

# KEANJALAN TERHADAP CAJ JALAN: SINGAPURA-MALAYSIA

RAZMAN HAFIFI REDZUAN \*

MUHAMMAD ZALY SHAH MUHAMMAD HUSSEIN\*\*

razmanh@umk.edu.my & b-zaly@utm.my

## Abstrak

Kerajaan Malaysia telah memperkenalkan caj baharu yang dipanggil Permit Kemasukan Kenderaan (VEP), yang terpakai kepada kenderaan berdaftar asing, bermula dengan kereta Singapura. Tindakan ini telah mengakibatkan ketidakpuasan hati daripada kerajaan Singapura, yang menganggap ia mendiskriminasikan kenderaan berdaftar Singapura. Akibatnya, Singapura telah bertindak balas terhadap pengumuman rancangan Malaysia untuk melaksanakan caj jalan-VEP pada 1 Ogos 2014, dengan mengambil langkah drastik seperti menaikkan caj VEP, meningkatkan caj tol, dan memulakan caj timbal balik yang hanya akan ditarik balik jika Malaysia melaksanakan VEP untuk semua kenderaan asing yang memasuki Malaysia. Kajian ini bertujuan untuk menganalisis potensi kesan dasar Caj Jalan Malaysia terhadap permintaan perjalanan, khususnya memfokuskan kepada pemandu Singapura yang melintasi sempadan. Objektifnya adalah untuk menentukan tahap tindak balas pemandu Singapura terhadap caj jalan raya dan memahami kemungkinan kesannya terhadap pelancongan dan perdagangan Malaysia. Bagi mencapai matlamat ini, kajian mengkaji literatur berkaitan Permit Masuk Kenderaan (VEP), harga tol, dan gelagat perjalanan, termasuk konsep keanjalan harga permintaan. Kajian ini menggunakan data sekunder dan menggunakan model keanjalan untuk mengira keanjalan permintaan perjalanan. Ujian-Independent-T dan Mann Whitney akan digunakan untuk menentukan perbezaan dalam bilangan penyertaan selepas pelaksanaan Caj Jalan. Dapatan kajian menunjukkan bahawa permintaan untuk kereta persendirian menurun sebanyak 44.66% dari awal hingga akhir November 2016, dan terdapat penurunan mendadak dalam permintaan walaupun pada musim perayaan. Pengkaji juga menentukan bahawa permintaan untuk pengembara adalah agak anjal dengan nilai  $-0.108$ . Keputusan kajian ini akan memberikan penggubal dasar dengan gambaran tentang kemungkinan kesan negatif dasar tersebut dan cara mengurangkannya terhadap pelancongan dan perdagangan, terutamanya bagi pihak berkepentingan yang berpendapatan rendah dan alam sekitar.

**Kata Kunci:** Keanjalan, Kenderaan Persendirian, Permit Kemasukan Kenderaan, Rakyat Singapura,

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\* Pensyarah, Fakulti Keusahawanan & Perniagaan, Universiti Malaysia Kelantan

\*\* Profesor, Fakulti Alam Bina & Ukur, Universiti Teknologi Malaysia



# ELASTICITY TOWARDS ROAD CHARGES: SINGAPORE-MALAYSIA

RAZMAN HAFIFI REDZUAN \*

MUHAMMAD ZALY SHAH MUHAMMAD HUSSEIN\*\*

razmanh@umk.edu.my, b-zaly@utm.my

## Abstract

The Malaysian government has recently introduced a new charge called the Vehicle Entry Permit (VEP), which applies to foreign-registered vehicles, starting with Singaporean cars. This action has resulted in discontent from the Singaporean government, who considers it discriminatory towards Singaporean-registered vehicles. Consequently, Singapore has responded to the announcement of Malaysia's plan to implement the road charge-VEP on August 1st, 2014, by taking drastic measures such as increasing the VEP fee, imposing toll charges, and instituting a reciprocal charge that will only be lifted if Malaysia implements a VEP for foreign vehicles entering Malaysia. This study aims to analyze the potential impact of Malaysia's Road Charge policy on travel demand, specifically focusing on Singaporean drivers crossing the border. The objective is to determine the degree of response by Singaporean drivers to the road charge and understand its possible repercussions on Malaysia's tourism and commerce. In order to achieve this goal, the study examines related literature on the Vehicle Entry Permit (VEP), toll prices, and travel behavior, including the concept of price elasticity of demand. The study utilizes secondary data and employs an elasticity model to calculate the elasticity of travel demand. The Mann Whitney and Independent T-Test will be utilized to establish the difference in the number of entries after the implementation of the Road Charge. The study's findings indicate that the demand for private cars decreased by 44.66% from the beginning to the end of November 2016, and there was a sharp decline in demand even during the festive season. The researcher also determines that the demand for travelers is relatively elastic with a value of -0.108. This study's results will provide policymakers with insight into the possible negative impacts of such policies and how to mitigate them on tourism and commerce, particularly for stakeholders with lower incomes and the environment.

