40	6,00	10,02	17,62
Median	336.471	20.855.449	9.011	7,32	5,78	8,37	15,57
Maximum	1.229.901	8.012.540	16.800	8,29	6,68	77,63	49,23
Minimum	58.303	302.760	1.334	6,65	- 13,13	2,01	7,14
Std Dev.	346.372	2.837.791	4.380	0,46	6,91	13,16	7,41

(Source: Research Data)

## RESULTS AND DISCUSSIONS

In Table 2, car sales averagely have reached 479.032 units for 30 years. The lowest average is 58.303 units, and the highest is 1.229.901 units. Meanwhile, motorcycle sales have reached 3.239.913 averagely in 30 years. The lowest average reaches 302.760 units, and the highest is 8.012.540 units. Then, the exchange rate of USD to IDR is IDR7.069 averagely. The highest average was IDR16.800 in 1998. Meanwhile, the lowest is IDR1.334. Moreover, the GDP of Indonesia averagely is around IDR1.791 trillion. The highest average was IDR4.000 trillion, and the lowest was IDR737 trillion in 1986. In average, the growth of GDP in Indonesia is around 6% in the last 30 years with -13% as the lowest average and 7% as the highest. Moreover, inflation in Indonesia was the highest (77%) in 1998. Then, the lowest was 2%. Averagely, inflation is 10% per year. Next, the highest interest rate in Indonesia was 49% during 1998, and the lowest was 7%. Averagely, the interest rate reaches 17% per year in 30 years.

Table 3 shows the results for car sales. In the exchange rate, from t-test, it results in 0,508. It is above the trust level of  $\alpha > 0,05$ . It can be said that the exchange rate of USD to IDR does not influence car sales in Indonesia.  $H_1$  is rejected. Generally, a vehicle

price adjustment is due to the exchange rate change. However, there was a time lag on the adjustment in 1998. The current car price will have a time lag in adjusting to the exchange rate. However, for some types of cars, the price will not be adjusted due to higher local contents than the import content.

The t-test result acquires the value of 0,000 for GDP or lower than 0,05. Therefore, GDP influences car sales in Indonesia.  $H_2$  is accepted. The higher the GDP is, the higher the car sales are in Indonesia. The higher the citizens' income is, the higher purchasing power of the consumer and the vehicle purchasing ability are. It is in line with the credit capacity to get financial help from the financial institutions. Financial institutions such as bank and finance company will penetrate a country if the economy of the country has reached a certain level for income.

In the growth of GDP, t-test result reaches 0,042 or below 0,05. It means that the growth of GDP affects car sales in Indonesia. The hypothesis that growth of GDP influences car sales ( $H_3$ ) is accepted. It shows that the ability of purchasing will be increased according to the increase in GDP. The growth of GDP will influence the GDP level or income level of the society. The higher growth of GDP is, the higher the impact it will have in GDP. The result supports the research by Nawi *et al.* (2013) and Kang and Lee (2014).

Table 3 Test Result of Car Sales Determinant

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Exchange rate of USD to IDR	-9,257751	13,76596	-0,67251	0,508
GDP	718077,5	114318,1	6,28140	0,000
Growth of GDP	8553,623	3973,52	2,15266	0,042
Inflation Lag 1	-2673,516	5044,4	-0,53000	0,601
Interest Rate Lag 1	746,8668	7740,603	0,09649	0,924
C	-4810132	783368,1	-6,14032	0,000
R-squared	0,886846	Mean dependent var		479031,5
Adjusted R-squared	0,863272	S.D. dependent var		346372
S.E. of regression	128077,3	Akaike info criterion		26,53551
Sum squared resid	3,94E+11	Schwarz criterion		26,81575
Log-likelihood	-392,0327	Hannan-Quinn criter.		26,62516
F-statistic	37,61989	Durbin-Watson stat		1,275737
Prob(F-statistic)	0,00000			

