Identification and Evaluation of Decisive Factors in the Growth of Automobile Industry of Pakistan

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ABSTRACT

Pakistan's automobile industry is small in Asia but its growth is the fastest in this region. This industry contributes 30 billion rupees to national exchequer through taxes and contributes around 2.8 percent in GDP. Hence, it is imperative to study the economic factors that are responsible for influencing this industry in this country. The present study is a quest in this domain. Economic factors that determine car sales such as GDP growth, CPI inflation, interest rate, exchange rate, unemployment rate, and fuel prices are used. The period of this study is from 1999-2021. ARDL modeling approach is used to test and estimate the potential cointegrating relationship between the aforementioned variables. Results of this study showed that car sales are affected by changes in the interest rate and unemployment rates in the short run. Factors such as GDP growth, CPI inflation, unemployment rate, and petrol prices significantly affect the car sales in the long run. The performance of automobile industry may be improved by open up domestic market to cut the import bill and to protect the local industry from foreign competition for the benefit of consumers.

1. Introduction

Pakistan's automobile industry has picked up the fastest speed in terms of growth. The phenomenal growth can be judged by the fact that this industry has seen a growth of 171% in-between 2014-18. Its share in GDP is around three percent and the employed labor force in this sector is above 3.5 million. Its market is small as compared to other Asian economies, but its rapid growth is the apex of its type. The major players in the automobile industry of Pakistan are Honda, Toyota, and Suzuki. Although, in recent years, cars by South Korean company Kia motors and Chinese company Chang'an are getting popular very quickly in Pakistan (Pakistan Board of Investment, 2021).

Economic growth is an important variable for determining demand. A positive growth reflects growth in income and positive income growth is expected to increase the demand for cars. Therefore, sales of cars are expected to be positively related to economic growth. Contrarily, higher interest rates increase the cost of borrowing, and cars are often purchased by

loans from banks. Hence, interest rates and sales of cars are expected to be negatively related. However, a higher interest rate also implies higher income on saving accounts and this could lead to a positive effect on car sales. Similarly, the depreciation of the domestic currency is expected to increase the price of cars and decrease the demand for cars. Most cars in Pakistan are assembled through imports of constituting components in Pakistan.

Inflation is normally associated with a reduction in purchasing power. Hence, higher inflation implies a reduction in the demand for cars. Therefore, fewer cars are expected to be purchased under such circumstances. Similarly, higher unemployment reduces the possibility of more sales of cars. So the instance of a higher unemployment rate can be expected to produce lower sales of cars. Similarly, higher petrol prices while keeping other prices constant could lead to fewer sales of cars.

This study will explore the economic factors that are influential on the sales of automobiles in Pakistan. The sale of cars is taken as the representative variable that reflects sales in the automobile industry. Since cars are widely used throughout the world and this variable can be used as a proxy to represent sales of the whole automobile industry. The past studies highlight the impacts of economic growth, interest rate, inflation, exchange rate, unemployment rate, and petrol prices (Huda, 2018; Lee & Kang, 2015; Patra, 2017). Current work is also based on analyzing the impacts of these key economic factors on the automobile industry for the economy of Pakistan. Specifically this attempted to estimate the individual contribution and impact of economic growth, interest rate, inflation, exchange rate, and unemployment rate on the sale of cars.

2.   Literature Review

Nawi, Ahmad, Mahmood, Nurathirah, and Hamid (2013) studied the factors influencing sales of cars in the Malaysian economy. The factors that came out to produce important effects on car sales were GDP, unemployment, inflation, rate of interest, and exchange rate. The impact of inflation on car sales was studied by Chifurira, Mudhombo, Chikobvu, and Dubihlela (2014) for the South-African economy. Lee and Kang (2015) examined the effects of durable goods prices, rate of interest, and income on sales of cars in China. Kruger and von Rhein (2015) showed the important contribution of economic factors to the survival of firms related to the automobile industry.

Moreover, Lee and Kang (2015) assessed the impact of worldwide financial disruptions on the Chinese automobile industry. The impact of food prices on car sales is studied by Tshiakambila (2016) for the South-Korean economy. Altaf and Hashim (2016) investigated the influences of product, product price, and sales services provided by the company on the purchase intentions of automobiles for the economy of Pakistan. Patra (2017) found a significant impact of macroeconomic variables as well as fuel prices on car sales in the Indian economy. Similarly, Johan (2019) studied the impact of economic variables on the Indonesian automobile industry.

Shoaib (2021) carried out a research to explore the main intra-organizational challenges faced by the automotive industry of Pakistan. This industry generate income, employment, export and contribute in economic stability. However, it also faced issues and practical challenges. The study used the quantitative methods to analyze these challenges. Data was collected from 350 employees of Atlas Honda, a larger automotive company based in Pakistan. Main findings of this study revealed that intra-organizational communication challenges arise due to industry characteristics, lack of resources and country's culture on managerial practices.