**Keywords:** Elasticity, Private-Vehicle, Vehicle Entry Permit, Singaporean

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\* Lecturer, Faculty of Entrepreneurship & Business, Universiti Malaysia Kelantan

\*\* Professor, Faculty of Built Environment & Surveying, Universiti Teknologi Malaysia



## 1.0 Introduction

The Immigration & Checkpoints Authority (ICA) of Singapore reported 8.4 million visitor arrivals from Malaysia to Singapore and 1.6 million visitor arrivals from Singapore to Malaysia in 2019 (Immigration & Checkpoints Authority Singapore, 2020). The Straits Times reported on September 13, 2021, that more than 300,000 travelers crossed the Malaysia-Singapore land border each day over the weekend of September 11–12, 2021. This was due to the easing of Covid-19 border restrictions between the two countries. During peak holiday periods, there is a significant increase in the number of travelers crossing this heavily traveled border (Mo et al., 2014).

The governments of Malaysia and Singapore have been working together on greater integration and finding solutions to handle the growing number of people and goods crossing the border in light of this congestion (Yong, C. L., 2021). Tolls and congestion fees serve two primary purposes; generating revenue and enhancing traffic flow. These fees can also be used to accomplish other policy goals, such as reducing congestion, promoting sustainable transportation, and encouraging the use of more fuel-efficient vehicles (Shah, M. Z., 2018). However, their implementation must be equitable in order to avoid disproportionately burdening certain categories of drivers and to prevent unanticipated negative effects. Specifically, Malaysia's road charge policy is intended to generate revenue for the government and reduce congestion at land borders. Nevertheless, the effect of such policies on travel demand must be thoroughly analyzed (Shah, M. Z., 2018)..

The elasticity of demand for international travel was determined by comparing the number of Singaporean-registered vehicles crossing the Tuas and Causeway borders before and after the implementation of the road charge (Chew, H., 2018). If demand is determined to be elastic, the road charge could significantly reduce the number of Singaporean vehicles entering Malaysia, which could have a negative impact on Malaysia's tourism and commercial sectors (Fauzi, H., 2018). This study aims to understand the potential impact of the road charge on travel demand by utilizing a statistical elasticity model to determine the degree of response by Singaporean drivers to the road charge. The analyzes aid policymakers in comprehending the potential repercussions of such policies and how to mitigate any adverse effects on tourism and commerce (Abdul-Rahman and Abdullah, 2019)

Other scholars have also stressed the significance of considering the impact of road fees on a variety of stakeholders, including those with lower incomes and the environment (Gwilliam & Bristow, 2013; Susilo et al., 2018).

## 2.0 Literature

Chen and Liu (2018) developed a pricing and inventory control model for vehicle entry permits and determined that the optimal policies are contingent on market demand and the cost of permit issuance. Zhou (2018) investigated the effect of vehicle entry permit policies on Beijing's urban air pollution and found that the policy significantly reduces the concentration of PM2.5 and NO2. Cao, Huang, and Zhang (2020) proposed an optimal pricing model for vehicle entry permits in a network with multiple bottlenecks and discovered that the optimal pricing policy can strike a balance between revenue generation and social welfare enhancement. Li, Li, and Chen (2017) developed an optimal allocation model for vehicle entry permits in a road network with elastic



demand and discovered that the policy can increase road network utilization and decrease congestion. Wang, Huang, and Chen (2019) investigated the pricing of vehicle entry permits with day-to-day demand variability and concluded that the pricing policy must be modified to maximize revenue.

