

ECONOMICS*Sociology*

Cohen, E. (2023). The increase in the number of vehicles and the shortage of parking in Israel's urban areas - economic and political factors. *Economics and Sociology*, 16(2), 37-55. doi: 10.14254/2071-789X.2023/16-2/3

INCREASING NUMBER OF VEHICLES AND THE SHORTAGE OF PARKING IN ISRAEL'S URBAN AREAS - ECONOMIC AND POLITICAL FACTORS

Erez Cohen*Ariel University, Ariel, Israel**E-mail: erze@ariel.ac.il**Received: September, 2022**1st Revision: March, 2023**Accepted: June, 2023*

DOI: 10.14254/2071-789X.2023/16-2/3

ABSTRACT. This study addresses the growing increase in the number of vehicles in Israel and the resulting shortage of parking in city centers. Israel was chosen as a case study because it is a country with rapid population growth, a concentration of residents in central areas, and inefficient public transportation, which constitute explicit causes of the trends presented in the study. The study seeks to portray the implicit causes underlying the increasing number of vehicles in Israel and of the shortage of parking in city centers. The research method combines quantitative and qualitative techniques. The quantitative part includes analysis of data on vehicle density in various cities in Israel and on the number of parking offenses resulting from the shortage of parking in city centers. The vehicle density index per 1,000 Residents for each city will be calculated by multiplying the total number of Private Cars Registered in the city by the total Number of city's Residents and multiplying by 1000. At the same time, the Number of Parking Reports data which presented in the study has been obtained from the local authorities themselves, which may cause to biased information according to the interests of those authorities. The qualitative part includes examination of the resultant public policy affecting the increase in vehicles. The data set will include the vehicle and fuel taxation policy. The research conclusions show that the increase in vehicles is affected among other things by economic and political factors that contribute to this growing trend and prevent its restriction, respectively. This study calls to the decision makers to promote and develop public transportation and correct its failures. Israel's public transportation services remain afflicted by many faults that contribute to residents' significant and increasing dependency on private vehicles. A large part of the public transportation means are too crowded, bus and train services do not run frequently enough, and the service is slow. There are insufficient connections between the different means of public transportation, with low access to stations among relatively large parts of the population and there is still a shortage of the necessary personnel and infrastructure for

it's develop. In addition, the research conclusions call for a political solution that will make it possible to operate public transportation on Saturdays, while also expanding the use of self-driving cars and allocating outlying parking areas together with rental services for electric scooters and bicycles or shuttle services to city centers.

JEL Classification: A12,
D78, F68

Keywords: car parking, traffic congestion, political instability,
public policy, economic incentives

Introduction

The consistent and continuous increase in the global population is creating many challenges for policymakers in areas of life such as housing (Cohen, 2018; Gong & Yao, 2021), education and higher education (Siniscalco, 2000; Klemencic & Fried, 2007), health (Harper, 2015; Eggleston, 2020), and transportation (Fowkes, May, Nash, Siu, & Rees, 2002). The demand for transportation in general and for private ownership of vehicles in particular is leading to growing traffic congestion (Cohen, 2019), slower traffic speed, and hence reduced work hours and lower work productivity (Sweet, 2011), increasing air pollution (Lipfert, Wyzga, Baty & Miller, 2006), a rising number of traffic accidents (Dicu & Stânga, 2013), and so on. This state of affairs exists in many countries, but it is particularly conspicuous in countries characterized by a consistent increase in the local population, such as Israel (Weinreb, 2020).

In addition, standards of living are also increasing in Israel (Bental & Brand, 2018), which allows members of different socioeconomic groups to make additional vehicle purchases. Moreover, public transportation in Israel is insufficiently developed and incapable of becoming a real alternative to the use of private vehicles (Ida & Talit, 2018). These circumstances are challenging policymakers in Israel, who are required to find solutions to the growing traffic congestion.

While previous studies (Lipfert, Wyzga, Baty, & Miller, 2006; Dicu & Stânga, 2013) examined the various effects of Israel's traffic congestion and the public policy implemented with regard to this issue (Cohen, 2019), the current study focuses on another effect of the increase in the number of vehicles, i.e the shortage of parking solutions in city centers. To this reality has many effects on the residents' lives such as loss of working hours due to searching for a parking space near the workplace, a many incidents of violence and fighting between drivers about getting a parking space, a psychological effects on the drivers such as irritability, anger and helplessness and more. Therefore, it is appropriate to review this issue and to examine the various factors for the increase in the parking shortage in the city centers in Israel, as this study tries to achieve.

Many studies examined the lack of parking in city centers around the world (as detailed below), however to date no study has examined the parking problem in city centers in Israel and it is evident that this issue is not one of the top priorities of local decision makers and policymakers. Therefore, the contribution of this study involves several aspects. First of all, the study seeks to examine the implicit economic and political factors that contribute to the increasing number of vehicles in Israel. Second, this paper constitutes a pioneer study and is the first to examine the shortage of parking in city centers in Israel, as a derivative of the increase in the number of vehicles. Third, the study offers suggestions for shaping and implementing an efficient public policy to regulate the parking pressure in Israel's urban areas, which take into account all the (explicit and implicit) causes contributing to this pressure.

The research hypothesis states that financial incentives of both the central government authorities and the local government authorities have an possible effect on the accelerated increase in the number of private vehicles in Israel and on the shortage of parking in Israel's urban areas (respectively). While the policy of the Israeli Ministry of Transportation encourages the purchase of private vehicles due to the existence of poor public transportation and the Ministry of Finance benefits from high revenues resulting from the taxation of vehicles and fuel, the local authorities do not respond as required to the constant increase in the number of vehicles in Israel and do not create additional parking spaces in the city centers. This is out of their desire to increase the number of parking reports and increase their financial income. Therefore, this study examine the Israeli vehicle and fuel taxation policy on the one hand, and the vehicle density index of several cities in Israel and compare it to the number of parking reports in order to establish a correlation between these two indices, on the other hand. The strength of this study is reflected in its contribution to expanding the literature on the causes of the increase in vehicles in a given country, as well as the accompanying consequences of this trend (Shortage of Parking in the Urban Areas).

