# STRUCTURE OF NEPAL'S TRUCKING INDUSTRY:
## Results from a Nationwide Survey

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# Contents

# Executive summary

This report includes outcomes from a nationwide survey of the trucking industry in Nepal. Using stratified random sampling methods; over 1000 trucks from different regions of Nepal were sampled. Information about the workforce, financing environment, working environment of the trucking industry were collected. By doing so, more than 100 variables related to the Nepalese trucking industry were measured.

We concluded that there are at least 39 local trucking entrepreneur's associations (TEA's) in Nepal who dictate the rule of the trucking operation for about 30,000 trucks along 429 recognized routes. TEA's attract memberships because of their capability to help truck owners in need; however TEA's have no legal authority.

The popularity of TEA's amongst truck owners could be explained by the following:

- A rise in the mass based justice system due to the breakdown of enforcement ability of local government;
- The limited resources of truck owners and consequently their inability to absorb economic shocks;
- During the past decades a nationwide desirability for unionization in Nepal emerged.

Nepal is dominated by small truck owners, who on an average own 2.4 trucks. The truck owners derive from the transportation industry itself and 70% of them do not have another saleable skill. Therefore truck owners are part of or form collusive groups, which occasionally restrict supply in the market. Our survey reveals that group formation manifests itself in the form of delayed permit issuance by TEAs on many routes.

Therefore, despite recent clampdown on the financial activities of TEAs, they remain an important player in Nepal. Our survey also concludes that truck owners see TEAs as a source of insurance in cases of accidents and 93% of those surveyed say they plan to continue their affiliation with them.

The small truck owners rely on themselves to get loads, which is a highly competitive environment. Loads are highly asymmetric: almost 60% of the trucks have loads less than one fifth of the time while returning from their destinations. All of the owners use cell phones and have no other communication devices to track vehicles. Bribery is a common feature in all aspects of the trucking industry operations: bribes are paid to get permits from government or TEAs, and to different agencies that stop trucks on their way to their destination. Truck owners could find themselves in a hostile environment, e.g. during accidents truck operates are often attacked. Insurance firms are not offering diverse enough services; therefore small truck owners are cornered in a position where they need to select a TEA's to protect their interest.

Syndicates impose costs on the overall economy in the form of deadweight loss. We calculated the cost to be $27.5575 million dollars per year. Furthermore, we estimated that in 2014, out of the 9.1% inflation rate of Kathmandu valley, 11% was due to the syndicates (i.e. in the absence of syndicates, the inflation rate should have been 8%). Additionally, deadweight loss due to syndicates is accounted for 2.6% of the total GDP growth.

# SECTION 1

## Introduction

## 1.1    What this study is about?

This study identifies different aspects of the Nepalese trucking industry such as the number of trucks and employments they generate, costs of operating trucks, their load procurement pattern and different systems under which they operate. We differ from previous studies, for example the one carried out by the Nepal Economic Forum on behalf of USAID, in terms of the details we try to uncover.

The Nepalese truck industry, due to lack of any other form of non-livestock based transportation service, plays a vital role in the country's economy. Nepal's first road was built in 1956AD. Before that, Nepal depended mostly on livestocks for transportation.  Before 1956, a slow, small rail served routes between Janakpur and Jayanagar, Raxaul and Amlekhgunj and a ropeway connected Hetauda and Kathmandu. Once the road was constructed, it quickly became the preferred mode of transportation and the demand for trucks slowly increased.

Theoretically, there are no barriers to enter the trucking industry: the prospective truck operator purchases a truck, and obtains the permit from the government to operate in the preferred route. The permit is issued either from the Transportation Management Bureau (*Yatayat Byabastha Bibhag*) or the Zonal Transportation Management Bureau (*Anchal Yatayat byawastha bibhag*). These agencies currently issue permits for 429 national routes and a number of other local routes. The national and local routes are changing over time as Nepal is currently witnessing a surge in road construction.

In reality, however, the process of being a truck operator is complicated and sometimes it is well-nigh impossible to operate a truck in the route of one's preference. Access to credit is not evenly distributed amongst the Nepalese population. It is common to find the actual operators being different from the truck owners, as those who have better access to credit tend to rent the trucks out to those who have difficulty in getting credit from banks (see details in chapter 1.4). After registering at the government's transportation bureau, the truck owners usually get a membership of one of the local Trucking Entrepreneur's Associations (TEA). These associations are often major organizations that negotiate on behalf of the truck owners with the government, insurance companies and also set the price at the routes under their jurisdiction.

There are two major transportation entrepreneur's associations in Nepal. One of these, *Nepal Truck Yatayat Mahasangh* (FTTEN), is dedicated to the truck operators, whereas the other organization *Nepal Yatayat Rashtriya Mahasangh* (NTNF) accepts trucks, buses and even tractor owners as members. Each of these associations has affiliated local, often route based, member associations, which are in some way autonomous. These associations are loosely organized, at least on a local level. Both of these associations do not have any official records for the number of trucks that are affiliated with them. Generally, the decision to enforce syndicate (i.e. restricting supply of service) is taken locally. Although the government is the authority to issue route permits, these associations have a say over who

gets a permit on most routes. It is not uncommon to see these associations vandalizing vehicles not belonging to them on their particular route.

Politically, there are two other private organizations that look after stakeholders against trucking organizations. The first is the Chambers of Commerce, who protects businessmen against the truck owners (as they determine the prices). The second is the transporters' association (*Nepal Dhuwani Byawasayi Sangathan*), who also competes against truck owners. The truckers are often vilified in the media, which either are controlled by or depend on the advertisement and other largesse of wealthy industrialists from the Chambers of Commerce (Federation of Nepalese Chambers of Commerce and Industries (FNCCI)). The truck operators generally do not deny that they restrict supply, and their rationale for this is that if they do not control the excess of trucks, the truck owners will have to operate their truck at the marginal cost (rather than average cost of operation) and thus will incur the net loss – (see FTTEN Smarika,2013).

The precise modus operandi of the major truck associations is still quite vague. Often associations do not keep a record of their members. Some of these associations do not have an office and are managed by the chairman of the association. These associations often run afoul against legal authorities and regulatory agencies such as the insurance board (IB). Their activities related to insuring members against accidents are deemed illegal by IB. However, the government has not actively moved against these associations. These associations are still very active in negotiating a minimum rental price with the government or in bargaining on behalf of the truck operator who has been involved in an accident.

Most of the dominant TEAs offer specific services to address this situation: members who are fully insured are completely protected by the TEAs in case of an accident. The TEAs help to negotiate with the aggrieved party, but also help the truck owners to get an insurance policy, pay the agreed compensation to the victims including medical costs and free the impounded truck from the government's administrative offices. These services are highly valued by the truck operators. Nowadays, most of the truck operators take the minimum mandated insurance (Rs 500K for third party death, and Rs 8000K for third party damage) and then take a TEA membership. The process of claiming insurance money from the insurance companies is found to be slow and difficult by the truck operators. Therefore, the services from TEAs are highly respected by them.

## 1.2    Regulatory Agencies in Trucking Sector

The Government of Nepal is the sole regulatory agency to guide the evolution of the trucking industry in Nepal. It builds highways, issues permits to operate trucks, and provides regulatory frameworks governing various issues such as access to credit, insurance premiums and route permits. Furthermore, as the petroleum products in Nepal are imported by the government only, government indirectly fixes the cost function of the truck operators. On top of that, the government also fixes minimum prices for the different truck routes.

Truck Entrepreneur Associations (TEAs), as explained earlier, are quasi-regulatory agencies. They rely on their location and organizational power to enforce the supply restrictions and price fixing in the routes they represent. The list of current active TEAs is shown in the appendix 20. In appendix 20 are the services offered by TEAs including the membership charges presented. Through interviews with chairpersons of different truck associations, we calculated that a total of 18812 trucks are currently registered with different TEAs. The total trucks/ crane/ excavators/ dodgers registered in the last 23 years, according to the Transportation Management Bureau, is 49404 (appendix 22). Since the numbers of cranes/excavators/dodgers are a very small fraction (approx. 10%) of this total, the total number of trucks registered in the past 23 years is likely to be around 45000. According to a

raw estimate provided to us by the experts of the field, each year 40-50 trucks are involved in accidents that lead to them being scrapped. This further reduces the total maximum number of trucks currently on the Nepalese roads to be around 44000. However, trucks older than 16 years are rare, and this further reduces the total number of trucks operating on Nepalese roads by about 30%. It is approximated that there are about 31000 trucks on the Nepalese roads right now. Although the number of trucks registered in the transportation office is rising each year, the number of trucks for 1990AD provided by the government was a cumulative number for the trucks before that year.

Since trucks are required to pay a membership fee to be operating on the road, the total number of trucks affiliated with an organization represents the correct lower bound of the total number of trucks plying on the Nepalese roads right now. This leads to our estimation of trucks running in Nepal in between 19000-31000.

During conversations with entrepreneurs it was revealed that except for the TEAs in Narayani, Gandaki, Banganga and Butawal, the other TEAs do not provide additional insurance services (appendix 20). This could lead to a lower affiliation rate of trucks in the TEAs regions where these organizations are active. Furthermore, some of the trucks are registered with private industries. Old trucks and locally operating trucks are also unlikely to be TEA members. Relatively poor truck owners may also choose to take risks rather than to pay a certain insurance premium.

The last column of the table of TEAs also provides the current membership fees. The charges are not the same for all and perhaps due to the increasing competition among TEAs, some TEAs have introduced different categories of memberships (and attendant charges). Because of new regulations introduced by the insurance board Nepal (IBN) during the last three years, TEAs are now a lot weaker than they were in the past. In particular, each truck is now required to be insured for its passengers as well as for third party damages, with a recognized insurance company which has rendered risk pooling by TEAs redundant. Insurance boards claim that the TEAs are still trying to extract the concession to allow them to insure their members, but it is unlikely to happen anymore.

## 1.3    Impact of TEAs on the Market

TEAs affect the economy by enforcing the odd/even rule in which odd number trucks are allowed to load one day and even number trucks are allowed to load another day. This introduces a distortion in the market. There are different variations of the odd/even rule (for example, the 7 days odd/even rule), but our analysis below focuses mainly on the 2 days odd/even (Jor Bijor) rule.

Diagrammatically, the market for the odd/even regime system (2 days, Jor Bijor) is given as follows:
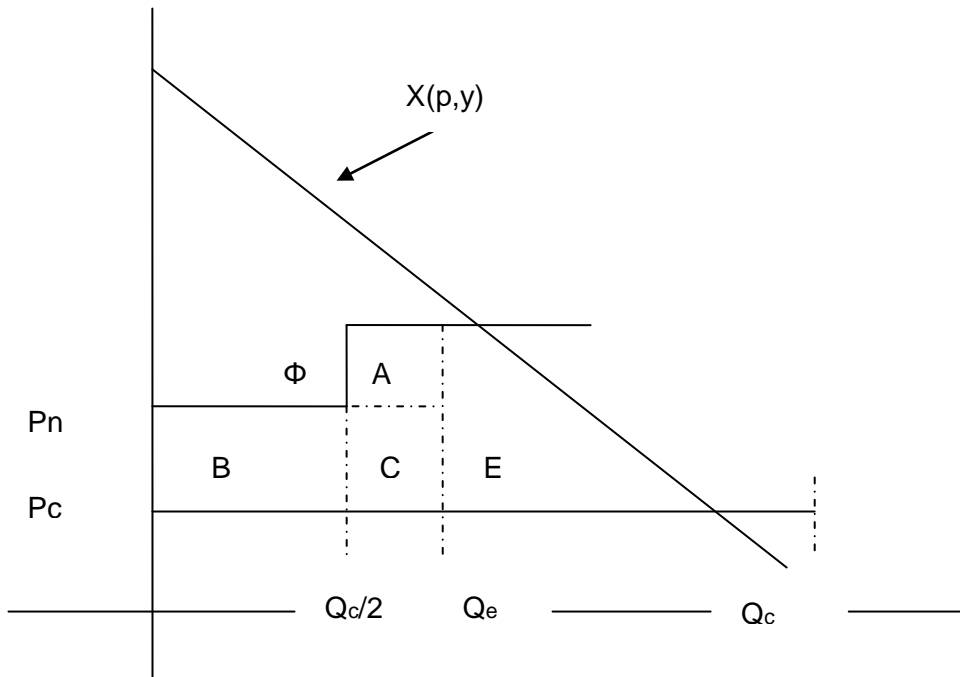


In the figure above, X(p,y) is the uncompensated demand curve of truck users facing the new system. We suppose that the truckers were acting competitively before the Jor-Bijor system was applied. Let $(p_c, Q_c)$ be the prevailing cost and quantity at the time, which by definition is the efficient outcome. Let's assume that the TEAs decide to raise the cost to $p_n$ while imposing the 2 days Jor Bijor system. This system will restrict the supply to the half of the trucks supplied in efficient system (assuming that, in the efficient system, the market was clearing, the total supply at the time has to be $Q_c$). If average waiting cost of the truck users (due to the shortage of the truck) is $\varphi$ and the market clearing amount of truck in the new system is $Q_e$, we should get the market structure as given above.