Haque, Rashid, and Ahmed (2021) studied the nature and performance of automobile sector of Pakistan in context of global business. The study evidenced that industry is largely protected and face high duties and compliance to governmental policies. The study employed the Balassa indices and data collection period was 1997-2016. The study results showed that

Spain and Japan had greater competitive advantages. There found a positive relationship between production and growth of industry.

It is quite clear from the literature that it is common practice to analyze the effects of aggregate economic variables on sales in the automobile industry. However, we have not come across a single study for the economy of Pakistan that did such kind of analysis. This study will try to fill this very gap in the economy of Pakistan.

3. Research Methodology

Six economic variables are used to assess the impact of these variables on sales of automobiles. These variables are GDP growth, inflation, interest rate, exchange rate, unemployment rate, and fuel prices represented by petrol prices. Data on these variables are taken from annual automobile reports, the Pakistan automotive manufacturers association, and different issues of Pakistan economic surveys and handbook of statistics published by the State Bank of Pakistan. The data range is from 1995-2021 and the frequency of the data is annual. The following six hypotheses are evaluated in this study.

> H1: GDP growth has an impact on car sales.
> H2: Inflation creates an impression on car sales.
> H3: interest rate influences sales of cars.
> H4: Car sales are affected by exchange rates.
> H5: Car sales are affected by unemployment rates.
> H6: Car sales are affected by Fuel prices.

The autoregressive distributed lag (ARDL) model[1] is used to assess the impacts of aggregate economic variables on car sales for Pakistan's economy. The model specification is given below.

$$\Delta CARS_t = \theta_0 + \emptyset_1 CARS_{t-1} + \emptyset_2 GDPG_{t-1} + \emptyset_3 CPIINFL_{t-1} + \emptyset_4 INTR_{t-1} + \emptyset_5 EXCR_{t-1} + \emptyset_6 URATE_{t-1} +$$
$$\emptyset_7 PETPR_{t-1} + \sum_{\rho=1}^{P} \varphi_P\, CARS_{t-P} + \sum_{j=1}^{q} \omega_j \Delta GDPG_{t-j} + \sum_{k=1}^{q} \gamma_k\, \Delta CPIINF_{t-k} + \sum_{l=1}^{q} \delta_l\, \Delta INTR_{t-l} +$$
$$\sum_{m=1}^{q} \sigma_m\, \Delta EXCR_{t-m} + \sum_{n=1}^{q} \tau_n\, \Delta URATE_{t-n} + \sum_{r=1}^{q} \beta_r\, \Delta PETP_{t-r}\,`+\epsilon_t \qquad (1)$$

Where,
> $CARS_t$ = Car sales in period t.
> GDP = GDP Growth rate
> CPIINFL = CPI inflation
> INTR = Interest rate
> EXCR = Exchange rate
> URATE = Unemployment rate
> PETP = Petrol price

θ_0, $\emptyset_1$, $\emptyset_2$, $\emptyset_3$, $\emptyset_4$, $\emptyset_5$, $\emptyset_6$, $\emptyset_7$, φ_P, ω_j, γ_k, δ_l, σ_m, τ_n, and β_r are the parameters of the model which are estimated by the ordinary least squares (OLS) estimation technique.

4. Results and Discussion

Table 1 shows the probability values of Augmented Dicky Fuller (ADF) unit-root test results for the economy of Pakistan. GDP growth and interest rate are stationary at levels whereas all other variables are stationary at first difference. Hence, we have a mix of I(0) and I(1) variables. Therefore, the appropriate modeling approach is ARDL.

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[1] For further detail, see Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001).

Table 1
Unit Root Test Results

Variables	ADF Test (At Level)	ADF Test (At First Difference)
CARS	0.24	0.00
GDPG	0.03	-
CPIINFL	0.21	0.00
INTR	0.03	-
EXCR	0.99	0.01
URATE	0.46	0.00
PETP	0.10	0.01

Sources: Authors' data analysis results, 2022

Table 2 contains the results of the Bound test results. It is obvious from these results that the calculated value is greater than the critical values of all traditional significance levels. Hence, there exists a cointegrating relationship between car sales, GDP growth, CPI inflation, interest rate, exchange rate, unemployment rate, and petrol prices.

Table 2
Bound Test Results

F-Statistics	10.49	
Critical bound values	**Lower Bound Value**	**Upper Bound value**
10%	2.33	3.25
5%	2.63	3.62
1%	3.27	4.39

Sources: Authors' data analysis results, 2022

Table 3 presents short-run and long-run results for the car sales model estimated for the economy of Pakistan. In the short run, the interest rate has a positive and significant impact on car sales. At a higher significance level, an increase in the unemployment rate has a negative impact on car sales. It seems that in the short-run car sales are affected by changes in the interest rate and unemployment rate for the economy of Pakistan. The value of the error-correction term is -0.88 which implies the presence of an error-correction mechanism. 0.88 percent error is corrected in each period indicating quick convergence.