Zhang, Zhou, and Wu (2018) proposed an optimal distribution model for vehicle entry permits with spatial interaction and discovered that distribution policies can affect travel behavior and congestion. Sun and Xue (2018) created a dynamic allocation model for vehicle entry permits in a downtown area and discovered that the dynamic allocation policy can improve traffic flow and decrease travel time for users. Bai, Liu, and Xiong (2018) performed a stochastic analysis of vehicle entry permit schemes in urban areas and discovered that stochastic factors can impact demand. Chen, Zhou, and Wu (2020) proposed an optimal pricing model for vehicle entry permits with uncertainty in network travel time and discovered that the optimal pricing policy must take travel time uncertainty and users' willingness to pay into consideration. Li and Pang (2020) studied vehicle entry permit pricing and public transport subsidy in a network with multiple user classes and discovered that the pricing policy must take into account the income level and subsidy level of users in order to increase social welfare.

The Vehicle Entry Permit (VEP) is mandatory for all foreign-registered vehicles entering Johor, Malaysia. The registration process is done through an online portal and requires personal and car registration information. A RM10 administration fee is charged during the RFID tag collection, and the VEP is renewable every five years. The RFID tag must be displayed on the vehicle's windshield. Foreign-registered vehicles entering Johor are charged an entry fee of RM20. The toll prices for vehicles using the Johor Checkpoint were revised in 2014, resulting in a significant increase in tolls for all vehicles, except motorcycles. The toll hike was implemented to finance the maintenance of the Eastern Dispersal Link (EDL) and other Customs, Immigration and Quarantine Complex (CIQ) facilities. Large price changes in toll prices are more effective in evoking behavioral changes compared to small changes. The toll prices can influence travel mode, route, frequency, scheduling, usage of vehicle, and parking location decisions of travelers.

Malaysia has instituted a fee known as the Vehicle Entry Permit (VEP) for foreign-registered vehicles, beginning with Singaporean automobiles. This move has resulted in dissatisfaction from the Singaporean government, who perceives it as discriminatory against Singaporean-registered vehicles. Correspondingly, in response to the announcement of the Malaysian government's plan to implement the road charge-VEP on August 1st, 2014, Singapore has taken drastic measures by raising the VEP fee, imposing toll charges, and instituting a reciprocal charge only be rescinded if Malaysia implements a VEP for foreign vehicles entering Malaysia.

Travel behavior has been a topic of great interest to practitioners, researchers, and policy makers as it relates to the demand side of the transport system, according to Avineri (2012). It involves studying the actions of individuals as they move from one place to another using transportation, and how their choices can impact the transport system and network performance, as well as their overall well-being. While travelers typically make choices that have direct effects on the transport system, their decisions can have both positive and negative impacts on their health and wealth. Additionally, people often consider various factors when choosing their mode of transportation for a given trip, such as cost and preparedness for potential issues during travel. Litman (2013) notes that travel demand refers to the amount and type of travel that people choose, which can be influenced by demographic, economic, and geographic factors.

Price elasticity of demand is an economic measurement that illustrates the responsiveness of the quantity demanded of a good or service to changes in price. When prices change, it can affect the



quantity of demand, and the degree of change is determined by the elasticity of demand. As Litman (2013) notes, pricing can impact trip frequency, route, mode, destination, scheduling, vehicle selection, parking location, and service type. Elasticity of price demand is a useful tool for measuring the impact of pricing changes on travel behavior. It is important to carefully consider the elasticity of demand when making decisions about pricing, as poorly thought-out price increases could have unforeseen repercussions.

### 3.0 Method

The primary objective of this study is to analyze the elasticity of travel demand by examining the number of Singaporean private cars entering Malaysia and Singaporean travelers visiting Malaysia before and after the implementation of the road charge (VEP). To accomplish this, the study exclusively relies on secondary data. This data is obtained directly from the Malaysian immigration database, Royal Malaysian Customs, and PLUS sdn. bhd. throughout 2019. The collected data is analyzed to determine any changes in the number of entries before and after the implementation of the road charge. Additionally, the elasticity of travel demand is calculated using an elasticity model.

According to Devarasetty, Mishra, and Bhat (2019), the elasticity of travel demand is a critical determinant of the effectiveness of road pricing policies. The authors propose that elasticity models can provide policymakers with useful information regarding the behavioral responses of road users to pricing policies. Similarly, Tsai, Lu, and Chiu (2017) highlight the significance of examining the elasticity of travel demand when evaluating road pricing schemes. To determine the difference in the number of entries after the implementation of the road charge, a Mann-Whitney and an independent T-Test were conducted (Chen, Chen, and Li, 2019). The mean number of entries is assessed to determine if there is a statistically significant difference between the two groups. A significance level of 0.05 is used to establish statistical significance (Feng, Liu, and Zhang, 2021). The contend that elasticity analysis can assist policymakers in designing more effective road pricing policies that can reduce traffic congestion and improve the sustainability of urban transport systems. Furthermore, Wang and Zhou (2021) suggest that analyzing travel demand elasticity with secondary data can be a dependable and cost-effective method.