Clearly, in this new system, the truck operators gain only B+C (assuming zero discounting rate for 1-day applied to C), while A and E will be deadweight loss to the economy. Analytically, the deadweight loss is given as:

$$DWL = \int_{p_c}^{p_n+\phi} x(\tau, y)d\tau - (p_n + \phi - p_c)\frac{Q_c}{2} - (p_n - p_c)(Q_e - \frac{Q_c}{2})$$

Notice that there is some controversy with regards to 'how to calculate' theoretically correct the DWL. *Hausman (1981)* believes that one should use the compensated demand function to estimate the DWL. Going from the Marshallian (uncompensated) to the Hicksian (compensated) demand function is not difficult, but it still requires going through some mathematical intricacies. In general, one solves for an associated indirect utility function, expenditure function and Hicksian' demand function once an estimation of Marshallian demand curve is found (see *Hausman(1981)* for the detail). However, *Willig (1976)* has suggested that when income elasticity of demand is small, one may use the Marshallian demand function like we have done above. Furthermore, even Hausman (1981) suggests that for goods that form a small part of the overall budget, using the Marshallian demand function to estimate deadweight loss provides a good approximation.

## 1.4   Buying trucks in Nepal

A major argument of the TEAs to support their supply restriction policies is that it is too easy to buy trucks in Nepal. In the past, almost all of the trucks in Nepal were sold by Sipradi Tradings, a firm associated with the former royal family. Policies conducive to purchasing trucks were in place, quickly leading to the glut of trucks in Nepal. Two previous studies have indicated that Nepal has almost six times more trucks per kilometre available on the highway than in India (please note that  this study does not support that claim). These studies have been cited in the annual yearbook of a major TEA to support their supply restriction policies.

Our investigation revealed that even though it used to be easy to buy trucks in the past; the access to credit has become more difficult recently. Banks provide loans to purchase trucks under the Hire Purchase System and an average truck chassis costs about 2.8 million rupees. However, banks generally don't provide loans to new firms or persons who do not have experience in trucking industries, unless they provide additional collaterals (such as land and building). New buyers also need to show a proof of income, and incomes are not easily verifiable in Nepal. Most of the prospective truck purchasers are small time transportation workers, and banks tend to be suspicious about their income statements.

The biggest problem currently faced by new purchasers is that they are not in a position to purchase new trucks. If a new purchaser is eligible for a loan; banks provide about 70% of the total chassis price (on the basis of the VAT bill). However, trucks costs almost 1.0-1.5 million rupees and on top of that it is difficult to obtain VAT bills. Without the VAT bills the banks do not provide loans for new purchasers. Consequently, new purchasers have to be able to pay almost half of the total price of the trucks which is generally beyond what people in trucking industries can afford.

In the past, banks were more liberal in providing credit for trucks; however, banks faced problems with collecting credit dues. The banks had to detain many trucks from the market but were unable to sell them on.  Consequently, they are now stricter with issuing new loans.

These difficulties in obtaining credit have generated a new class of owners in Nepal who have a good reputation with the banks and therefore are able to get a more competitive loan. As a result, the new owners lease their recently bought trucks to others at a higher price.

# SECTION 2
## Data and the survey strategy

The goal of the trucking industry survey was to understand the average firm size, modernization level, average fleet age, cost structure, market structure, second hand market structure, the types of individuals' involved, regulatory difficulties faced by them and the presence or absence of market barriers for their efficient operations in Nepal's trucking industry. We also wanted to provide data for the possible estimation of deadweight loss due to the syndicates who are active in the trucking Industry. A schematic representation of the survey strategy is given below:

| | **From TEAs** | | | | | **From Non TEAs** |
|---|---|---|---|---|---|---|

| **Cluster** | **Narayani** | **Bagmati** | **Gandaki** | **Koshi** | **Lumbini** | Same regions as "from TEAs" |
|---|---|---|---|---|---|---|
| | Narayani TEA Terai TEA **…** **(See appendix 2 for full list)** | Bhaktapur TEA Manohara Local Truck and Minitruck Entrepreneur Association Nepal Truck and Container Entrepreneur Association (Lokanthali) | Gandaki TEA Paschima nchal TEA Gandaki Midsize TEA… | Biratnagar TEA Koshi TEA… | Lumbini TEA Banganga TEA Nepal India Transportation Entrepreneur TEA… | **Districts selected should cover the whole country (see explanation below)** **1st Strata** |

| **Locally Operating TEAs** | | | | | | |
|---|---|---|---|---|---|---|

| **Trucks affiliated to TEAs, with full options for insurance** | ### | ### | ### | ### | ### | **2nd Strata** |
|---|---|---|---|---|---|---|
| **Trucks affiliated to TEAs, but not fully insured** | ### | ### | ### | ### | ### | **3rd Strata** |
| **Trucks not affiliated to any TEA** | ### | ### | ### | | | |

**Total sample (in a range of 1000)**
1. Truckers affiliated to at least one TEA, and taking insurance as their membership option
2. Truckers affiliated to TEAs , but not taking insurance as their option
3. Truckers not affiliated to any TEAs

**Explanation: we propose the following sampling strategy**

First, the stratum that partitions the overall truck population is made as follows:

1.  The first stratum contains the trucks that are affiliated with at least one of the Transportation Entrepreneur Associations (TEAs) as full members and have taken the full insurance options. Insurance options were the primary draw of the Narayani Transportation Entrepreneur Association (NTEA), which is currently the most dominant TEA in the country, when it was first established circa 1980s.

2.  The second stratum includes the trucks that are the members of the TEAs, but have not opted for the full insurance. These members pay significantly less for their membership fee (appendix 20). TEAs normally lobby for them, help them negotiating with administration and with complainants when accidents occur. However, these members handle financial transactions including insurance claims themselves.

3.  The third stratum includes trucks that are not affiliated with any TEA. Trucks without a membership are rare and mostly occur in regions that are only recently getting road networks. Other trucks without a TEA membership could be those who are too old, do not drive far from their base and are not afraid of possible administrative issues. Another reason for not having a TEA membership could be individuals who cannot afford the membership fee or those who are happy to take the risk.

We have selected five dominant regions as our clusters - Narayani zone, Bagmati, Koshi, Lumbini and Gandaki and their surrounding areas. According to the government's Transportation Management Divisions, these zones have seen the highest number of vehicle registrations during recent years (see figure 1). Appendix 2 provides the full list of TEAs in the clusters. Specific TEAs have been selected in these clusters in terms of population. From each of these clusters, we will sample the three strata suggested above. At the end, we collected 5% of our samples from non-affiliated members, 70% of the trucks were fully insured, and 25% were partially insured.

# Truck Entrepreneur's Associations (TEAs)

## 3.1   Origin of TEAs

TEAs were established because of the need to protect truck owners against the aftermath of accidents involving their trucks. Before TEAs people often relied on mutual arbitration rather than going to the court. Third party insurances that were offered by insurance companies were limited and were not legally mandatory until 2012AD. Accidents necessarily involved a negotiation process between victims and truck owners. Truck owners who were insured also found it difficult to get compensation from the insurance companies. Owners felt that they would benefit from being represented through an association rather than as an individual.

Early TEAs promised to help truck owners in case of accidents in two ways, (1) by guaranteeing to pay third party damages (often by utilizing the TEA's welfare fund or *bhalai kosh*) and (2) by negotiating with the third party, police and insurance companies on behalf of the truck owners. Both services were highly valued by the truck owners. To sustain TEAs not only truck owners had to benefit but the TEA executives as well. TEAs benefitted by collecting membership fees, but more than that, they forced insurance companies to pay false claims. The Insurance Board (IB) of Nepal officials mentioned two major events where TEA officials benefitted (1) by taking benefit of the fact that according to existing insurance schemes, while passengers were paid Rs 1 lakh in case of accidental death, the third party death were paid Rs 5 lakh. It was a common bullying tactic of TEAs to present the passengers as a third party death and claim the difference. (2) by protecting trucks through the TEA . TEAs were found to strike deals with insurance firms in which they were to insure a certain number of trucks but they would claim less than that. For example; if a TEA had 1000 members, it would claim it had 500 members. Whenever a truck was involved in an accident, they would claim that the truck was insured as part of a TEA insurance. The benefits were evenly split between insurance company owners, executives and the TEA officials. IB discovered that deals were being made and clamped down on these practices during the last two to three years.

The TEA's have evolved from their early avatar as a facilitator in claim processes and are now regarded more as a union, who sets rules in their territories of influence and resort to vandalism to enforce those rules. Lately, in major trade corridors, the TEAs frequently enforce the Jor-Bijor (odd/even) system. Several other alternatives of this system have been frequently tried by major TEAs operating in important trade corridors recently, for example the 2-days Jor-Bijor System (under which odd vehicles may pick up load the first two days and even vehicles pick up the other two days) and 3-days Jor-Bijor system, once a week system (in which a truck may load only once a week) and once a month system. Since it normally takes at least two days for the truck to reach its destination and return to its base, under the 2-days Jor Bijor system, the maximum load a truck can pick is 7 times a month. As the TEAs also fixes the rent, which means that even the truck owners are getting fewer transportation contracts, they still earn more money than in a business-as-usual environment.

Generally, these kinds of supply restricting systems are imposed when demand for trucks is considered as low. For example, during the rainy season, the dominants TEAs decide

restrictions they would impose on trucks, for the benefit of their members. Narayani TEA is a major player in these decisions. As soon as demand increases, they generally lift the restrictions. In 2013, when a calamity struck along the Tatopani-Kathmandu highway, the truck operators enforced the once-a-month rule and hiked the rent to Rupees six lakh per trip (from their usual Rupees forty thousand per trip).

Since the TEAs don't have any legal power, nor do they have sufficient manpower to enforce these systems, it was not uncommon to violate the supply restriction policies adopted by the TEAs. However, lately TEAs inform their local branches and/or affiliates of their decision regarding the supply restriction as soon decisions are made. The local branch members then become proactive in enforcing these decisions. Furthermore, TEAs can refuse to support those trucks that break rules.

Like many other organizations in Nepal, the TEAs often argue with each other. Arguments are predominantly driven by a personal leadership desire, but sometimes political parties also get involved. Sometimes, TEAs split because of a power struggle on a local level (this happened recently in Gandaki). On the other hand, some TEAs have merged recently (for example the Pawa TEA). In some regions, there are two or three TEAs. Small and divided TEAs are often unable to deliver important services to their members as well as enforce their allocation rules.

## 3.2    Automobile Related Accidents

Roads are a relatively new phenomenon in Nepal. 2 districts (out of 75) are yet to see roads, and many districts adjacent to the high Himalayas, as well as near western Nepal, have seen roads only just. Similarly, both economic activities and the number of vehicles plying in certain regions, in for example Karnali, Seti, and Mahakali, are small.

A conflict resolving process in Nepal used to emphasize local resolutions. Villages, where roads have only recently been built, used to resolve any conflicts amongst them. Government run courts are notoriously slow. The lack of faith in government institutions have made people sceptical of promises made by government officials.

The early entrants in the truck industry were people with sufficient resources. In Nepal, approximately 8 years ago a truck cost Rs 2 million and that same amount would have bought 2 acres of land in many regions of Terai. Nowadays, most of the land that can be used for building a house costs on an average twenty times more. Truck prices have remained relatively constant, and this has made it easier to own trucks for landed class. Truck ownership is no longer a symbol of affluence. In fact, many of the truck owners are very likely to be dependent on the income from the truck to run their day to day affairs. Truck owners are socially not very powerful. This has two implications: first, after an accident, the victims demand a high compensation from truck owners because of the old belief that the truck owners come from landed class. Second, the truck owners are unlikely to be able to fulfil the demand, because in reality they are not very rich. This often leads to a protracted negotiation.

## 3.3    Government's Minimum Cost Determination Mechanism

The government of Nepal regularly determines the maximum suggested rent a truck can charge on the routes it was given permission to operate on. Ironically, this system of suggesting rent was established at the request of truck operators themselves who felt besieged by the charges coming in the media about them charging exorbitant prices and causing inflation in the market. The government takes the following factors into account while making its operating cost calculation:

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a.   Salary and allowance to the drivers and helpers.
b.   Taxes identified as income tax, transport tax, renewal tax, permit cost, fitness tax, pollution tax and municipality tax.
c.   Insurance
d.   Maintenance costs identified as engine overall cost, gear and differential cost and general maintenance
e.   Battery cost
f.   Depreciation
g.   Interest payment of truck
h.   Overhead cost such as parking and others
i.   Variable costs such as fuel, diesel, tyre and lubricant

Besides this, the government adds 15% book value as a margin for the truck operator and calculates the average fair for the distance travelled.

The truck operators normally agree that it is the exhaustive list of the total cost, except for the "jaach pass" (the tax to be paid to travel in each route every trip).

Appendix 21 below provides a suggested cost of the government on the Birgunj Kathmandu route and for comparison the results of the average values of those costs from our survey.

# SECTION 4

## Results

## 4.1    Ownership Structure

It was concluded that 59% of the truck owners are solo truck owners. 70% of these solo truck owners were previously employed in the transportation industry. The distribution of the truck size (i.e. the number of trucks owned) of a firm is given in appendix 1. An overwhelmingly large number of truck owners own only one truck. The median truck owner owns one truck, and on average, the owners own 2.4 trucks (with standard deviation 3.96). Owning 3 trucks would put someone in 75th percentile and owning 6 trucks would put him in 95th percentile. Ownership of 20 trucks corresponds to 99th percentile.

These results confirm what is generally observed in the Nepalese trucking industry: most of the owners are poor individuals. Many of these joined the trucking industry as an assistant and worked their way up as a truck owner. 70% of these owners don't have other skills and decided to stay in the trucking industry. This explains their aversion to the competitive market with frequent exit possibilities.

The median truck in Nepal is 5 years old, and on average, the trucks are 6.4 years old (with standard deviation 4.6 years). The distribution of the truck age is given in appendix 2.  On average, the trucks have travelled 247620 kilometres. There is a large standard deviation (347492Km) for this. The median truck has travelled 135743 kilometres. For the distribution, see appendix 3.