Table 3
Short-run and Long-run Results

Short-run				Long-run			
Dependent Variable (Car Sales)				Dependent Variable (Car Sales)			
Regressors	**Coeff.**	**t-Stat**	**Prob.**	**Regressors**	**Coeff.**	**t-Stat**	**Prob.**
D(GDPG)	0.02	0.23	0.82	GDPG	0.14	1.94	0.08
D(CPIINFL)	-0.02	-0.32	0.75	CPIIINFL	-0.55	-2.02	0.07
D(INTR)	0.34	4.01	0.00	INTR	0.01	0.02	0.98
D(EXCR)	-0.18	-0.29	0.77	EXCR	-0.52	-0.49	0.63
D(URATE)	-0.16	-1.70	0.12	URATE	-0.76	-2.45	0.03
D(PETP)	0.04	0.36	0.72	PETP	0.81	2.10	0.00
ECM (-1)	-0.88	-11.95	0.00				

Sources: Authors' data analysis results, 2022

Table 3 also contains long-run results for car sales for the economy of Pakistan. GDP has a positive long-run impact on car sales for the economy of Pakistan. Its value is statistically significant at 10 percent level of significance. Contrarily, CPI inflation has a long-run negative effect on car sales for this economy and this result is also statistically significant at ten percent level of significance. The findings are also in align with the study of (Hunibachew, 2021). The unemployment rate has also a negative effect on car sales in this economy and this influence is statistically significant. Surprisingly, an increase in petrol prices, in the long run, has a positive impact on car sales which is also statistically significant. All other variables have statistically insignificant effects on car sales.

4.1   Post Diagnostic Test Results

This section will contain post-diagnostic test results for the estimated models. These results are for serial autocorrelation, residuals' normality, and model stability tests. These results show that the model does not suffer from the problems of autocorrelation, residuals' non-normality (Table 4), and model instability (Figure 1). Therefore, we can conclude that the results of this model are reliable.

Table 4
Testing of Serial Correlation and Residuals' Normality

Breusch-Godfrey Serial Correlation LM Test: No autocorrelation			
F-statistic	0.093639	Prob. F(1,9)	0.18
Normality test Ho: normally distributed residual			
Jarque-Bera	0.63	Probability	0.73

Sources: Authors' data analysis results, 2022
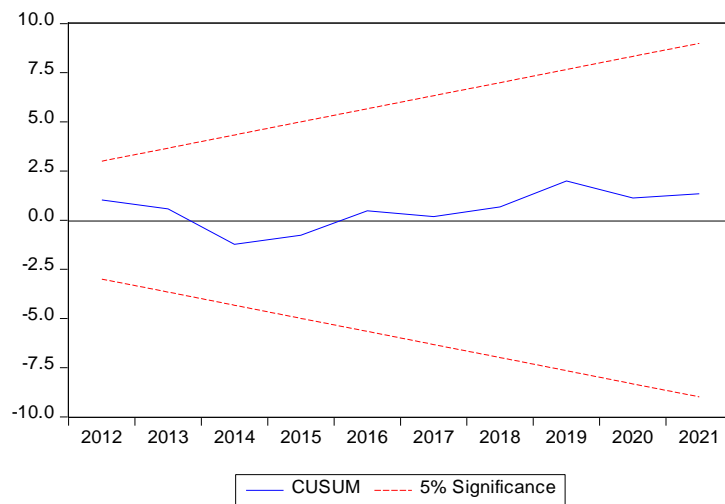
Figure 1: Testing of Model Stability
Sources: Authors' data analysis results, 2022

5.   Conclusions and Recommendations

This specifically carried out to determine the role of major economic variables on car sales in Pakistan. The findings revealed that car sales are positively affected by an increase in the interest rate and negatively by an increase in the unemployment rate. GDP growth and petrol prices have long-run positive influences on the car sales for this economy. Usually, hikes in petrol prices are related to an even greater increase in the prices of domestically produced consumer goods. Therefore, an increase in petrol prices seems to give an excuse to the producers to increase their price and hence their profits. These surges in profits might be the reason behind the positive relationship between petrol prices and car sales. Negative long-run relationships appear to exist between car sales, CPI inflation, and the unemployment rate for the economy of Pakistan. Hence, for smooth positive car sales, the policymakers need to ensure stable GDP growth, a decrease in the unemployment rate, and a reduction in CPI inflation. For a sustainable development of automotive sector, Pakistan should effort to establish manufacturing facility and allow the duty free import of plant and machinery on a one time basis.

Authors Contribution
Rukhsana Rasheed: introduction, data analysis and interpretation, drafting
Mazhir Nadeem Ishaq: conception/design of work, revision, incorporation of intellectual content
Fahad Malik: data collection, literature search, methodology, drafting

Conflict of Interests/Disclosures

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