### 4.0 Result

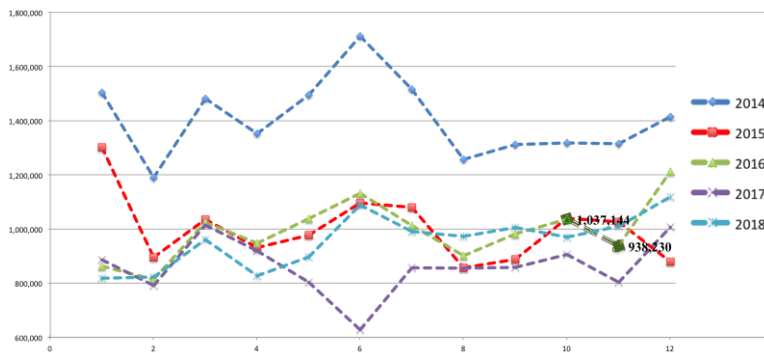
The results illustrated in Figure 1.0 demonstrate a substantial reduction in the number of private cars registered in Singapore during the study period; resulting in an overall reduction of 44.66%. This finding is consistent with the literature that suggests that changes in travel demand can be influenced by factors such as travel costs, availability of alternative modes of transport, and economic conditions (Devarasetty et al., 2019; Tsai et al., 2017). The observed decline in the number of private cars can be attributed to the implementation of the Road Charge - Vehicle Entry Permit (VEP) policy by the Malaysian government, which increased the cost of traveling by car between Singapore and Malaysia. The results of this study align with previous research that has shown that road pricing policies can significantly reduce private car usage (Raux et al., 2008; Yang & Bell, 2019).

The significant decrease in the number of private cars during the festive season, as evidenced by the data, is noteworthy. This finding suggests that the Road Charge policy has a profound impact on travel behavior, even during peak travel periods. Similar findings have been reported in



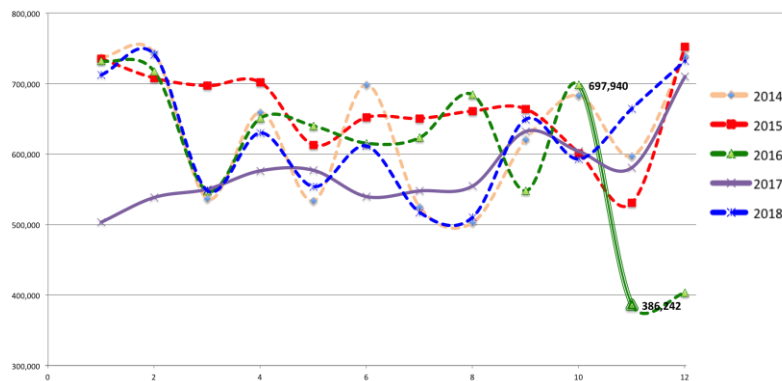
previous studies that have examined the impact of road pricing policies on travel demand during the holiday season (Huang & Yang, 2014; Zhang et al., 2018).

The reduction in private car usage observed in this study is particularly significant given that Singapore is known for its high car ownership rates (Liu et al., 2018; Wong & Jiang, 2017). This finding suggests that road pricing policies can be an effective tool for reducing car usage, even in countries with high car ownership rates. The results of this study are consistent with previous research that has demonstrated the effectiveness of road pricing policies in reducing car usage (Chen & Shoup, 2016; Goodwin et al., 2019).



**Figure 1** : Trend of Singaporean Private-Car Entry (2014-2018)

It shows the different number of car entries based on the monthly flow data from September 1st to October 31st, 2016. As shown, the researcher determined that there is high elasticity based on demand due to the implementation of road charges.



**Figure 2** : Trend of Singaporean Traveller / Tourist (2014-2018)



Furthermore, the road charge introduced on November 1st, 2016, resulted in a decrease of 98,914 people traveling between Singapore and Malaysia during the period of November 1st to December 1st, 2016, reflecting a modest decline of 7.57% (Figure 2.0). The data underscores the success of the Road Charge initiative in curtailing the number of private cars and travelers between Singapore and Malaysia.