The employee size of Nepalese truck firms is quite small. On an average, they have 3.2 employees (standard deviation 4.07). Median truck owner have 2 employees. This is consistent with the number of trucks we have calculated. More interesting is the fact that about 53% of the firms have only 2 employees, while 10% of the firms have only 1 employee. Many of the trucks in Nepal have two staffs, often one of them being the owner himself.

68% of the respondents considered themselves primarily as a transportation sector employee. The other 32% are primarily engaged in the non-transportation industry such as manufacturing, trading, farming etc. Among those who were engaged in other professions, 7.5% were manufacturers. This implies that about 2.5% of the total trucks belonged to manufacturers. Similarly, farmers accounted for 33% and traders accounted for 31% of those who identified themselves as belonging primarily to non-transportation sectors.

Due to the small size of almost all businesses in Nepal, truck owners hardly need to hire other trucks to fulfil their obligations. Most of the truck owners (70%) mentioned that they never hire other trucks to carry goods. It also indicates that people requiring trucking industry services themselves assess whether they need additional trucks, and if so, they would go out and look for trucks themselves. 30% of the truck owners say they have hired trucks to fulfil their load transportation obligations. Even among these 30% truck owners, most have hired trucks only a few times. The primitive nature of Nepalese trucking Industry can also be observed by looking at the information regarding the number of times these truck owners have hired trucks. Only 25% of those who have hired outside at least once in a year have

hired more than 60 times a year. This indicates the absence of professional transporters with frequent outside trucking needs. Clearly, either the professional transporters buy trucks when they have a high demand, or they have a low demand for transportation needs.

## 4.2    Truck Entrepreneur Associations (TEA)

As we mentioned earlier, TEAs form an integral part of the Nepal's transportation sector. Originally, they provided an avenue for pooling risk to the truckers, but increasingly, as law and order situations in Nepal have weakened, their power as a truckers' union has been an important asset in negotiating for the rights of the truckers – and therefore TEAs continue to be popular.

We found that 80.25% of the trucks in our sample were affiliated with a Truck Entrepreneur's Association. To determine the ratio of trucks affiliated with TEAs to those not affiliated with TEAs, we first collected data from Dhangadhi (Attariya), Bhairahawa, Hetauda, Pokhara and Birtamod. We stayed at popular police posts, and asked only one question to the drivers of passing trucks: whether they belonged to a TEA or not. We had previously calculated the total number of trucks belonging to TEAs by using telephone interviews with chairmen of these TEAs. Based on this, we had decided the number of trucks from TEAs and non-TEAs that we needed to interview.

Memberships for TEA's are not cost-free. On an average, a truck pays Rupees 1252. 0 (with standard deviation Rs 1141.72) and median trucks pay Rs 1200 for a membership. The majority of these truckers (93%) plan to continue their membership. Only 4.4% said they do not plan to continue and 2.5% were unsure about their continuation plan.

An absolute majority of truckers said they joined TEA's to protect them against unexpected events in cases of accidents (54%). 17% of the truck owners cited two other reasons as their primary motive in joining TEAs: (1) to get business and (2) due to the fact that they could not operate without being part of a TEA. Most of the truckers felt that incentives (such as insurance, network) were the most important factors to join a TEA rather than intimidation of not being able to operate without being a part of TEA.

## 4.3    Modernization Level

All trucks we surveyed said they use mobile phones, but not GPS, to communicate with each other and with owners. This probably attests to the penetration and affordability of mobile services in Nepal. It also indicates the primitiveness of the Nepalese trucking industry: since the fleet size is small, the industry doesn't use GPS transmitters to track the trucks.

## 4.4    Utilization Level

Trucks on an average reported to have operated 220 days per year (with standard deviation 83.9 days) per year, with median truck operating 220 days as well. Our questions on utilization level were intended to extract information on the extent of syndicates. It seems trucks on an average are operating on 60% of the total days possible, probably indicating a mild level of average nationwide syndicate intensity.

Truckers reported that they served a large number of clients. The active number of clients, on average, was 62.01(with standard deviation 106.1) and the median number of clients was 10. The average was therefore driven by the large right tail.

One interesting fact is that 62% of the truckers reported that their number of clients has increased recently, while only 13% said that the number has decreased. The rest of the

truckers claimed the number has remained stagnant. It reflects the increasing economic activities in Nepal in recent years. Consistent with this finding, only 9% truckers said their most important client accounts for more than 50% of their business. 27.09% said their most important client (MAC) accounted for less than 5% of their total business. Furthermore, 23.74% said their MAC accounted for 5-10% of their business. Likewise, 16.2% said their MAC accounted for 11-25% of their business and 19.8% said the MAC accounted for 25-50% of their business.

More than half of the trucks always carried goods produced by others, and a median truck carried 100% of goods produced by others - see appendix 7. Furthermore, most of the trucks reported that they do not receive subcontracts from others. In fact, the distribution of the subcontract percentage suggests that almost half of the trucks either get all of their loads as a subcontract from others or they get none, indicating a lack of networking on the Nepalese market - see histogram on percentage of load they get as a subcontract in appendix 8. In our sample, 19.5% responded that they get none of their loads as a subcontract, and 17.43% suggested that they get all of their loads as a subcontract.

A total of 57.4% trucks said that they get loads only 0-20% times during the return trip. Additional 20.5% trucks said they get loads only 21-40% times during the return trip, 10% said they get loads 40-60% times during the return trip, and only 11.9% trucks said they get load of any kind more than 60% of the return trips.

A total of 41.99% trucks said that, on average, they get loads of only 0-20% of their total capacity on their way back in the return trip. Additional 23.54% trucks said they get 21-40% of their capacity in the return trip, 16% said they get 40-60% of their capacity, and only 18.4% trucks said on average they get more than 60% of their capacity during the return trip.

Only 1.73% of the trucks surveyed said they charge 80-100% of their regular price during the return trip. On the other hand, 50.37% said they charge less than 20% of their regular price during the return trip; 23.21% said they charged 21-40% of their regular price and 18.27% said they charged 41-60% of their regular price during the return trip. The rest (6.42%) said they charged 60-80% of their regular price during the return trip.

A total of 55.7% of the trucks said that the drivers are allowed to stop unscheduled on the way to their destination; whereas the rest said the drivers are not allowed. Out of those who said the drivers are allowed to make unscheduled stops, 63.84% of the truckers said that they allow unscheduled stops because drivers demand high concessions from the owners. Additionally, 19.19% said the main reason behind this allowance is the slow business, forcing owners to try to pick up passengers on their way to their destination. Interestingly, 6.28% indicated that drivers are allowed to stop because of a third party setting. Generally, the transportation entrepreneurs have connections with local police or revenue officers in different check posts, and they only pass these check-posts when their connections are manning them. Trucks wait in small towns nearby until time is appropriate for them.

## 4.5   Regulatory Environment

License related regulatory restrictions are the main constraints according to most truckers' (76.14%), Citing license Raj as the most restrictive law in their profession. 18.07% named road safety related regulations are the biggest restriction, where as 11.08% mentioned axle load related regulations. Less than 1% cited insurance regulations are the most important regulatory restriction in their profession. In line with this, when asked whether they needed to get a permit before operating in their current route, only 2.96% said they did not need any permit. But despite licenses being cited as a major restrictive effect, 95% of the respondents said that it took them less than 30 days to get the license to operate.

About 20% of the total respondents in our survey admitted of paying a settlement to the government to gain the route permit, which every respondent said were mandatory on their route. Almost every one of those belonging to Gandaki Yatayat admitted of paying Rs 2,00,000.00. While the median truckers admitted to paying Rs 5,000.00 to get the permit. The average bribe to get the route permit was Rs 71566.07 (with standard deviation being Rs 94190.24). The fluctuation of the bribe amount is significant: people reported paying as low as Rupees 50. The histogram of the bribe paid indicates bimodal distribution: most of the bribes paid are small while a significant amounts were also recognized around Rs 2, 00,000.00 (see appendix 8).

78.93% of the respondents said that they needed a permit from non-governmental agencies (TEAs) to operate on their route. The permission from TEAs was received relatively fast: the median trucker said it took only 5 days to get the permit and 95% of all respondents said they received it within a month. The distribution of days required to receive permits (for the bottom 95%) is given in appendix 9. Among those who responded to our questions, 24.81% said a bribe was expected of them to get the TEA permit. Of those who said they paid a bribe for the permit, the range of the bribe paid was Rs 200-1500 with an average payment of Rs 4604.76 (with standard deviation Rs 4626.06) and median payment being Rs 2500. Besides these two permits (government route permit and TEA permits), there seemed to be other permits as well. 8.57% of respondents reported that they had to obtain other permits before they could start their business and the median time to obtain these permits was 7 days. Four people reported paying almost Rs 5000 to obtain this other permit, but otherwise, a bribe was not expected for this permit.

Truckers reported as many as 10 agencies stopping them on highways. 27.84% of the truckers in our sample said that they are stopped by 2 agencies. Similarly, 23.2% said they were stopped by 3 agencies and 14.18% said they were stopped by 4 agencies. 15.2% said they were stopped by 5 agencies, where as 10% said they were stopped by 6 agencies (see appendix 10).74.3% truckers in our sample said they pay a bribe to speed up the process when stopped by these agencies, and the median bribe amount paid during a trip was Rs 500. The distribution of bribes has a very long right tail which has been a recurring feature of all our data. The average bribe paid during a trip was Rs 1030.2 (standard deviation being Rs 1947.2). Importantly, 39.15% of the respondents said that the amount of the bribe paid is independent of the type of cargo being carried. 60% of the respondents thought it was somewhat important to very important. Other factors that affect the amount of bribes paid to the inspectors from regulatory agencies included overload, road conditions, failure to renew permits and licenses, distance to be travelled, and in the event of festivals.

Truckers' opinions were divided regarding the type of environment they were operating in, 36.86% thought that they are operating in an imperfectly competitive environment. During our interview, many TEA officials had insisted that the freight allocation system was active only occasionally, in particular when the demand is low. Among the respondents, 44.04% said they have a freight allocation system (FAS) active for 0-3 months a year, and 14.68% said they have a FAS active for 3-6 months a year. A quarter of the respondents (24.77%) said the FAS system was active for 9-12 months each year. We also found that price fixing and freight allocation went together: 32.23% of the respondents said that the TEA fixed price for 0-3 months in a year, 28.31% said they fixed price for 3-6 months, 5.42% said price fixing happened for 6-9 months and 34.04% said the price was fixed 9-12 months. The price fixing predictably is above the government set minimum price: 70.48% said the price is fixed below government set price only 0-25% of the times. 10.1% said the price was fixed below government's minimum price more than 50% times. Most of the truckers said they honoured the price fixing by TEAs. 59.9% said they never negotiate the fixed price, where as 36% of the respondents said they occasionally negotiate despite the price being fixed. The rest, 4.1%, said they always negotiate irrespective of the price.

Truckers feel that the Jor-Bijor system is ineffective in getting business at all times. 59.29% of the respondents said they get loads only 20% of the times when the Jor-Bijor system is in place. Only 2.5% of the respondents said they get load 90 -100% of times when the Jor-Bijor system was in place. 13.57% of the respondents said they get load 21-40% of the times and 12.5% said they get load 41-60% of the times during the time when the Jor-Bijor system is effective. About 6% said they get loads for 80-90% of the time. Despite the fact that 58.13% of our respondents said they had preferred customers (who would give them load regularly) and 33.13% of the respondents said they charged these preferred customers differently.

## 4.6 Expenditure

The median driver is paid Rupees 9000 as a monthly salary. The average monthly salary paid to the driver is Rs 9383.33 (with standard deviation 3998.3). The distribution of the salary is given in appendix 11. The median salary of the helper is Rs 2000, and on average the helper is paid Rs 3138.71 (with standard deviation Rs 2296.56). Helpers are paid as low as Rs 300 per month and as high as Rs 12000 per month. Their salary distribution is given in appendix 12. Drivers are paid somewhere between Rupees 0-11000 as an allowance per trip, with the median driver being paid Rs 800 and the average driver is paid Rs 1076.49(standard deviation: 1061.62). Helpers are similarly paid an average allowance of Rs 426.76 (standard deviation: 41729) and the median helper is paid Rs 300 per trip.

Trucks reported making on an average 25.28 trips (standard deviation being 127.08) per month, with the median truck taking 8 trips per month only. Each of these trips is on an average 3029.03 km (standard deviation being; 2639.12Km) and the median trip is 2500 km long.

Almost half of the truck operators told us that they do not pay income tax (51.1% of all respondents). Among those who do pay income tax, the average payment is RS 18621.53 (standard deviation being RS 18102.12) and the median payment is Rs 15000. The distribution of tax paid by the trucks (conditional on them paying at least a positive amount) is given in appendix 13. An average truck operator reported paying Rs 2246.76 as a transport commission per trip (standard deviation being Rs 3925.30) and the median operator reported paying RS 850, among those who reported paying it. Transport commission, in our definition, is the commission money paid to the transport companies which help the owners to get the goods for supplies.