Table 4 Test Result of Motorcycle Sales Determinant

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Exchange Rate of USD to IDR	124,0225	133,2082	0,93104	0,361
GDP	4278092	1106214	3,86733	0,001
Growth of GDP	36804,64	38450,3	0,95720	0,348
Infation Lag 1	-25483,29	48812,82	-0,52206	0,606
Interest Rate Lag 1	-33268,67	74902,99	-0,44416	0,661
C	-28692867	7580367	-3,78516	0,001
R-squared	0,84215	Mean dependent var		3239913
Adjusted R-squared	0,809264	S.D. dependent var		2837791
S.E. of regression	1239357	Akaike info criterion		31,07494
Sum squared resid	3,69E+13	Schwarz criterion		31,35518
Log-likelihood	-460,1241	Hannan-Quinn criteria		31,16459
F-statistic	25,60857	Durbin-Watson stat		0,555644
Prob(F-statistic)	0,00000			

The research result acquires the value of 0,601 in inflation. It is above the trust level of 0,05. It implies that inflation does not influence car sales in Indonesia. The hypothesis that inflation influences car sales ( $H_4$ ) is rejected. The higher inflation is, the higher interest rate will be. The high-interest rate will reduce the payment capacity of the consumer. The result is not in line with Nawi *et al.* (2013).

Similarly, the interest rate does not influence the car sales in Indonesia. The results show that t-test reaching 0,924 or above trust level of 0,05.  $H_5$  is rejected. It is in line with the result of inflation. Interest rate is affected by inflation. Thus, the result differs from Nawi *et al.* (2013), Tshiakambila (2016), and Lee and Kang (2015).

From t-test in Table 4, the result is 0,36 or above the trust level of 0,05. It means that the exchange rate of USD to IDR does not influence motorcycle sales in Indonesia.  $H_6$  is rejected. The statistic results show that car sales and motor cycle sales are not influenced by the exchange rate. Next, the result of t-test for GDP is 0,00. It is below 0,05. It implies that GDP influences motorcycle in Indonesia. The higher the GDP is, the higher the motorcycle sales are in Indonesia. Therefore, the  $H_7$  accepted that GDP influence the motorcycle sales in Indonesia. In other words, the higher the citizens' income is, the higher the vehicle purchasing ability will be. The result regarding GDP is supported by Nawi *et al.* (2013) and Patra and Rao (2017). The statistic model shows that both car sales

and motorcycle sales are influenced by the GDP.

In the growth of GDP, the researcher acquires the value of 0,35. It is above the trust level of 0,05. It is concluded that the growth of GDP does not influence motorcycle sales in Indonesia. So,  $H_8$  is rejected. The result of motorcycle sales is different from car sales. It is because the consumers who purchase car are sensitive to the growth of GDP than the consumers who purchase motorcycle.

For inflation, it reaches 0,61 or above the trust level of 0,05. It means that inflation does not influence motorcycle sales in Indonesia.  $H_9$  is rejected. The result is in line with Chifurira *et al.* (2014). However, it is contrary to Nawi *et al.* (2013).

Last, the interest rate does not influence the motorcycle sales in Indonesia. It is proven by t-test result (0,66). It is above the trust level of 0.05. The hypothesis that interest rate influences the motorcycle sales ( $H_{10}$ ) is rejected. However, the result differs from Nawi *et al.* (2013), Tshiakambila (2016), and Lee and Kang (2015). A credit supply shock causes a decline in auto sales during the financial crisis. It is driven by the illiquidity of the most important providers of finance in the auto loan market (Benmelech *et al.*, 2017). Normally, during the financial crisis, the interest rate will be high.

## CONCLUSIONS

The research aims to study the determinants of automobile sales in Indonesia. The automobile sales are the sales of car and motorcycle during 1986-2016. The research focuses on five macroeconomics variables (exchange rate, GDP, growth of GDP, inflation, and interest rate). From the test result, it can be concluded that GDP and the growth of GDP stimulate both motorcycles and cars sales in Indonesia from 1986 to 2016. However, the exchange rate of USD to IDR, inflation, and interest rate do not influence car and motorcycle sales in Indonesia with the lag-1 test. The significant influence is not found.

The research has few limitations, such as the economic cycle effect. It is because the data observed in 30 years only focus on the vehicle produced by the manufacturer. These limitations may prohibit the results to be generalized. Further research may be performed by limiting the year and extending the number of micro variables. The variables can be product life cycle, the demography of consumer, number of distribution channel, and infrastructure readiness. Furthermore, the other macroeconomics variable such as tax effect, the liberation of foreign investment, liquidity policy by the government, and foreign exchange policy will add the value on the research results.

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