1. Literature review

1.1. The shortage of parking in city centers

Private car ownership facilitates autonomy, travel speed, and privacy that are not possible when using public transportation, developed as it may be. All the more so when public transportation is irregular, slow, and crowded. However, private vehicles remain stationary most of the time, whether during the work day (parked at the workplace) or at night (parked near the home). This means that each vehicle occupies two parking spaces every day, leading to a widening discrepancy between the demand for parking and the supply of parking space, and hence to a shortage of parking solutions in residential and work areas in the city center (Ibrahim, 2017). Many cities throughout the world share this problem, for instance Cairo in Egypt (Ibrahim, 2017), many cities in China (Au, 2012), Melbourne in Australia (Shao, Salom, Gu, Dinh, & Chan, 2017; Taylor & van Bommel-Misrachi, 2017), New York in the United States (Jaller, Holguín-Veras, & Hodge, 2013), Paris in France (Lebovka, Tatochenko, Vygornitskii, & Tarasevich, 2020), and others.

The shortage of parking in city centers could increase traffic congestion due to the longer time spent on the road until finding parking near one's home or work, increase air pollution (Negev, 2020), and sometimes even lead to parking in prohibited places and endangering passersby, for lack of options (Šego, Pražen, & Olivari, 2021). Moreover, as a way of increasing the supply of parking, local authorities allocate spaces for curb parking. This has the effect of narrowing sidewalks, creating crowding, and limiting the possibility of allocating lanes for bicycles, scooters, and the like (Ibrahim, 2017). Therefore, the shortage of parking in urban areas is becoming gradually more acute and regulatory actions are required for its prevention, or at least for formulating public policy for its reduction (Guo & McDonnell, 2013; Barter, 2015). In order to deal with the shortage of parking in city centers, however, it is first necessary to understand and analyze its causes.

1.2. Causes of the shortage of parking in city centers

Several factors are known to contribute to the shortage of parking in city centers. First of all, most historical cities and particularly the centers of historical capitals were originally planned to have narrow streets that are suitable for horses and carriages but not for cars

(Johnson, 2013). In addition, the population density in these cities was significantly lower in the past than at present. Since in most cases it is not possible to fundamentally change the structure of these cities, they have retained their narrow streets that limit the possible number of parking spaces. Second, large business and recreational centers were established in areas that are not connected to an efficient public transportation network, thus attracting a large number of private vehicles. A third factor is the faulty planning of the expected demand for parking in new cities and urban areas (Litman, 2020), following the failure of public transportation in these cities and areas and the inability of local planning committees to anticipate the extent of private vehicle ownership by local residents.

Moreover, the planning of parking in new cities and urban areas tends to focus on curb parking alongside the sidewalks and in defined parking spaces at road level, instead of planning multi-level parking areas for more efficient utilization of space and increased parking capacity. Fourth are the illegal violations of building laws and land designation regulations in local municipalities, which contribute to the increased demand for parking in those areas and the irrelevance of the original parking calculations initially made by the developers (Ibrahim, 2017).

1.3. Proposals for solving the shortage of parking in city centers in the light of the research literature

Side by side with the worsening traffic congestion, the increasing use of private vehicles is also causing an increasing shortage of parking in city centers, as stated, constituting a wake-up call to decision makers to enact reforms that will alleviate the resultant difficulties (Barter, 2015). Indeed, the research literature presents several options for coping with this challenge. One of these is to increase the supply of parking spaces by converting some streets into one-way streets, building additional parking lots, and using smart parking solutions to increase the parking capacity (Šego, Pražen, & Olivari, 2021). Another option is to impose a toll on parking in congested city centers in order to reduce the demand (Guo & McDonnell, 2013). In addition, it is suggested that smart cloud-based parking services be expanded in smart cities by using new internet applications that better regulate parking-related traffic (Atif, Ding, & Jeusfeld, 2016). Yet another solution is simply to focus on planning effective parking that takes into account the anticipated demand for parking in different areas (Taylor & Van Bemmelen-Misrachi, 2017).

Hence, it appears that the research literature recognizes the shortage of parking in city centers, describes the causes of its emergence in different cities around the world, and also presents several possible solutions that mostly focus on increasing the supply of parking space. Therefore, the current study expands the research on two fronts: First of all, its findings reveal that the direct causes of the shortage of parking in city centers in Israel (to be detailed below) are further augmented by economic and political causes that contribute significantly to the growing increase in the number of vehicles in Israel and aggravate the shortage of parking in city centers. These causes were not presented in previous articles written on the subject. Second, unlike the previous studies that focused, as stated, on increasing the supply as a way of dealing with the shortage of parking in city centers, the current study seeks to examine ways of reducing the demand for parking as a possible solution for this issue.

1.4. Direct causes of the shortage of parking in city centers in Israel

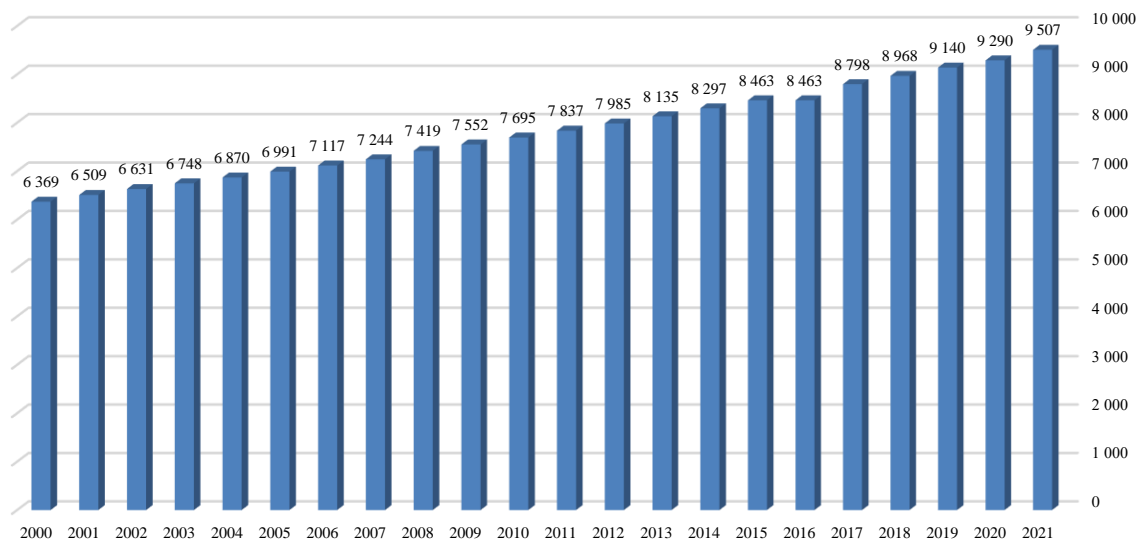
The current study focuses, as stated, on the problem of vehicle parking in urban areas in Israel. This country is characterized by a rapid population increase and by the concentration of