The respondents also gave a varying answer on how much they pay for billbook renewals as evidenced in appendix 14. The average yearly payment for billbook was Rs 12499 (standard deviation 11643.3), and the median payment was 14000. Similarly, on an average, the truck operators reported paying Rs 6101.01 per year for a route permit, with the standard deviation being Rs 9743.15. The median payment was Rs 3100. Similarly, the median trucker reported paying Rs 1200 as a yearly tax. The corresponding figure for average tax was Rs 3452.32 (with standard deviation being Rs 4968.81). Strangely, only 35% reported paying Rs 400, and other reported widely varying number, the distribution of which is given in appendix 14. Similarly, trucks on average paid Jaach Paas tax of Rs 709.45 (Rs 714.92), with the median truck paying Rs 400. Similarly, the average truck paid Rs 2810.78 (standard deviation being Rs 3684.36) and the median truck paid Rs 1200 per year as a municipal tax. The median truck also reported paying Rs 550 as a pollution tax per year, whereas the average truck reported paying Rs 1792.5 (standard deviation 3556.02). The median truck reported paying Rs 35000 per year in insurance. On an average, the truckers said they pay Rs 34,418.83 (with a standard deviation 18129.74) of insurance.

The median truck reported Rs 50,000.00 as an average yearly cost for engine maintenance. The average truck reported Rs 63608.91 (with standard deviation 43034.24) the yearly maintenance cost. Appendix 15 provides the distribution for engine maintenance cost. The median truck also spends Rs 50000 in yearly gear and differential maintenance cost. The average truck spends Rs 42875.81(with standard deviation being Rs 59186.74) in this category. For other miscellaneous costs, the median truck reported Rs 25000, and the average truck reported Rs 44071.45 (with standard deviation Rs 52435.76). The distribution of other is given in appendix 17. Furthermore, the median truck reported spending Rs 10,000.00 in battery and an average truck paid Rs 11816.25 (with standard deviation being Rs 6763.58). Regarding other overhead costs, the trucks reported that on average they spend Rs 55597.58 (with standard deviation being 85489.27). The median overhead cost report was Rs 28000. The distribution of the overhead cost is given in appendix 18.

The median truck required 330 ml diesel to travel 1 km. The average diesel requirement for the truck was 347ml (standard deviation being 213 ml). An average truck operator reported his monthly gas cost to be Rs 1,38,958.80 (standard deviation being 118000.40), and a median truck operator reported his monthly gas cost to be Rs 100000.00. The median lubricant cost for the trucks is reported to be Rs 5600; the average lubricant cost is Rs 8886.8 (with standard deviation being Rs 9894.0). Similarly, as for tire cost, the trucks on average spend Rs196832.4 in tire per year (standard deviation being Rs 163702.3). The median tire cost is Rs 150000.00. The distribution for annual tire cost is given in appendix 19.

## 4.7    Constraints

For an absolute majority of the truckers (84.56%), the primary constraints they faced when they started the business was related to the access to credit. The rest (15.44%) cited license Raj as the primary constraint. This constraint is due to the strong position of banks. Furthermore in their view, roads are quite congested. Only 7.52% of the trucks said the roads they operate on are not constrained. 52.18% said the roads are very congested and 40.29% said the roads are somewhat congested. Furthermore, 34.38% said they don't encounter any mechanical failure during their trip, 52.4% said they encounter 1-2 mechanical failures every 10 trips and 13.22% said they encounter more than 2 mechanical failures during every 10 trips. 13.35% of the respondents said in case of mechanical failures they don't find help nearby. 54.37% said that help nearby is available but the charges are high, and 32.28% said help is available easily in their route. Also, 8.54% said they come across strikes more than 2 times in every 10 trips, where as 43.41% said they encounter strikes on an average during 1-2 trips every 10 trips. The rest said strikes are rarely encountered, and didn't consider them as a constraint. Only half of the respondents (49.63%) said fuel shortage was not a constraint for them. 43.46% respondents said they encounter fuel shortage during every 1-2 trip out of 10 trips, where as 6.91% said face fuel shortage more than 2 trips in every 10 trips.

Truckers' opinions about road safety were divided. About half (54.08%) said roads are safe, where as 5.87% said the roads are riddled with criminals and 40.05% said the roads are unsafe because of the presence of criminals.

# Impact on Economy and Prices

## 5.1 Impact on Economy

We now study the impact of trucking syndicates on the overall economy. A precise estimate requires us to estimate Harberger's polygonal given in chapter 1.3. Since it requires estimating the demand curve for the services of trucking industry, a question requiring considerably more time and beyond the scope of current study, we provide the estimate based on approximations.

The formula for estimating the DWL was given as follows:

$$DWL_i = \int_{p_c}^{p_n+\phi} x_i(\tau, y_i)d\tau - (p_i^n + \phi_i - p_i^c)\frac{Q_i^c}{2} - (p_i^n - p_i^c)(Q_i^e - \frac{Q_i^c}{2})$$

We use the following parametric form for the Marshallian demand, $x_i(p, y_i) = \varsigma y_i - \alpha p$, where the demand for trucking services is inversely related to the fare, and is positively related to the income level. $\varsigma, \alpha$ - are parameters entering the demand function. This demand function is a corridor level, yearly demand function and will be interpreted as such. This demand function can be derived by aggregating individual demand curves, which will facilitate its interpretation. For example, suppose $y_{ij}$ is the income of individual j in corridor i and that $\beta = \dfrac{\alpha}{N}$ is the intercept associated with price in the individual demand curve,

$x_{ij} = \varsigma y_{ij} - \beta p$. Then, $x_i(p, y_i) = \sum_{j=1}^{N} x_{ij} = \varsigma \sum_j y_{ij} - N.\beta p = \varsigma y_i - \alpha p$.

We first derive the deadweight loss in the catchment area of Birgunj. Given that Birgunj custom accounts for 52% of the total imports and has traditionally slightly more than 50% of the total customs revenue, we estimate that the national deadweight loss is roughly twice that of Birgunj. Since most of the goods are inelastic, we assume $\alpha$ is very small and $\varsigma = \dfrac{219}{10000000}$, which is roughly the total number of trips trucks make in Birgunj area in a year ($365 \times 600$ trips per year, given that on average 600 trips a day are made via Birgunj customs) divided by yearly GDP for Birgunj's catchment area (about $\dfrac{1}{2}$ of national GDP of $20$ billion dollars).

Upon solving, we get

$$DWL_i = \varsigma y_i\left(p_i^n + \phi - p_i^c\right) - \frac{\alpha}{2}\left[\left(p_i^n + \phi_i\right)^2 - p_i^{c2}\right] - \left(p_i^n + \phi_i - p_i^c\right)\frac{Q_i^c}{2} - \left(p_i^n - p_i^c\right)\left(Q_i^e - \frac{Q_i^c}{2}\right)$$

We parameterize $p_i^c = \$180, p_i^n = \$220$. This is generally the price hike observed during the syndicate. Furthermore, we set $\phi = \$25$: this is the additional cost a truck incurs when it has

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to wait for a day. We used the rate of warehouse in Birgunj custom to calculate this value. Given that it costs Rs 0.25 to store 1 kilogram, it takes Rs 2500 per day to store materials carried by a 10-ton truck. The final ingredient in this estimate is $Q^e$. We argue that it should be 60% of $Q^c$ (which is # of trucks in competitive equilibrium). This roughly reflects the fact that trucks reported being able to operate only 60% of time in our survey. We use $Q^c$ =12500, roughly half of all trucks plying in Nepal.

Assuming $\alpha \to 0$, we can calculate the DWL for Birgunj region as $13.77875 million dollars. The nationwide estimate for deadweight loss is therefore $27.5575 million dollars.

## 5.2   Impact on prices

Finding the impact of syndicates on prices was nontrivial. Nepal Rashtra Bank (NRB, Central Bank of Nepal) collects and publishes data on CPI index for both Kathmandu valley and Terai region (including Birgunj). While the food and beverage costs are generally lower in Terai than in Kathmandu, the difference in CPI index is actually lower during rainy season than in winter. Since syndicates are imposed during the rainy seasons, this difference is actually counterintuitive, and generally, it indicates that CPI index as such as not much useful to estimate the impact of syndicates in prices.

The impact of syndicates on prices must be lower in Terai and in the regions adjacent to India. Not only it is cheaper to transport goods from India to these regions, people can simply walk over to India and buy goods and thus nullify the price impact. The impacts are more significantly in distant hills and in Kathmandu valley. Here we provide the estimate of price transmission for Kathmandu valley.

Since the average value of goods imported per day is 785.2 million Rupees, assuming half of these enter Nepal via Birgunj, where 600 trucks travel each day, the value of goods carried by each truck is NRS 6, 54,333. Given average fare increase ($p_i^n - p_i^c$ above) of Rs 4,000.00, and the likelihood that only half of the trucks are being operated in any given day while others have to spend Rs 2500 for a warehouse storage fee per day, the cost increases by Rs 5200 on average for a given truck. Importers admitted that they make 20-30% profit of their imports. For our estimation; we use 25% profit as a benchmark. Given the inflation rate of 9.1% for 2014, this implies that in the absence of a syndicate induces cost increase, the inflation rate would have remained 8.00%, and hence almost 11% of total inflation can be attributed to the syndicate.

## 5.3   Impact on overall poverty

According to the data from the World Bank, Nepal's GDP in 2013/14 was $19.29 billion dollars and it grew by 5.48% at the time. Our deadweight loss data is for 2014. Assuming the same growth rate for 2014, we note that GDP grew by approximately, 1.05 billion dollars in 2014. The loss due to syndicate (27.55 million dollars) is, therefore, 2.6%.

# SECTION 6

## Conclusion

We have provided comprehensive details of the trucking industries in Nepal: their organization, modus operandi, information on personnel working in these industries and the related costs involved. This study is exhaustive as the surveyors have collected data from all around the country, representing almost every route.

We conclude that the market is made up of small entrepreneurs who began their careers in the trucking industry itself. Barriers to enter on the market mainly come from the difficulties in retrieving credit and a parallel permit system that is run by both the government and TEAs. TEAs are still dominant in setting prices and in the supply of trucks, though truck owners have found ways to negotiate around them as well. Like everything else in Nepal, the trucking industry and the role of TEAs are also changing over time, mainly because of the increasing assertiveness of the insurance board and other regulatory bodies.

Syndicates, we found, affect the country's economy negatively. The loss economy wide was estimated to be $27.55 million dollars in 2014, accounting for 2.6% of the net GDP growth. This loss also accounts for 11% of the total inflation in Kathmandu.
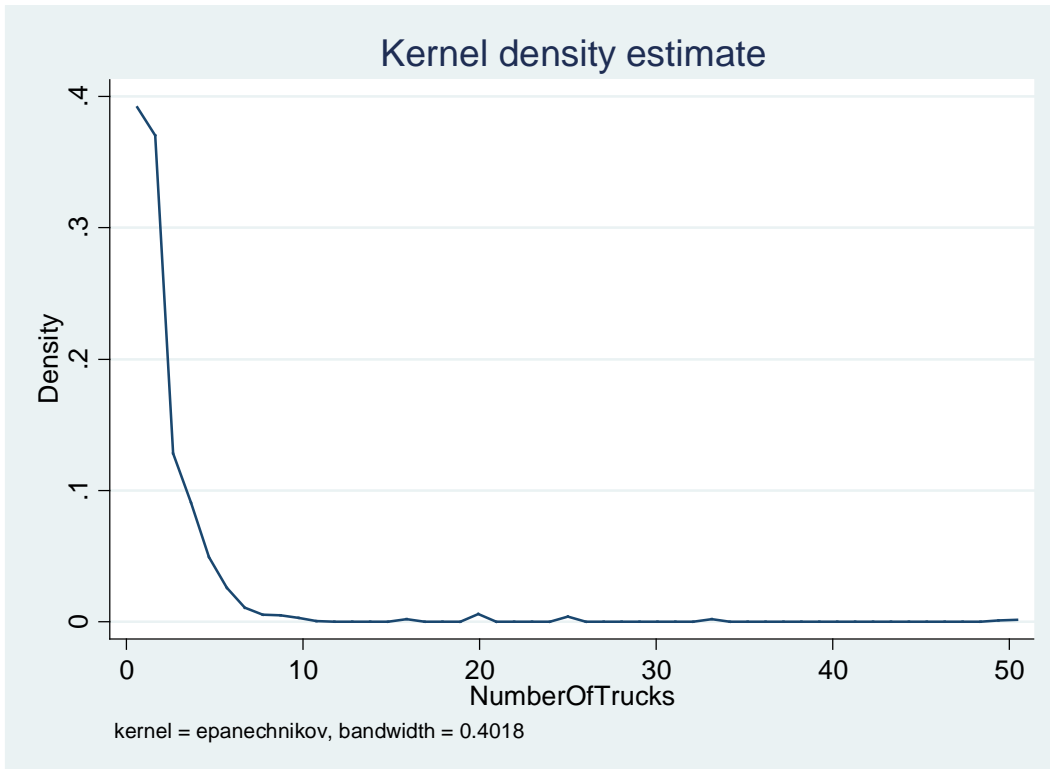
EVIDENCE
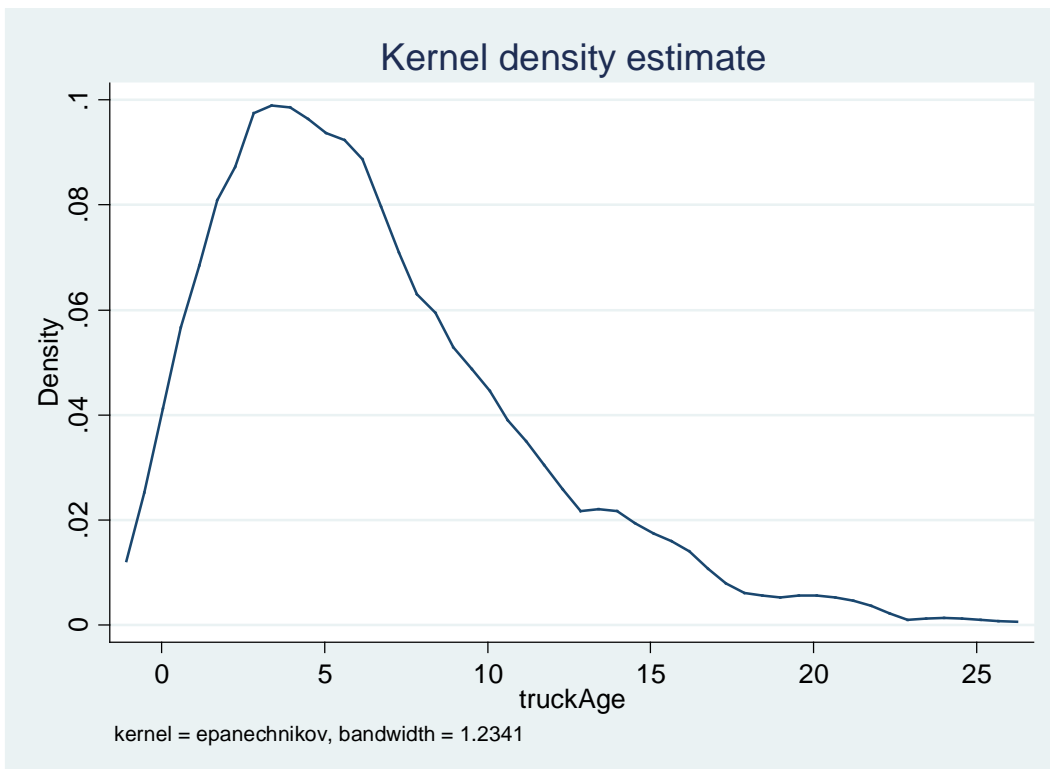ON DEMAND
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INFRASTRUCTURE | LIVELIHOODS

FITTEN Smarika (2013), FITTEN headquarter, Kathmandu

Hausman, J. A. (1981). Exact consumer's surplus and deadweight loss. *The American Economic Review*, 662-676.