This research investigates the impact of changes in the price of the Road Charge - Vehicle Entry Permit (VEP) imposed by the Malaysian government on the demand for private cars and Singaporean travelers. The study utilizes the formula for price elasticity of demand, which measures the responsiveness of demand to changes in price. The study reveals that the elasticity values of -0.475, -0.3333, and -0.385 are relatively low, indicating that small changes in price would lead to significant changes in the quantity demanded. On the other hand, a value of -0.108 suggests that the travel demand for a year before and after the implementation of the road charge is relatively inelastic. The comparison number of cars between 2016 and 2017 using Mann-Whitney test were 0.009; and the comparison number of Singaporean travel into Malaysia between 2016 and 2017 using Independent T-Test were 0.007.

The findings of this study align with previous research conducted on the effects of road pricing policies. According to Santos and Fraser (2015), the price elasticity of demand is a critical factor that determines the effectiveness of road pricing policies. The authors argue that the elasticity of demand can help policymakers determine the optimal pricing level that can balance the need for revenue generation with the reduction of traffic congestion. Similarly, Soltani et al. (2019) emphasize the importance of analyzing the price elasticity of demand when evaluating the effectiveness of road pricing schemes. The authors suggest that elastic demand can provide opportunities for reducing traffic congestion and improving the sustainability of urban transport systems.

Moreover, the study's findings are consistent with the theory of demand and supply. According to Nicholson and Snyder (2014), when demand is relatively elastic, small changes in price can significantly affect the quantity demanded. In contrast, when demand is relatively inelastic, changes in price have a proportionately smaller effect on the quantity demanded. Similarly, Varian (2014) highlights that the elasticity of demand is a crucial determinant of the market power of firms, as it influences the degree of control that companies have over prices. The results of this study provide valuable insights into the impact of changes in the price of the road charge on the demand for private cars and Singaporean travelers. The study's use of price elasticity of demand to measure the responsiveness of demand to price changes is in line with previous research and established economic theory. The findings suggest that policymakers should consider the price elasticity of demand when designing road pricing policies to maximize revenue generation while minimizing adverse effects on the quantity demanded.

## 5.0 Conclusion

The substantial reduction in the demand for private cars entering Malaysia from Singapore is a significant finding that aligns with established economic principles. The Road Charge-VEP policy imposed fees on foreign vehicles entering Malaysia's borders, leading to a sharp decline in the demand for private cars in Singapore. This reduction in quantity is in line with the law of demand, which states that an increase in price leads to a decrease in demand (Mankiw, 2014). The findings of this study are consistent with previous research conducted on the impact of road



pricing policies on travel demand. Raux et al. (2008) and Yang and Bell (2019) have shown that road pricing policies can significantly reduce private car usage.

The study also finds that the demand for travel between Singapore and Malaysia is relatively elastic in the short term, becoming relatively inelastic over a longer period. This finding is consistent with the theory of elasticity of demand, which states that the responsiveness of demand to price changes varies depending on the time period examined (Nicholson & Snyder, 2014). The study's use of Price Elasticity of Demand to measure the responsiveness of demand to price changes is in line with established economic theory (Varian, 2014). The elasticity values of -0.475, -0.3333, and -0.385 suggest that the demand for travel between Singapore and Malaysia is relatively elastic, indicating that small changes in price would lead to significant changes in the quantity demanded. On the other hand, a value of -0.108 suggests that the travel demand for a year before and after the implementation of the Road Charge is relatively inelastic. The p-value of the independent t-test is 0.007 while Mann-Whitney U test is 0.009, which is less than the significance level of 0.05, indicating that the difference in mean number of travelers between the two years is statistically significant different.

The study suggests that the Road Charges-VEP policy led to a shift in capital from private vehicles to public transportation or green modes of transport such as walking and cycling. This finding is consistent with previous research that has shown that road pricing policies can encourage the use of alternative modes of transport (Devarasetty et al., 2019; Tsai et al., 2017). The positive impact of these changes is reflected in the achievement of Road Charges-VEP objectives, such as reducing road congestion, minimizing the risk of accidents, and mitigating the effects of vehicular pollution (Chen & Shoup, 2016; Goodwin et al., 2019 ). The study's findings suggest that policymakers should consider the short-term and long-term effects of road pricing policies when designing them to achieve optimal results (Santos & Fraser, 2015; Soltani et al., 2019).

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