the population in the center of the country, side by side with a rapid increase in the number of vehicles and a lack of efficient public transportation. These features have the effect of intensifying problems involving vehicle parking in urban areas.

1.4.1. *The Increase in Israel's population*

Israel is considered a country with a more prominent population increase than other developed countries (Schellekens & Anson, 2017; Weinreb, 2020). The increase in Israel's population stems from a combination of three main factors: First, the high rate of Jewish immigration from other countries to Israel, usually for ideological and Zionist reasons (Eckstein & Weiss, 2004). Second, the rise in life expectancy resulting (among other things) from the advancement and improvement of healthcare services (Dwolatzky, Brodsky, Azaiza, Clarfield, Jacobs, & Litwin, 2017). Third, relatively high marriage, childbirth, and fertility rates for religious, cultural, and traditional reasons (Szajnbrum, 2009; Okun, 2013; Okun, 2017; Weinreb, Chernichovsky, & Brill, 2018). The increase in Israel's population, which began with the founding of the state, has continued consistently in recent years as well, as evident from the data in the Graph above.

Graph 1 presented below describes the increase in Israel's population from the beginning of the current century up to and including 2020.



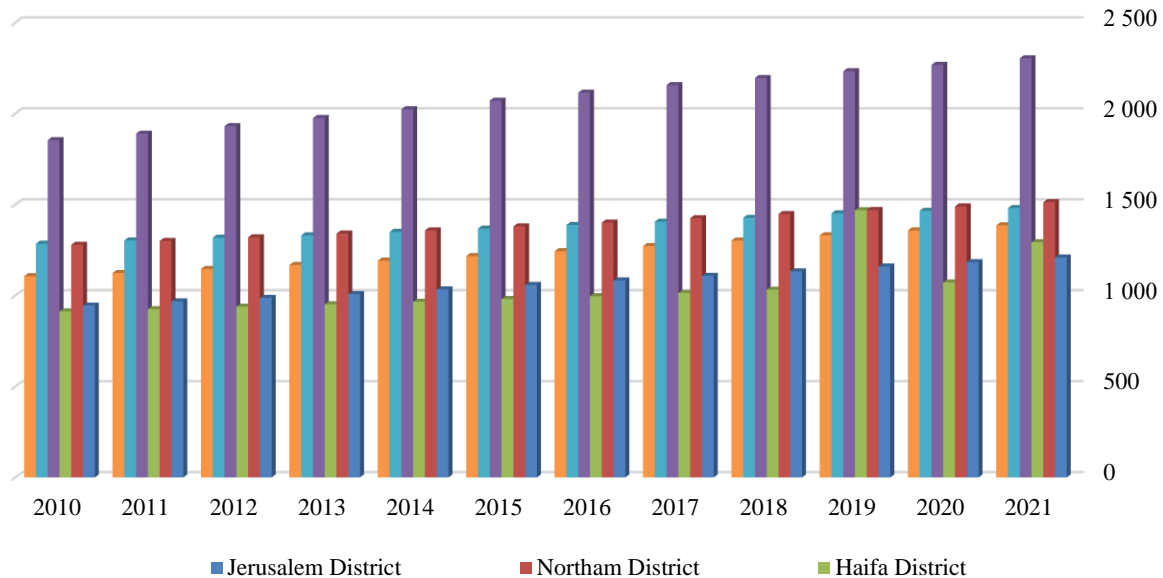
Graph 1. Israel's population in the years 2000-2021 (in thousands)

Source: *Israeli Central Bureau of Statistics, Table 2.1. Population by Groups*

1.4.2. *Population concentration and vehicle density in central Israel*

Concurrent with the increase in Israel's population, residents are also inclined to concentrate in the center of the country (DellaPergola, 2004). Central Israel (which includes the central, Tel Aviv, and Jerusalem districts) now includes more than half Israel's residents, while the rest are spread among the close periphery (Haifa district) and the distant periphery (the northern and southern districts). This trend has several interrelated causes, such as education and schooling disparities between the center and the periphery (Soen & Davidovitch, 2004; Harus & Davidovitch, 2019), the low supply of high-paying jobs in peripheral areas, and the

low availability and quality of public transportation, which is not capable of meeting the needs of residents in peripheral areas who seek to work in the center (Sharav, Givoni & Shiftan, 2019; Suhoy & Sofer, 2019). These circumstances result in a high population density in central Israel and increase the incentive to purchase private vehicles, traffic congestion, and the shortage of parking in city centers in central Israel. Graph 2 presented below portrays the distribution of the population between Israel's different districts.