Willig, R. D. (1976). Consumer's surplus without apology. *The American Economic Review*, 589-597.
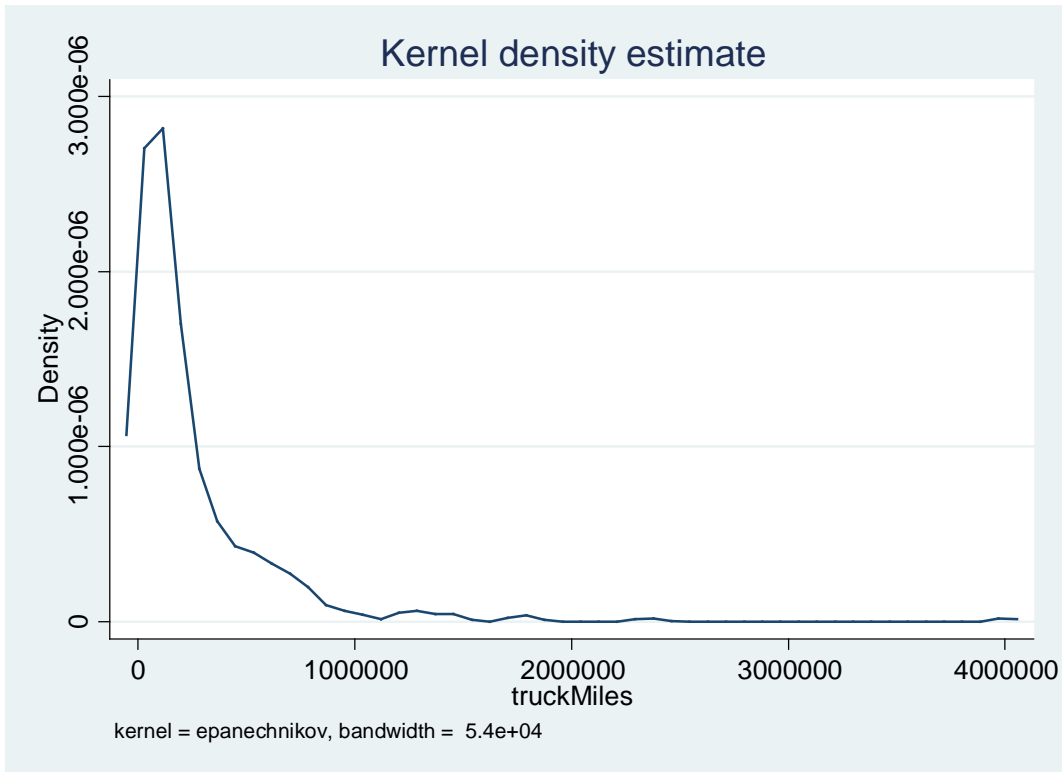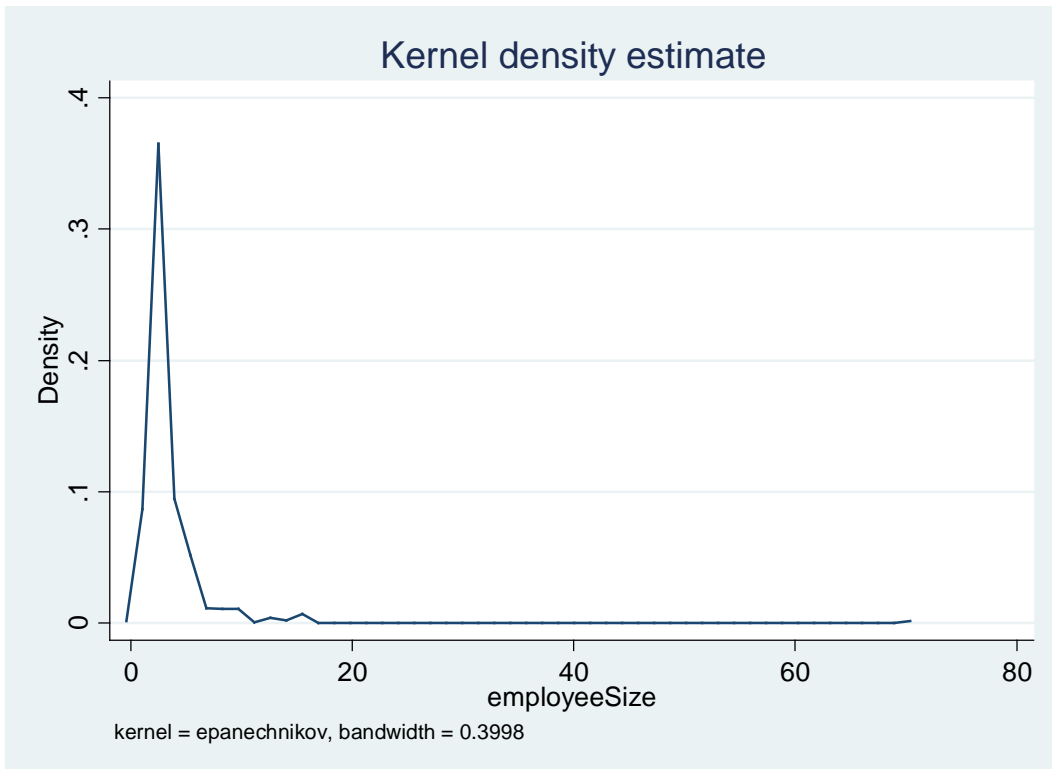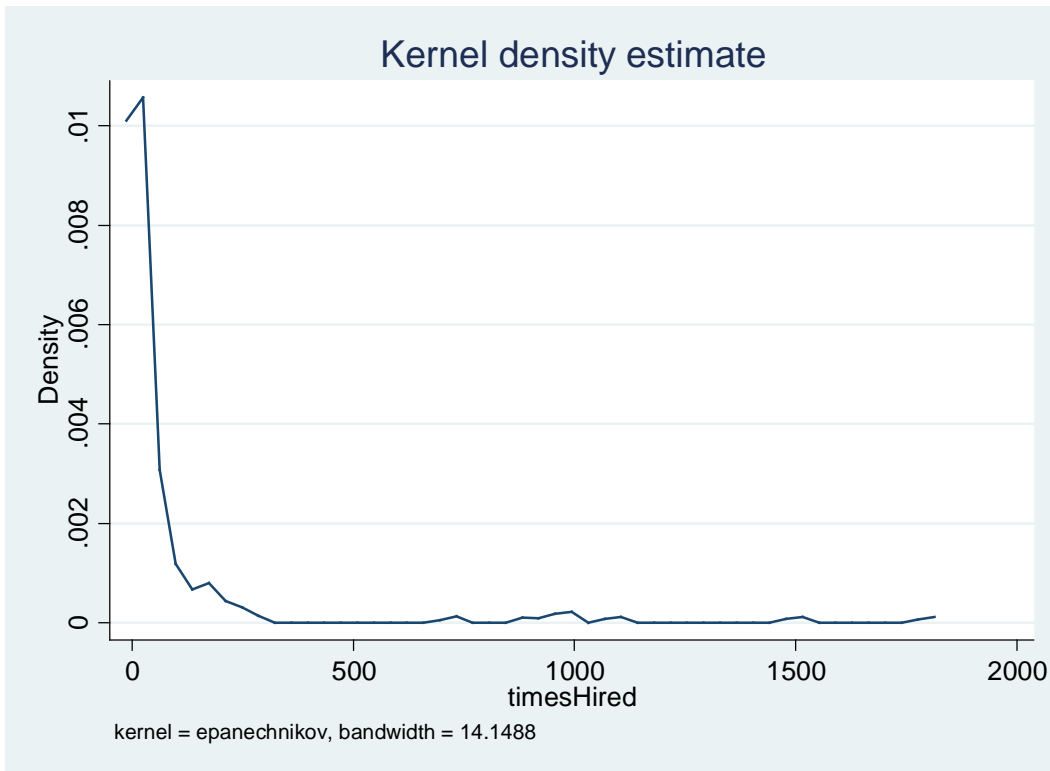
**Appendix:**
(1)     Number of Trucks per firm