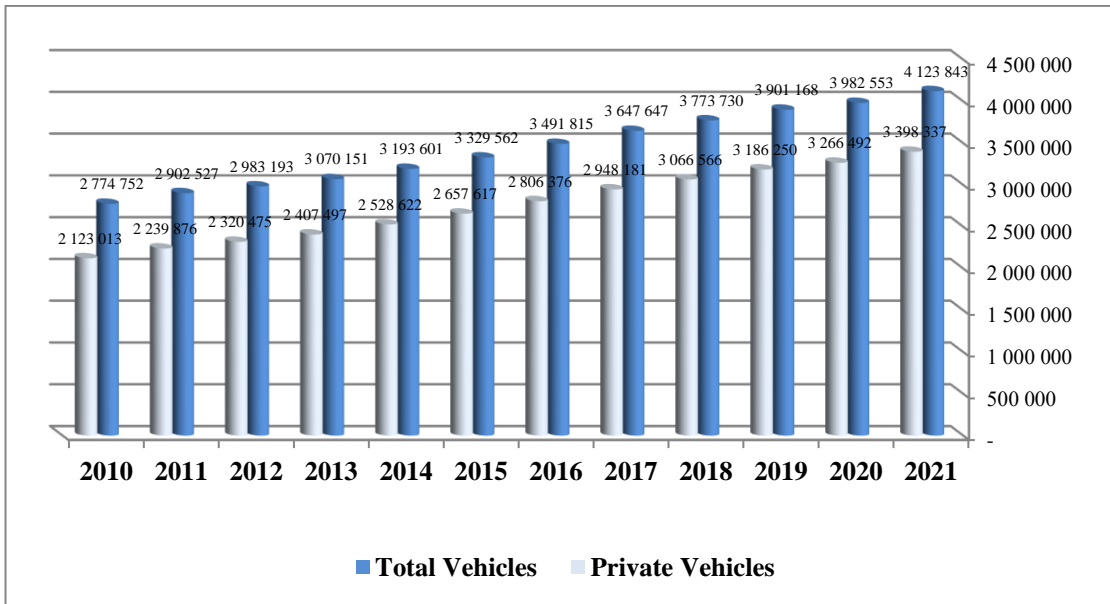
Graph 2. Population distribution in Israel by districts in 2010-2021 (in thousands)

Source: *Israeli Central Bureau of Statistics, Table 2.15: Population, By District*

1.4.3. Increase in the number of vehicles

The increase in the country's population and the dependency on private vehicles as a result of the poor public transportation system have led to an annual increase in the number of vehicles on Israel's roads. The hundreds of thousands of new vehicles imported to Israel every year,¹ deducting the vehicles removed from circulation, have created a significant annual addition to traffic in the last decade, which adds to the congestion and to the shortage of parking in urban areas in central Israel. The increase in the number of vehicles in the last two decades has doubled the congestion on Israel's roads, considered the highest in the western world and in OECD countries. The increase in the number of vehicles on Israel's roads in the last decade is presented in the following Graph:

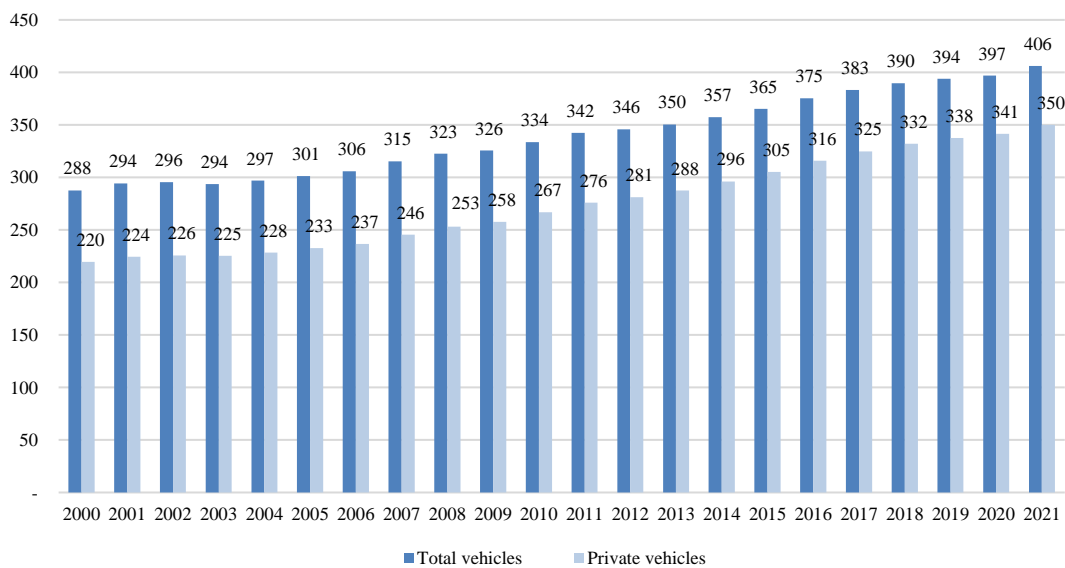
¹ In 2021 a sharp rise of 34% was recorded in the number of new vehicles on Israel's roads. This is an all-time record.



Graph 3. Number of Vehicles in Israel in 2010-2021

Source: *Israeli Ministry of Transportation*.

The annual increase in the number of vehicles in Israel is higher than the annual increase in the population. Hence, the index examining the number of vehicles per 1,000 residents has also begun to rise, as shown in the following Graph:



Graph 4. Number of vehicles in Israel (per thousand people) in 2010-2021

Source: *Israeli Central Bureau of Statistics, Table 3. Number of Vehicles (Per Thousand People)*.

1.4.4. Deficient public transportation

After many years in which Israel’s public transportation suffered from neglect, when the transportation budget was utilized mainly to develop the road infrastructure in order to improve services for private vehicles (Cohen, 2019), policymakers decided to introduce a comprehensive structural reform to improve the public bus system. As part of the reform,

additional operating companies were added to the local bus system, creating competition and leading to a considerable improvement in services (Ida & Talit, 2018).

Nevertheless, and despite the significant government investment in public transportation in recent years, the service provided to residents is still not an adequate response to the demand for public transportation services. Israel's public transportation services remain afflicted by many faults that contribute to residents' significant and increasing dependency on private vehicles. A large part of the public transportation means are too crowded, bus and train services do not run frequently enough, and the service is slow. In addition, there are insufficient connections between the different means of public transportation, with low access to stations among relatively large parts of the population. This prevents public transportation from becoming a real alternative to private vehicles and enhances the need for private vehicles despite their many drawbacks.

In addition, there is still a shortage of the necessary personnel and infrastructure for developing public transportation, although Israeli policymakers declared at the end of the twentieth century that promoting public transportation is vital for developing the country and its economy. In the last decade, for the first time in Israel's history, most of the Ministry of Transportation's development budget was devoted to public transportation, but there is still a shortage of drivers and of infrastructure intended for public transportation, such as specially designated public transportation lanes on the roads, railway tracks, and others (State Comptroller, 2019).