Kernel density estimate

kernel = epanechnikov, bandwidth = 0.4018

(2)     Age of a truck



Kernel density estimate

kernel = epanechnikov, bandwidth = 1.2341

(3)    Total kilometres run by a truck



Kernel density estimate

kernel = epanechnikov, bandwidth = 5.4e+04

(4)    Employee size of a Trucking firm



Kernel density estimate

kernel = epanechnikov, bandwidth = 0.3998

(5)     Number of times hired per year

**Kernel density estimate**



kernel = epanechnikov, bandwidth = 14.1488

(6)     Days of operation per year

**Kernel density estimate**



kernel = epanechnikov, bandwidth = 22.9557
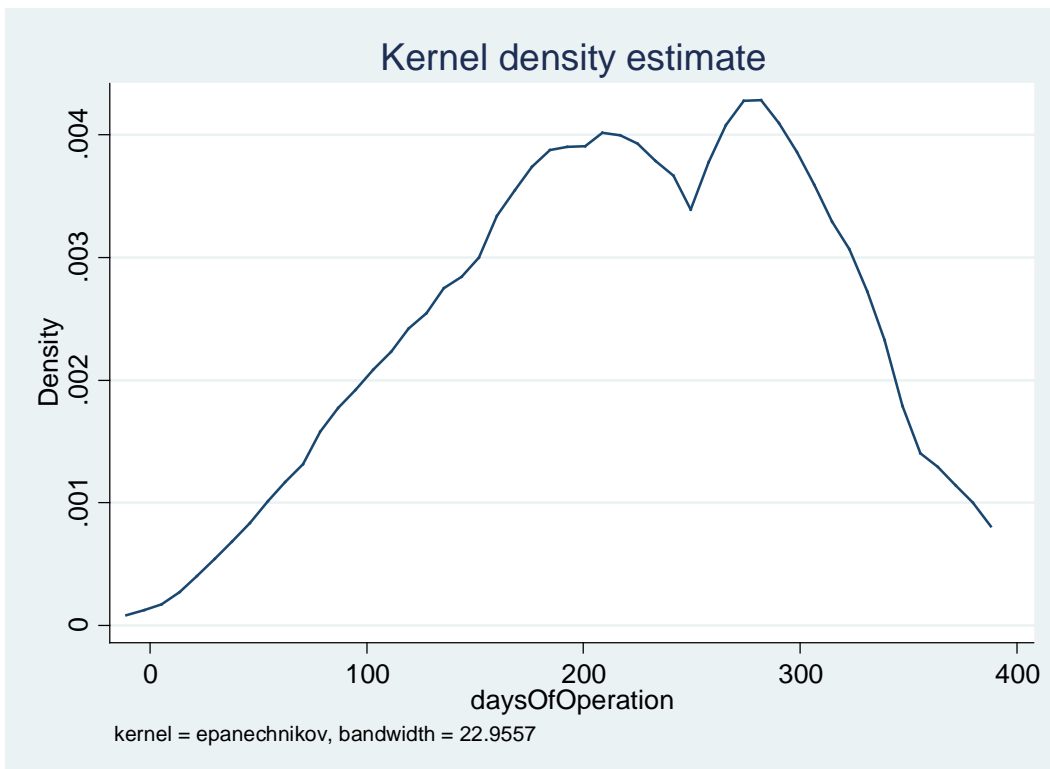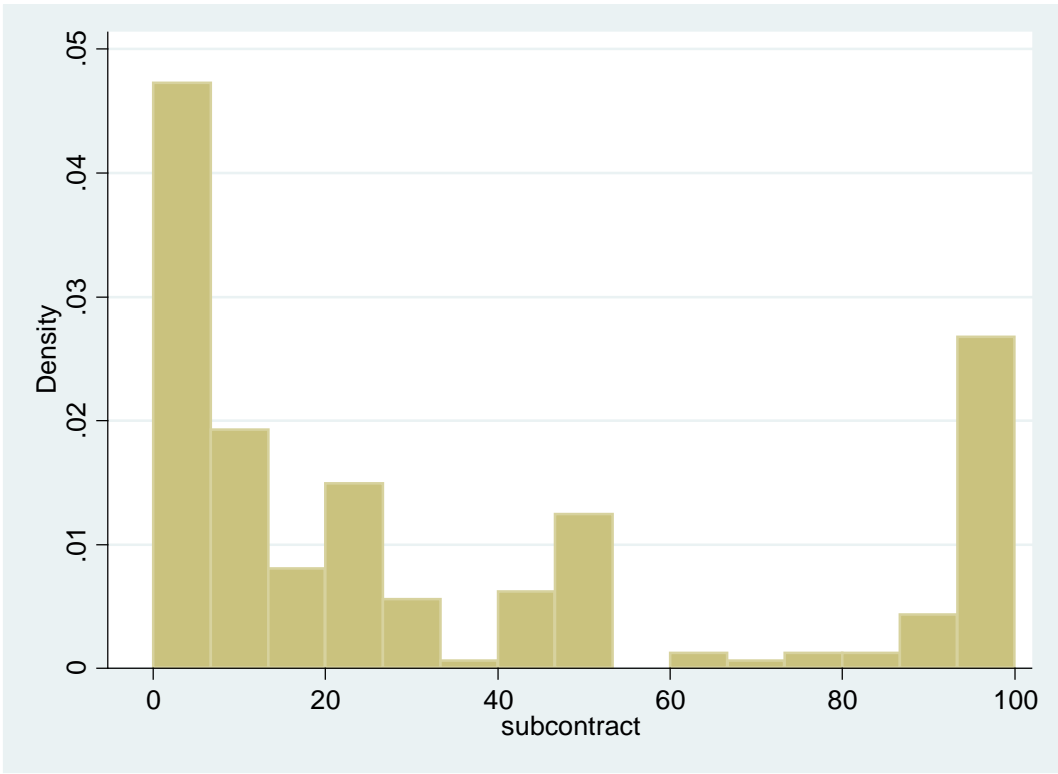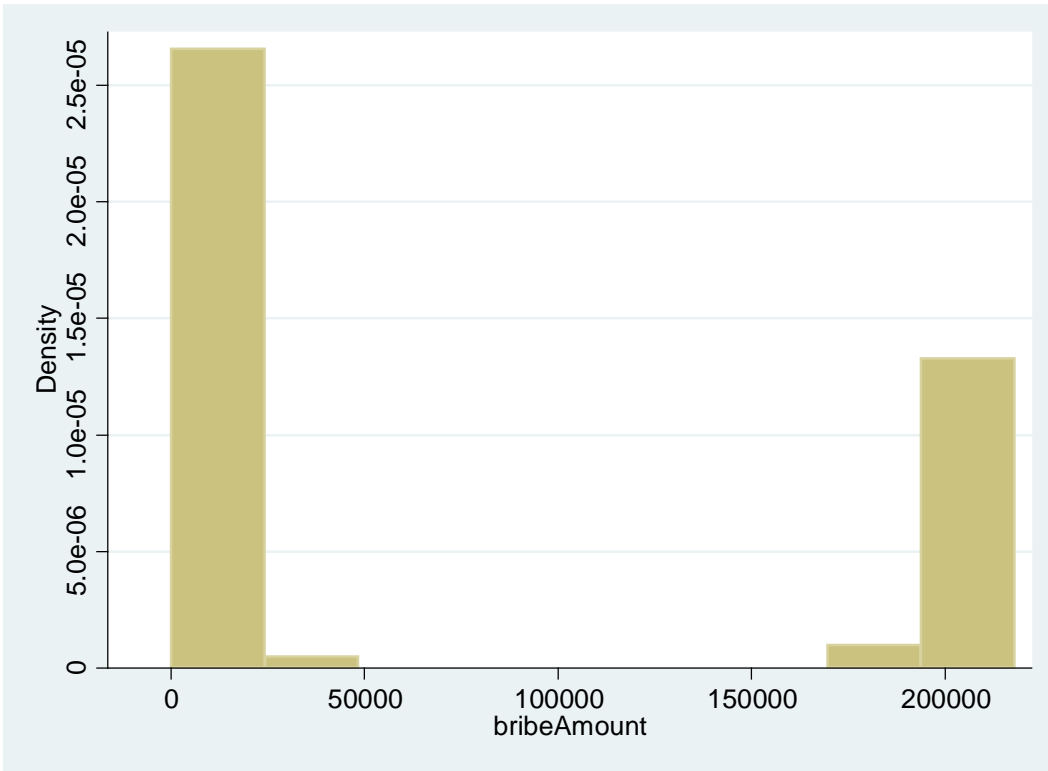
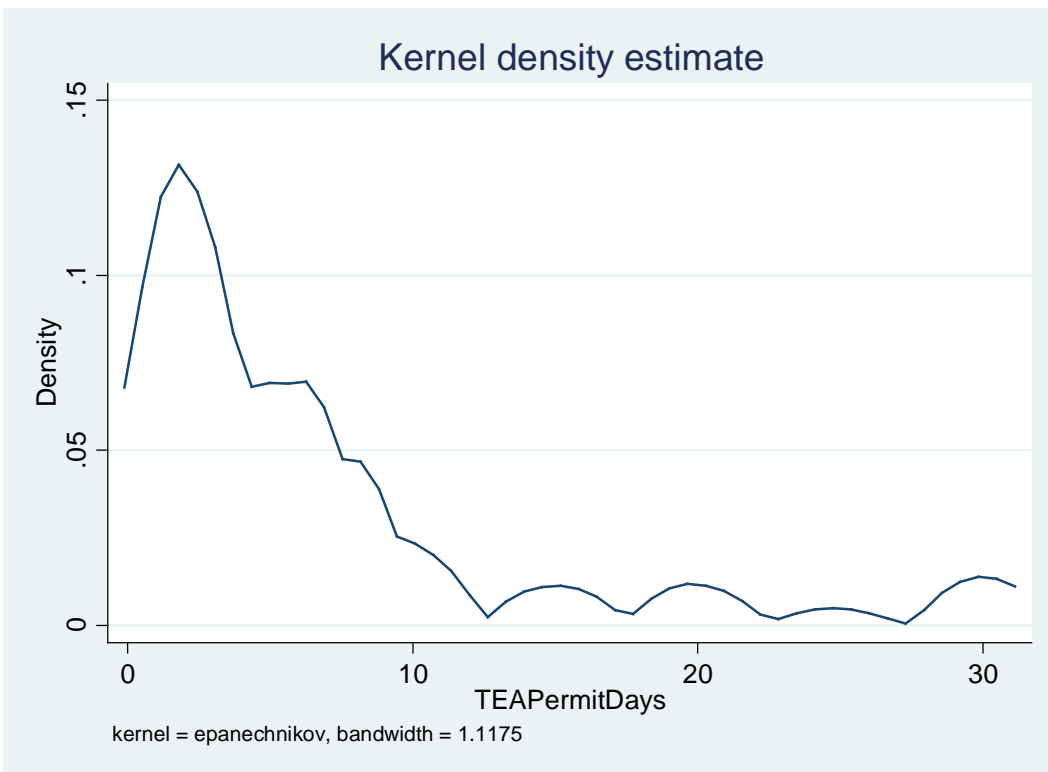(7)     % of total volumes produced by other firms
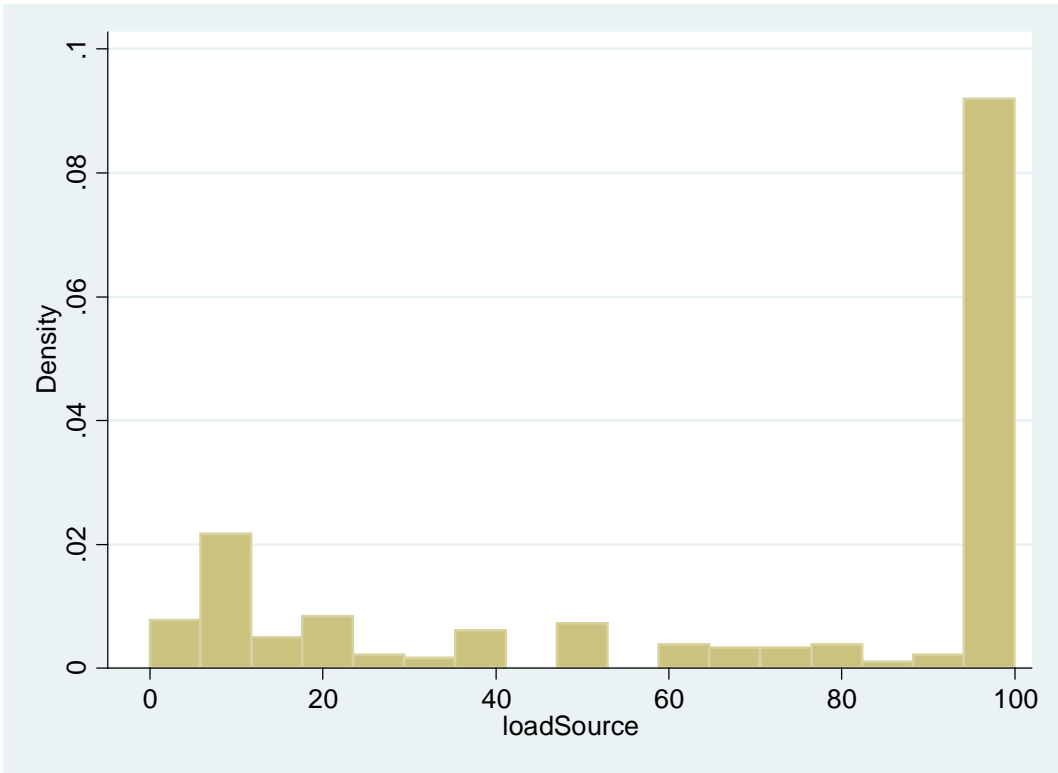


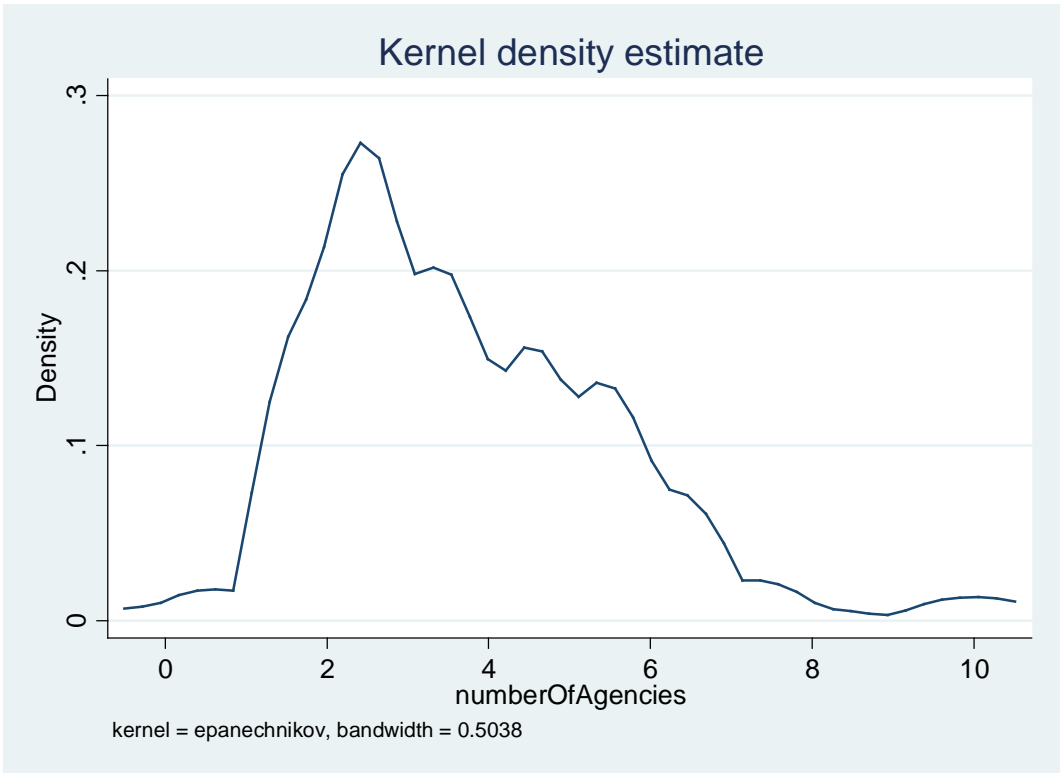(8)% of total volumes subcontracted by other firms