1.5. Vehicle density in cities in central Israel

The concentration of the population in central Israel, together with the deficient public transportation as described above, are leading to a rise in the density of private vehicles in the central and Tel Aviv districts. On one hand, these districts have a very high concentration of residents, as stated, and on the other their cities are usually home to groups with a strong socioeconomic status (Machlica, 2020) who have a high rate of privately owned vehicles. In contrast, the Jerusalem district has the highest concentration of residents in Israel, however since its population includes a relatively high proportion of ultra-orthodox and Arab residents, characterized by a relatively low socioeconomic status (Landau, 2015; May-Yazdi & BenDavid-Hadar, 2018), the rate of vehicle ownership there is fairly low.

The Haifa district is considered a periphery that is relatively close to the center, characterized by a population with a medium socioeconomic status and the financial ability to purchase private vehicles. Therefore, in Haifa too there is a high vehicle density. In contrast, the districts in the distant periphery (the northern and southern districts) are characterized both by a low population concentration and by relatively weak socioeconomic groups (Machlica, 2020) and therefore the number of private vehicles in these areas is relatively low. The table presented below presents the vehicle density in selected cities from Israel's different districts.

Table 1. Vehicle Density by Selected Cities in Israel's Districts in 2020 (Number of Vehicles Per 1,000 Residents)

District	City	Number of Residents	Private Vehicles Registered in Cities	Vehicle Density (Number of Vehicles per 1,000 Residents)
Tel Aviv District	Tel Aviv	463,808	221,929	478.5
Central District	Rishon Lezion	256,055	116,771	456.0
	Herzliya	98,965	42,837	432.8
	Kfar Saba	101,829	39,970	392.5
Haifa District	Haifa	283,736	115,560	407.3
	Hadera	98,908	34,437	348.1
Jerusalem District	Jerusalem	951,149	221,919	233.3
Southern District	Beer Sheva	210,595	69,010	327.6
	Eilat	52,520	18,081	344.2
	Ashdod	226,153	59,210	261.8
	Ashkelon	146,518	47,460	324.0
Northam District	Tiberias	45,868	13,712	299.0
	Safed	36,060	8,047	223.1

Source: *Israeli Central Bureau of Statistics - Table 22. Private Vehicles Registered in Cities; Residents by city:* <https://www.cbs.gov.il/he/settlements/Pages/default.aspx?mode=Yeshuv>

In light of these data, it is apparent that the density of private vehicles is higher in cities in the central and Tel Aviv districts than in the other districts, and accordingly the shortage of parking in the former is more acute.

2. Methodological approach

This study examines the implicit causes of the increase in the number of vehicles in Israel and the shortage of parking in city centers and suggests a public policy capable of responding to the disparity between the demand and supply of parking spaces by reducing the demand for privately owned vehicles. The research method combines quantitative and qualitative research. The quantitative part analyzes data related to the vehicle density in various cities in Israel and the number of parking offenses resulting from the lack of parking spaces in city centers during 2010-2021. The vehicle density index per 1,000 Residents for each city will be calculated by dividing the total number of Private Cars Registered in the city by the total Number of city's Residents and multiplying by 1000 (Table 1). At the same time, the Number of Parking Reports data which presented in the study has been obtained from the local authorities themselves, which may cause to biased information according to the interests of those authorities.

The qualitative part examines the public policy affecting the increase in the number of vehicles in Israel (the data set will include the vehicle and fuel taxation policy) and presents possible options for reducing their number as a way of dealing with the shortage of parking in city centers. The research data are based on information extracted from the Israeli Central Bureau of Statistics, Ministry of Transportation, Ministry of Energy, and various local municipalities.

3. Results

As depicted in the introduction, several well-known factors are affecting the increase in the number of vehicles in Israel and hence the shortage of parking in city centers. The research

findings reveal two other implicit factors that contribute to this increase and that are related to the financial and political considerations of decision makers in Israel, as detailed below:

3.1. Budgetary and financial factors

As stated, decision makers in Israel are aware of the traffic congestion problem and in recent years they have begun to allocate increasing funds to developing public transportation, with the aim of promoting alternatives to the use of private vehicles. This is a mixed blessing, however, as effective policy that truly seeks to reduce traffic congestion must come hand in hand with a policy that detracts from the individual's interest in using private vehicles, rather than only promoting public transportation infrastructure. Israeli citizens still see the use of private vehicles as the best option and preferred option over using public transportation.

This is evidenced by the sharp rise in the number of private vehicles purchased and the conspicuous increase in the number of new vehicles imported to Israel, which are contributing to the growing traffic congestion in Israel (Cohen, 2019). Hence, it seems that in order to change citizens' usage habits, the state must act to reduce the incentive to purchase and own private vehicles. Imposing high taxes and multiple fees on vehicle owners will probably reduce their desire to own a vehicle, as it is cheaper to use public transportation. In order to examine this claim, the revenues of the Ministry of Finance from taxation and from various fees related to motor vehicles shall be presented.

3.1.1. Import taxes on vehicles and spare parts

Similar to many countries around the world, Israel too imposes import taxes on vehicles and spare parts for vehicles. These taxes include, among others, purchase tax² and customs. The purchase tax imposed on vehicles in Israel is considered among the highest in the world.³ Israel's revenues from this source have been growing in recent years, reaching some ten billion shekels a year. Vehicle imports were affected in 2020, as was most of the economy, by the Covid-19 pandemic and by government steps aimed at curbing the spread of the pandemic.

Nonetheless, a relatively high level of activity and of imports was evident in this year. On one hand, most of the vehicle purchase deals require direct contact between the seller and the buyer, and the movement and trade restrictions imposed in Israel due to Covid-19 caused a decline in activities in this industry. In addition, the compromised financial security of potential vehicle buyers due to the lockdown and quarantine policy further reduced the number of deals closed. On the other hand, in this period public transportation became less attractive, both due to the disruptions in its activity and due to the concern of infection, such that many preferred to use private vehicles, modifying the decline in the number of vehicle purchases. A summary of the state's revenues from import taxes on vehicles and spare parts in recent years is provided in the following table:

² The purchase tax is an indirect tax imposed on expenditures (commodities and services) rather than on revenues. The amount of the tax is relative to the price of the product, commodity, or service purchased.

³ An OECD report shows that the purchase tax on new imported vehicles in Israel is among the highest in the world. For the sake of comparison, the purchase tax on vehicles in Korea is 0-5%, in Japan 3%, and in Mexico from only 2%. In Ireland the rate ranges from 14-36% and in Finland the range is wider, 4.4-50% (depending on the size of the vehicle and the pollution it generates).

Table 2. Revenues from taxation of vehicle and spare part imports in 2010-2020 (million shekels)

Year	Imported Vehicles	Purchase Tax	Customs	Total Revenues
2010	221,923	8,848	535	9,383
2011	229,944	8,655	496	9,151
2012	203,727	7,768	438	8,206
2013	225,297	7,865	417	8,282
2014	279,205	9,803	538	10,341
2015	229,972	8,758	479	9,237
2016	348,148	12,926	684	13,610
2017	218,276	8,703	848	9,187
2018	267,070	10,469	649	11,118
2019	286,816	10,560	776	11,336
2020	237,632	9,669	606	10,275

Source: *Israel Tax Authority*: <https://www.gov.il/he/Departments/publications/reports/tax-reviewvehicle>

3.1.2. Fuel taxes

The price of fuel in Israel includes four parameters, among them **excise tax**. The rates of **excise tax** imposed on the various fuel products are determined by the Ministry of Finance and reflect a constant sum for each unit of product (liter of fuel). As of January 2022, the rate of excise tax in Israel was 49.12% of the price of one liter of petrol.⁴ Indeed, the original purpose of the excise tax was to reduce the use of the taxed product, however Ministry of Energy data show a rise in the state's revenues from excise tax⁵ in recent years, which amounted to some 21.5 billion shekels in 2021!⁶ As if this was not enough, a decision was also reached in 2020 to raise the taxes on hybrid vehicles⁷ that consume less fuel, in order to cover the potential loss of income due to the increased use of these vehicles.

3.1.3. Vehicle licensing fee

In addition to the various vehicle taxes described above, the state also profits from licensing fees related to vehicle ownership (such as vehicle licenses and driver's licenses). Ministry of Finance data show that the state's revenues from vehicle licensing fees have risen in recent years,⁸ as evident from the following table.

Table 3. Revenues from vehicle licensing fees in 2010-2020 (million shekels)

Year	Total revenues from vehicle licensing fees
2010	3,382
2011	3,520
2012	3,722
2013	3,961
2014	4,145
2015	4,434
2016	4,648
2017	4,892
2018	4,912
2019	4,950
2020	4,700

Source: Israel Ministry of Finance, State Revenue Report: Chapter 14 – Vehicle Taxation.

⁴ Source: Ministry of Energy.

⁵ In 2018 – 18.3 billion shekels; in 2019 – 19 billion shekels, in 2020 – 20 billion shekels.

⁶ Source: Ministry of Finance - Israel Tax Authority

⁷ Raising the tax from 30% to 50%.

⁸ With the exception of 2020.

3.1.4. Private usage value of company cars

The state of Israel receives additional revenues from a tax called private usage value of company cars. This tax is imposed on employee use of company cars.⁹ In Israel, the amount of this tax is a derivative of the car's list price and its rate is among the highest in the world. Until about ten years ago, only specific workplaces (such as hi-tech companies) gave their workers use of a company car as a benefit, however this practice has greatly expanded and in recent years the state's revenues from this source have reached some six billion shekels a year.¹⁰

In light of these data, it appears that there is no unequivocal answer to the question of whether the Ministry of Finance's taxation policy indeed aims to reduce citizens' use of vehicles and to encourage them to shift to public transportation. On one hand, the Ministry of Finance policy imposing heavy taxation on the use and ownership of vehicles can reduce the incentive provided to citizens to purchase cars and encourage them to increase their use of public transportation, thus diminishing traffic congestion as well as the shortage of parking in city centers. On the other, public transportation is not being developed at the necessary pace and quality to make it a truly relevant alternative for drivers. Hence, the true purpose of the Ministry of Finance vehicle taxation policy is unclear.

The rapid and conspicuous increase in the total state revenues from vehicle taxation and fees raises the concern that the state of Israel depends on revenues from vehicles and is even shackled to them. The fact that these constitute a huge portion of the state's revenues, together with the many oppressive budgetary and political commitments deriving from coalition-based constraints typical of Israel's governance structure, means that Israel is becoming gradually more dependent on vehicle taxation as a lifeline. Therefore, Israel's taxation policy can be seen as another factor that contributes indirectly to the shortage of parking in city centers.

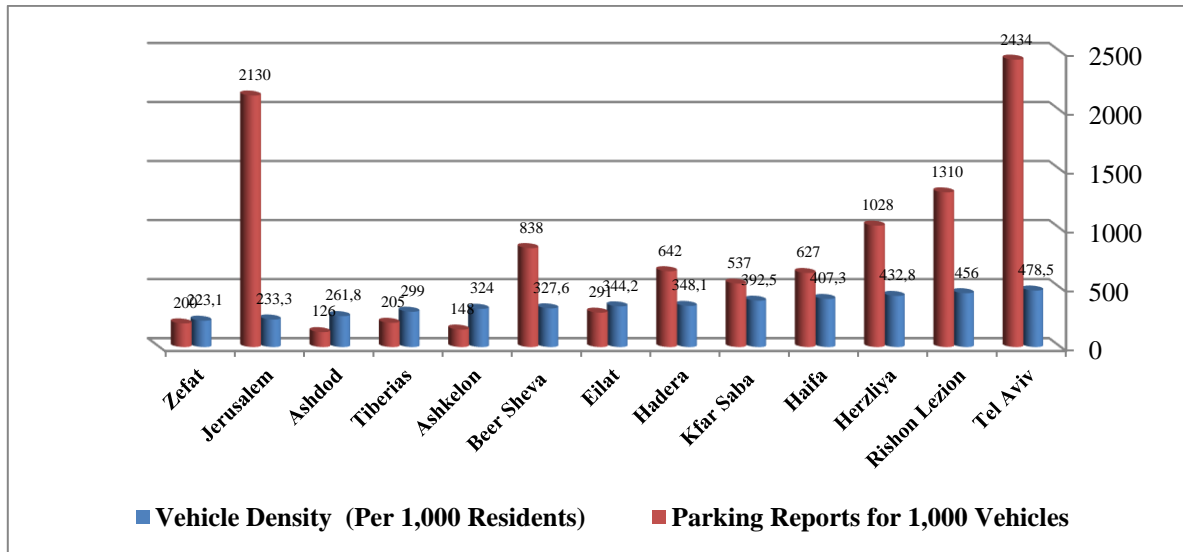
3.1.5. Revenues of local municipalities from parking reports