(8)    Bribe paid to get route permit



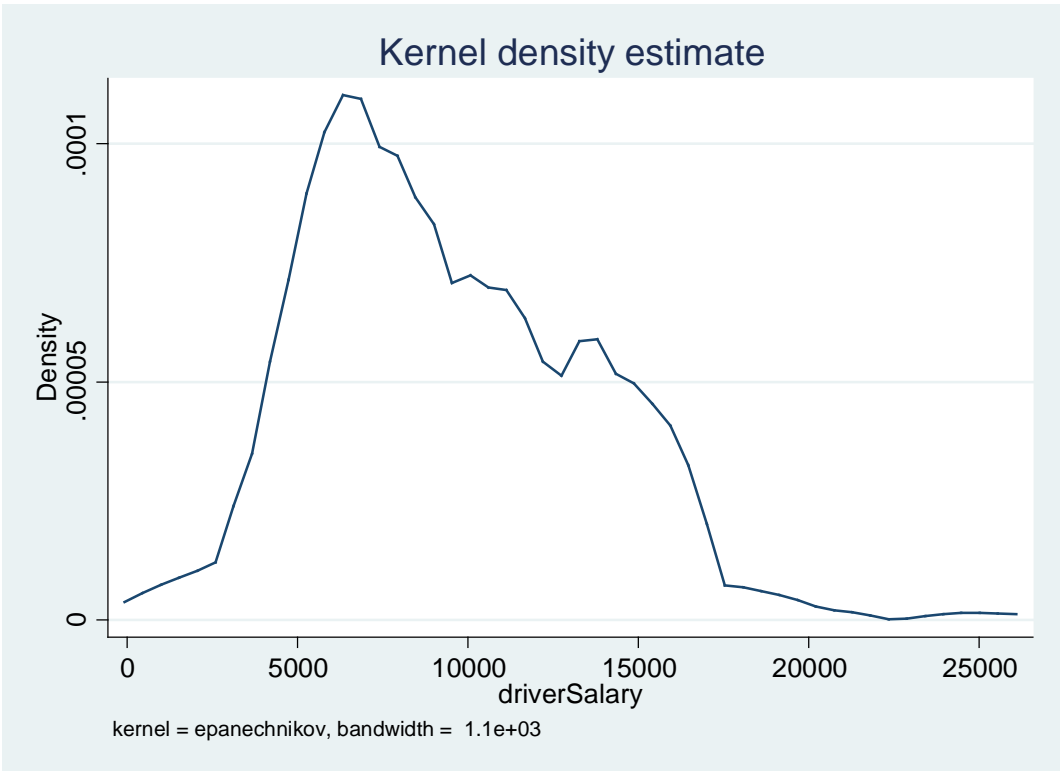(9)    Days required to get permits from TEAs

## (10) Number of agencies stopping in highways



Kernel density estimate

kernel = epanechnikov, bandwidth = 0.5038

## (11) Salary of the driver



Kernel density estimate

kernel = epanechnikov, bandwidth = 1.1e+03

(12)     Salary of the helper



Kernel density estimate

kernel = epanechnikov, bandwidth = 505.7753
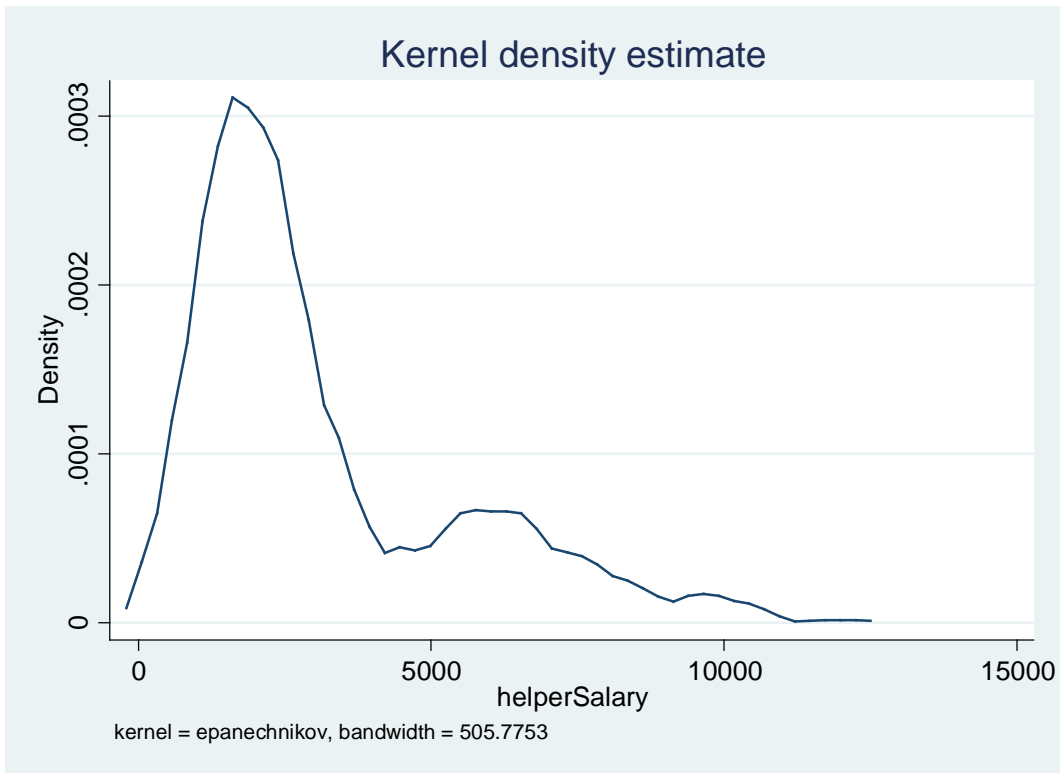
(13)     Income tax paid by firms



Kernel density estimate

kernel = epanechnikov, bandwidth = 149.8508
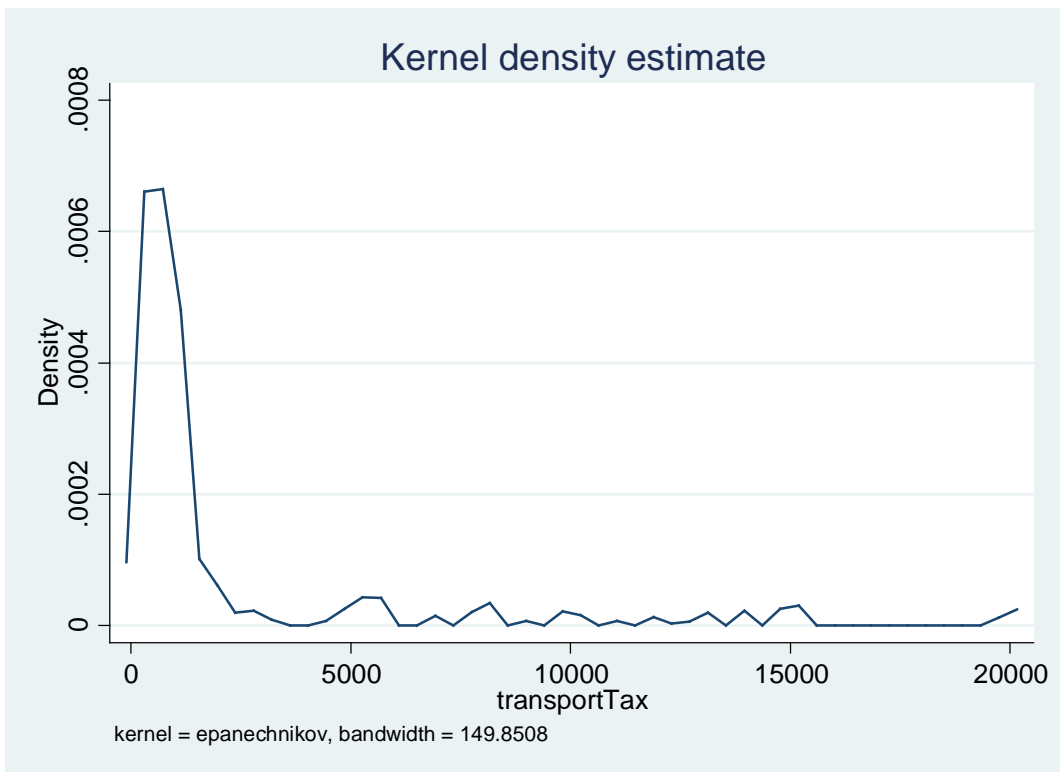
(14)    billbook renewal charges
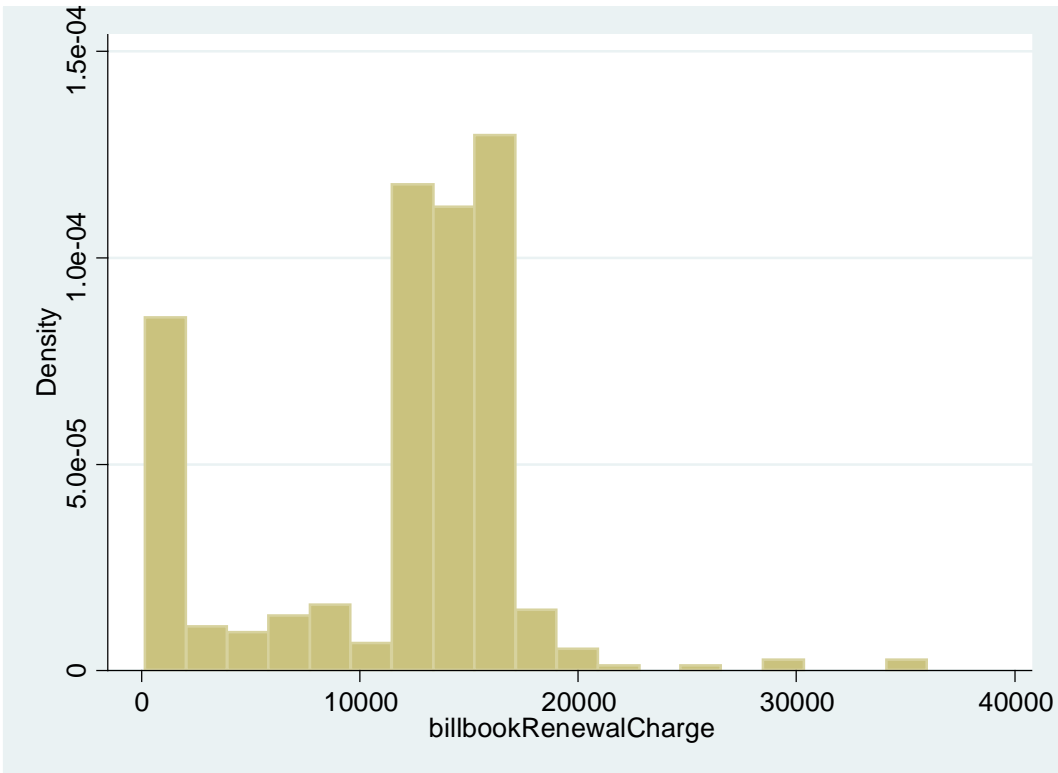


(15)    Fitness charge
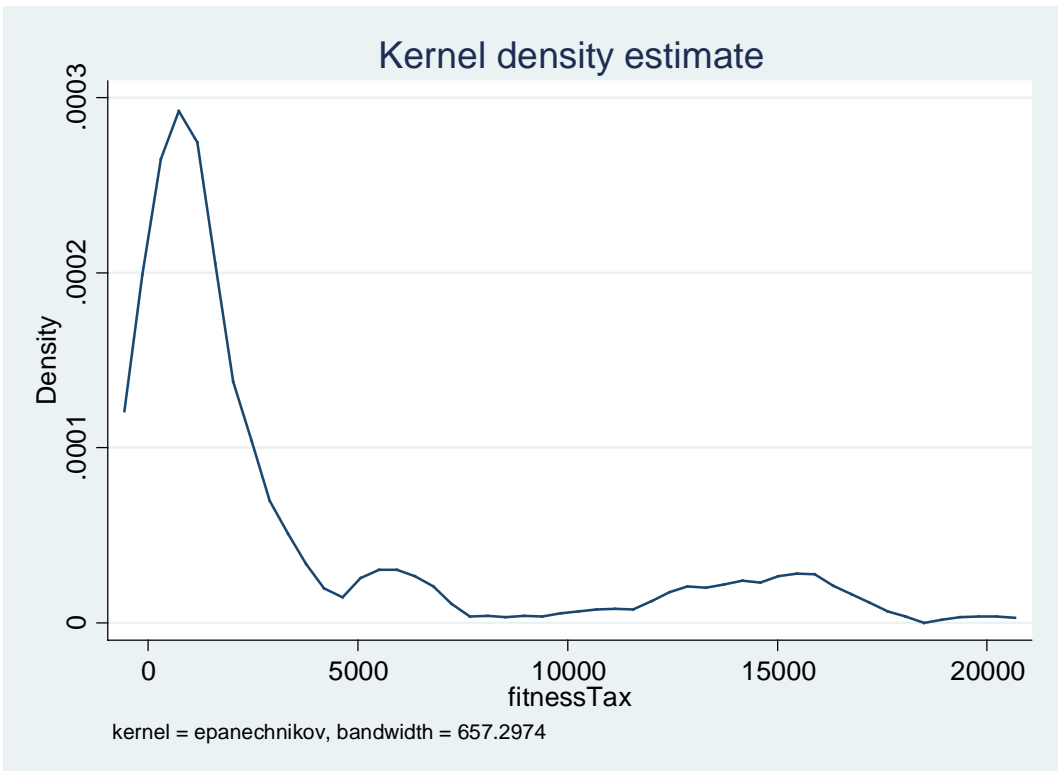
(16)    Maintenance cost of an average truck