Vehicle congestion in city centers is leading to an increase in illegal parking, including parking on sidewalks, parking in prohibited areas, and so on. Frustrated drivers who do not find parking near their homes or destinations are at times motivated to act in contravention of the municipal traffic regulations and park their cars in prohibited areas. These drivers are issued parking reports that generate not insignificant revenues for the local municipalities. The data on the number of parking reports issued in several local municipalities in Israel from 2010 to 2021 indicate that, normally,¹¹ the higher the vehicle density in the local municipality the higher the average number of parking reports given during the period examined. Graph 5 below shows the average annual number of parking reports issued in several selected local municipalities in Israel's different districts during 2010-2021 (number of parking reports for every thousand vehicles registered in the city) versus the vehicle density (number of vehicles registered in the city for every thousand residents), as shown in Table 1.

⁹ Imputed value of usage is a sum calculated as part of the income of an employee who has use of a company car. This sum constitutes the monetary value of the benefit accruing from use of the car.

¹⁰ Source: Ministry of Finance, Israel Tax Authority - Private usage value of vehicles.

¹¹ Aside from several exceptions to be described below.



Graph 5. Average Number of Parking Reports (per thousand vehicles) Versus Vehicle Density (Per Thousand Residents), by City, In 2010-2021.

Source: *Data on reports were provided by local municipalities in Israel.*

The order in which the local municipalities are presented in the figure above was determined by the vehicle density: from low to high (and from left to right). Therefore, it can be easily seen that the higher the vehicle density in the local municipality, the higher the average annual number of parking reports issued (for every thousand vehicles). An exception are the cities of Jerusalem and Beer Sheva, which are (assumedly) characterized by fairly low vehicle density but have a relatively high annual average number of parking reports. These exceptions can be explained as follows: Jerusalem is Israel's capital, housing the government offices, courts, many culture and sports complexes, and multiple tourist sites. Therefore, this city daily attracts a significant public that does not live in the city. Hence, the large number of vehicles on the streets of Jerusalem, which increases vehicle density, is not reflected in the density index shown in the figure, which only relates to the number of vehicles registered as belonging to residents of the city.

The city of Beer Sheva is located in the southern district in general and in the Negev area in particular and is in fact the capital of the Negev. In recent years, this area has been characterized by a lack of authority to cope with the high level of crime and the growing threat to public order, particularly among the considerable Bedouin population (Yahel, 2021). The relatively high number of parking reports issued in Beer Sheva is probably related to the deficient civic culture typical of this area, with its disregard of public order and contribution to the many parking offenses (Koenlsler, 2013).

Then again, the high average annual number of parking reports in the central district (Kfar Saba, Herzliya, and Rishon Lezion) in general and in the Tel Aviv district in particular, areas characterized by a fairly high vehicle density, is evident. Therefore, it may be said that the higher the vehicle density, the higher the number of parking offenses in prohibited spaces due to the increasing shortage of parking. This is manifested in the rise in the number of parking reports issued in the local municipality, which increase its revenues. Hence, it is reasonable that the heads of Israel's local municipalities have no incentive to increase the supply of parking spaces in their territory, so long as they continue to enjoy these increased revenues that amount to tens of billions of shekels annually.

3.2. *Political factors*

Improving public transportation and resolving its various faults could certainly help reduce the incentive of Israeli citizens to purchase private vehicles. Nevertheless, this also depends on the availability of public transportation on weekends. The absence of regular public transportation on Saturdays reduces or even completely eliminates drivers' incentive to give up ownership of private vehicles.

The issue of the Sabbath and its observation has occupied the gradually evolving Jewish society in Israel from the time of the British mandate. At that time, several arrangements emerged that served as the foundation of the status quo principle. The arrangements included an agreement that the Sabbath would be observed in all national institutions, that there would be no public transportation in any town, and regulations were determined ensuring the cessation of all trade and commerce activities on the Sabbath (Saturdays).

Therefore, with regard to public transportation, Israeli policy is based on government decisions stemming from the status quo that was reached even before the state was founded. In fact, most of Israel's public transportation is not active on the Sabbath, aside from services associated with very distant towns in the north or south.¹² Then again, in the city of Haifa, for example, public transportation operates on Saturdays, including internal services (only within the city), because in pre-state years transportation operated there on Saturdays as well, so this maintains the status quo. In other mixed cities as well, such as Nazareth and Nof Hagalil, public transportation operates on Saturdays. Taxis and shared taxis with a fixed route (*sherut*) are authorized to travel on Saturdays with no limitations.

Indeed, in recent years several private initiatives have emerged, aiming to provide transportation services on weekends and particularly Saturdays, however public policy has remained as previously, prohibiting public transportation on Saturdays although many Israeli citizens are interested in its development.¹³ The reason for this state of affairs is related to political extortion employed by the leaders of ultra-orthodox political parties, who take advantage of the unstable governance structure that has existed in the country for many years.

The reason for this reality is connected to the fact that though Israel has embraced western parliamentary democracy, its electoral system is different from those of most western countries. Israel has adopted a proportional representation system with a single-member district: the entire state of Israel is one electoral constituency in Knesset elections. This feature has been a constant since 1949, while secondary features, such as legal thresholds and the proportional seat-allocation formula, have changed and have had an impact on degrees of proportionality (Shugart, 2021).

In addition, only political parties or party coalitions, rather than individuals, are eligible to participate in the national elections. Knesset seats are distributed among factions of the political parties and party coalitions based on their proportion of the total number of votes cast. Since no single political party or party coalition can emerge from an election with an overall majority to form a government, they must form a coalition. This unique form of parliamentary democracy in Israel is a breeding ground for political factions and leads to much political disorder, with the result that Israeli politics consists of many small parties. Small and medium-sized parties repeatedly fracture into new small and medium parties, producing a vicious circle (Yu, 2010).

Israel's political instability has the effect of undermining the legitimacy of leaders' attempts to implement long-term policy steps (Cohen, 2016). This reality compels the prime

¹² Such as the internal and external services in Eilat, service to distant northern towns as far as Kiryat Shmona, and others.

¹³ Surveys conducted on the topic attest to this trend.

minister to build a weak coalition based on a (usually narrow) majority comprised of several parties that have little in common in different areas (political, social, and economic). Therefore, the leaders of these parties apply political and budgetary pressure on the prime minister, which ultimately leads to suboptimal nomination of senior ministers who often lack knowledge of the domain with which they are charged, not to mention acting first and foremost to achieve the goals and aims of their party and its supporters at the expense of the public interest. Furthermore, such a weak coalition as in Israel might easily lead to its dissolution by one of the partners due to some crisis, forcing the entire country to hold frequent repeat elections, as is occurring in practice in Israeli politics.

Hence, it can be said that the structure of the governance system in Israel, which creates an artificial coalition that grants too much political power to each of its components, is what ultimately allows the political extortion applied by ultra-orthodox parties, which blocks the operation of public transportation on Saturdays. This state of affairs increases citizens' incentive to purchase private vehicles, leads to an increase in the number of vehicles on Israel's roads and in traffic congestion, as well as to the aggravated shortage of parking in city centers.

4. Discussion

This study calls to the decision makers to promote and develop public transportation and correct its failures. Israel's public transportation services remain afflicted by many faults that contribute to residents' significant and increasing dependency on private vehicles. A large part of the public transportation means are too crowded, bus and train services do not run frequently enough, and the service is slow. In addition, there are insufficient connections between the different means of public transportation, with low access to stations among relatively large parts of the population and there is still a shortage of the necessary personnel and infrastructure for its development.

The research findings indicate a consistent increase in the state's revenue from vehicle and fuel taxation on the one hand (tables 2 and 3) and a correlation between the level of cities' vehicle density (number of vehicles per 1,000 residents) and average number of parking reports (per thousand vehicles) on the other hand (graph 5). These findings may indicate to financial and political incentives that prevent the shaping of an efficient policy to reduce the demand for vehicles in Israel, diminish their numbers, and solve the shortage of parking in city centers. On one hand, the financial incentives that achieve very large financial profits for the state (as a result of the taxation of vehicles and spare parts, taxation of fuel, and imposing various fees on vehicles) and on the other hand contribute to the growing revenues for local municipalities (from parking reports). Therefore, encourage the state to import gradually more vehicles and thus to aggravate the traffic congestion and the shortage of parking in city centers.

On the other, the governance structure in Israel is characterized by a political coalition comprised of a single large ruling party beside several small sectorial parties with considerable political power, which undermines its stability. The ultra-orthodox parties take advantage of these circumstances to impose their objections to operating public transportation on Saturdays, preventing the release of Israeli citizens from their dependency on private vehicles. Indeed, there are also other factors that affect the demand for private vehicles in Israeli society, related to the demographic increase, the rise in the standard of living, and the deficient public transportation, but as long as the state remains financially dependent on the vehicle-related revenues and as long as the Israeli governance structure deriving from its electoral system mandates political dependency on the ultra-orthodox parties, it will not be possible to considerably reduce Israeli citizens' incentive to own private vehicles.

Conclusions

In light of the research findings, the following conclusions can be reached: first, it is suggested that the state have to promote legislation that allows operating public transportation on Saturdays, while creating political arrangements that will facilitate this. These political arrangements can include coalition negotiations offering ultra-orthodox parties alternate benefits that will allow them to relinquish the status quo regarding the prohibition against operating public transportation on Saturdays. Secondly, it is necessary to promote effective policy steps capable of at least halting the increase in the number of vehicles using the roads, seeking curbside parking, and perhaps even reducing their numbers. These steps must focus on reducing the demand for vehicles or their usage and less on increasing the supply of roads or of parking solutions, through the follows means:

Expanding the use of self-driving cars and cooperative vehicles

When the various ethical, social, and regulatory technological issues associated with extensive use of self-driving cars in city centers will be resolved (Holstein, Dodig-Crnkovic, & Pelliccione, 2018; Yoganandhan, Subhash, Jothi, & Mohanavel, 2020), this type of vehicle will be able to reduce the demand for parking in city centers. Unlike regular vehicles, self-driving cars can deliver passengers to almost any place in the city and then continue independently to the city outskirts to park. In addition, self-driving cars can park in smaller parking spaces without endangering nearby vehicles and thus save parking space. Moreover, if the self-driving car is shared by several users or is not privately owned to begin with, it can be used to deliver passengers and then pick up others, such that it will be active for lengthier spans of time and will not spend time in a parking space for most of the day like regular vehicles (Wiseman, 2017). At the same time, it should be noted that may appear a number of potential challenges and obstacles that would need to be overcome to implement these solutions. For example, it may be difficult to secure funding for the development and deployment of self-driving car infrastructure, and there may be safety concerns associated with widespread use of autonomous vehicles and more.

Allocating Outlying Parking Areas

Another way of reducing the demand for parking space in city centers is by allocating outlying parking areas, while providing rental services for electric scooters and bicycles. In this way, the driver can drive from home to the parking area and back in a small vehicle (electric scooters and bicycles) that does not require a parking space and continue to the final destination without wasting time and fuel on finding a parking space. Similarly, organized shuttle services can be arranged from the outlying parking complexes to the city center.

In summary, the problems involving the increase in the number of vehicles in Israel and the growing shortage of parking in city centers can be handled by applying and integrating political and regulatory solutions. This may involve on one hand finding a political solution that will facilitate operation of public transportation on Saturdays, and on the other expanding the use of self-driving cars and allocating outlying parking complexes while operating rental services for electric bicycles and scooters or shuttle services to the city center.

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