Kernel density estimate

kernel = epanechnikov, bandwidth = 1.0e+04
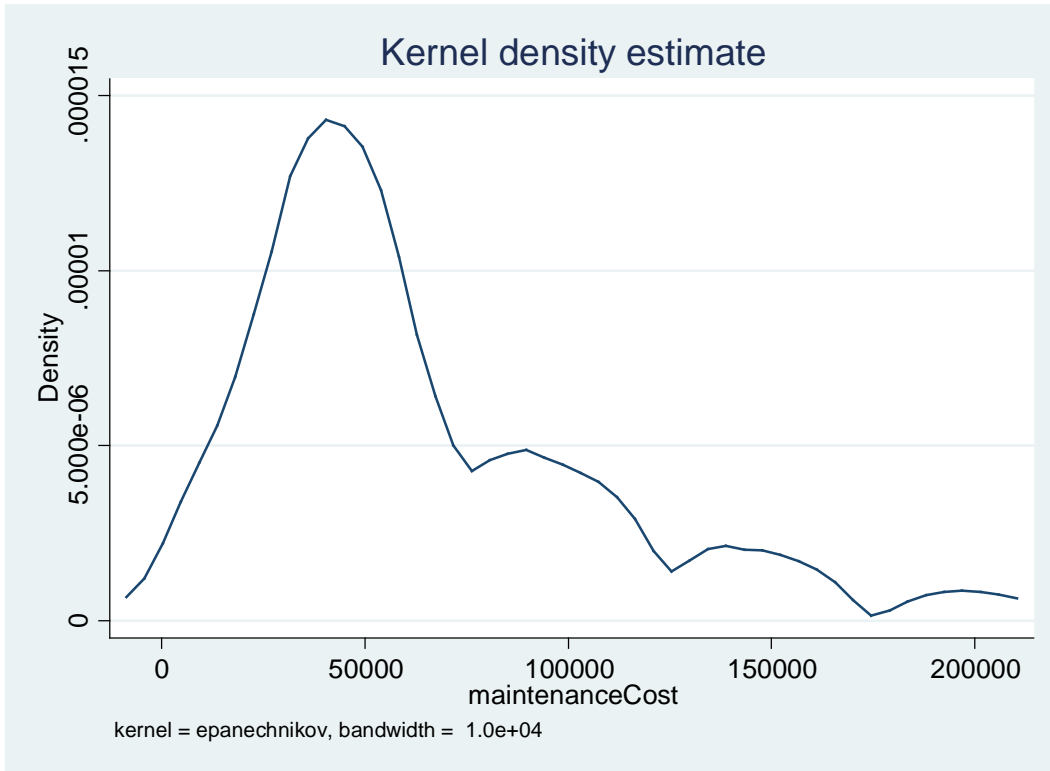
(17)    Gear and differential cost of a truck



Kernel density estimate

kernel = epanechnikov, bandwidth = 7.0e+03

(18)    Other miscellaneous costs



Kernel density estimate

kernel = epanechnikov, bandwidth = 8.8e+03

(19)    Overhead costs



Kernel density estimate

kernel = epanechnikov, bandwidth = 8.4e+03

(20)    Tire costs



Kernel density estimate

kernel = epanechnikov, bandwidth = 4.4e+04
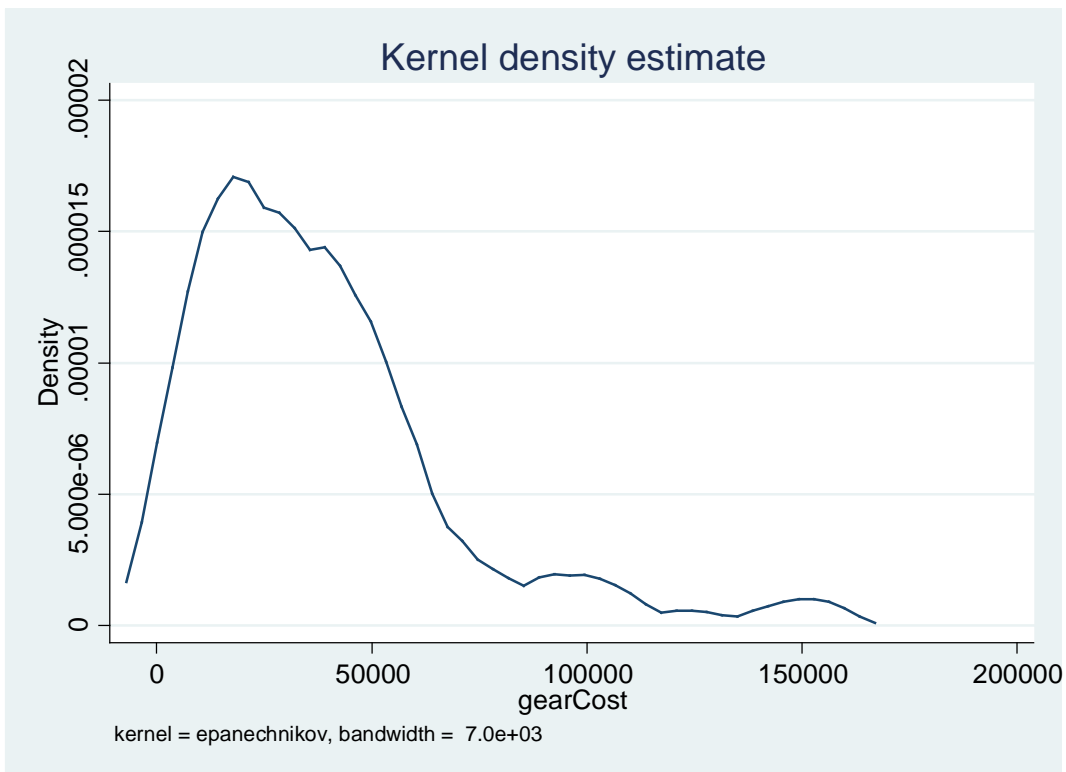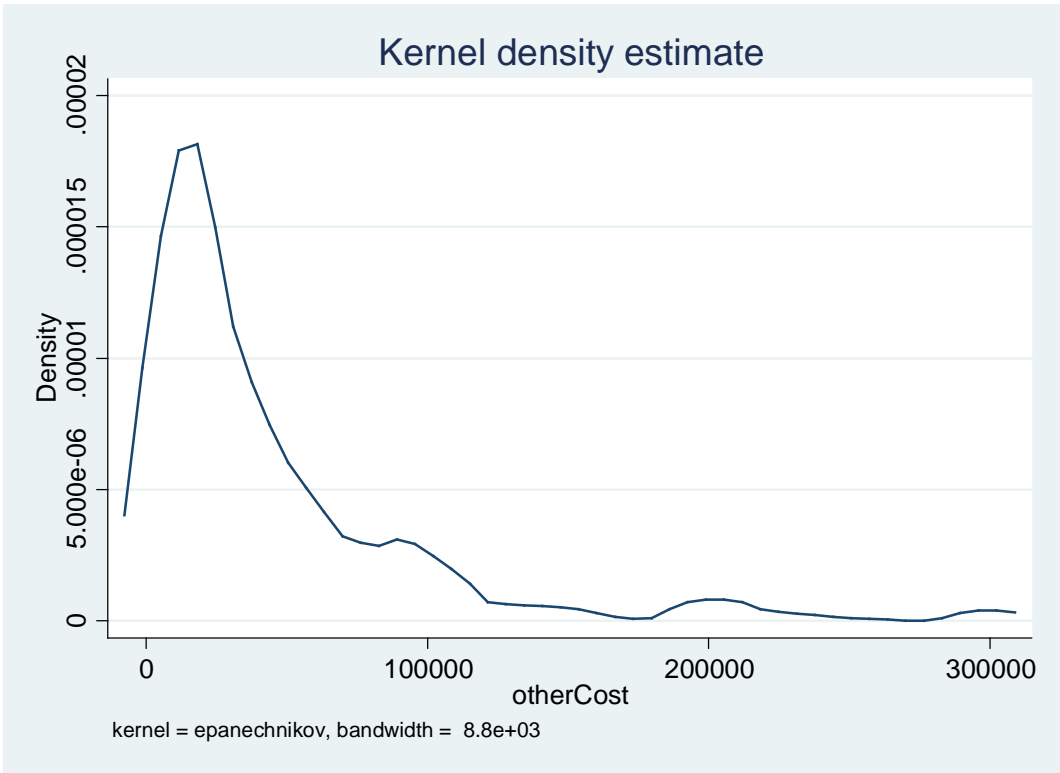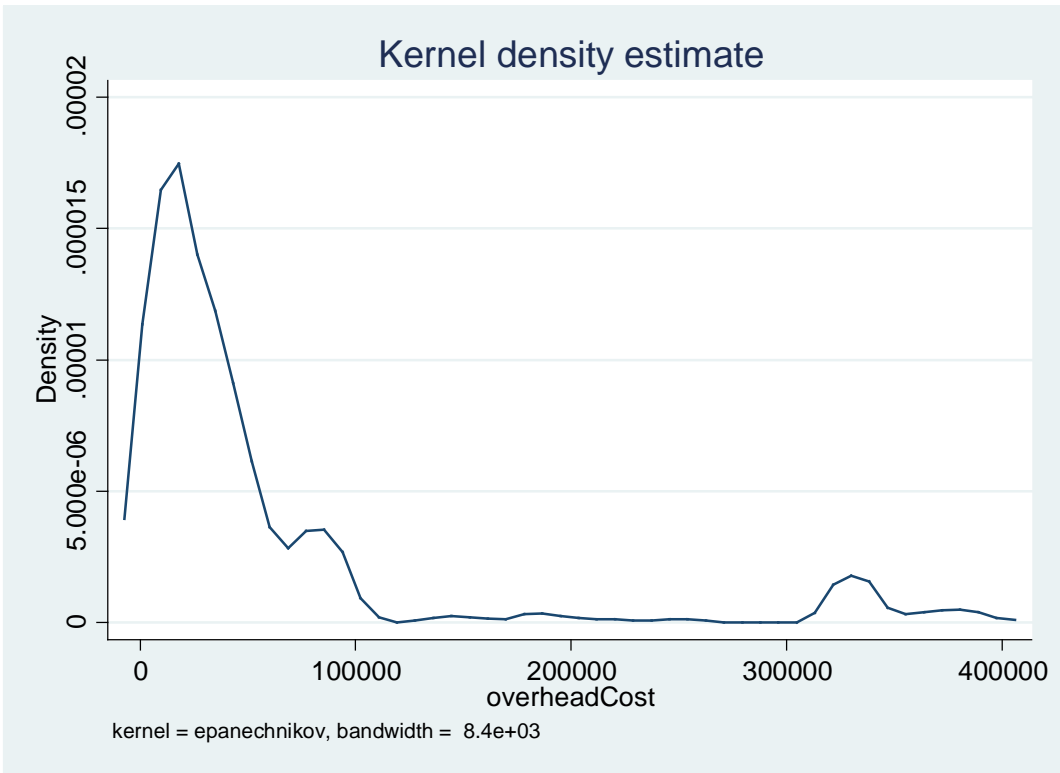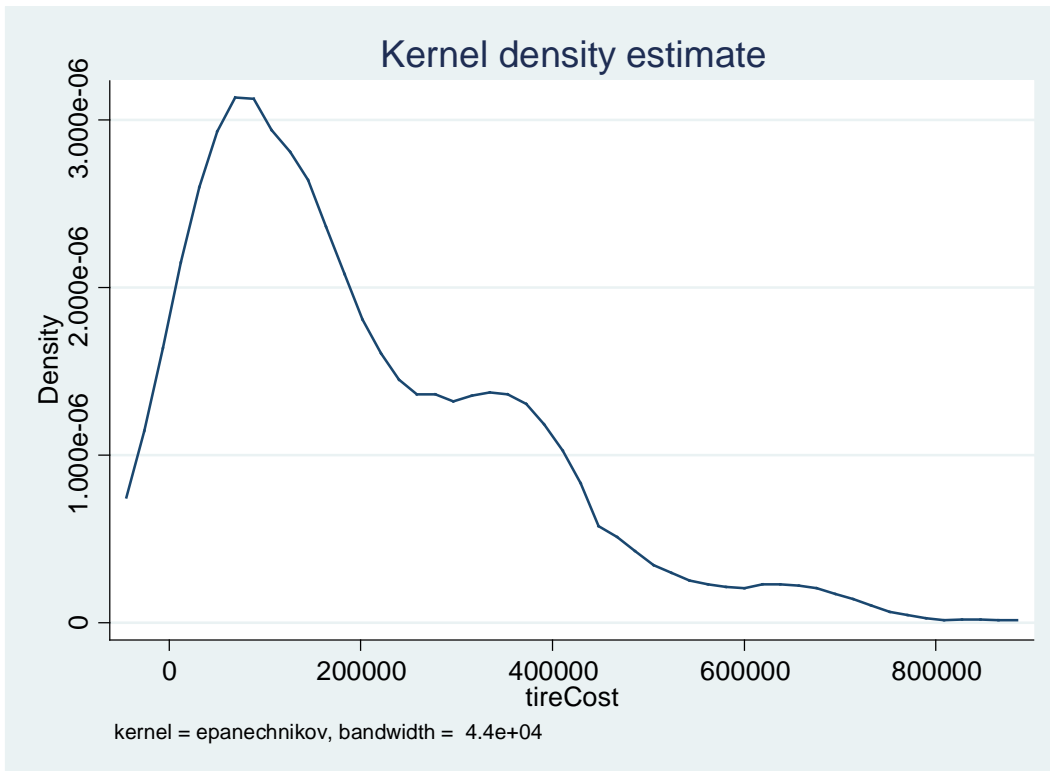
20. List of TEAs listed under Nepal Truck Yatayat Mahasangh(FTTEN):

| S. NO | Organization Name | Chairman | Number of Trucks | Telephone/Mobile | Membership offered | Membership cost |
|---|---|---|---|---|---|---|
| 1 | Pawa Nepal Mechi T.E.A | Shriram kharel | 156 | 023-543529/9852672121 | Single | RG- 30,500 RN- 2100/yr |
| 2 | Biratnagar T.E.A | Binod khadka | 223 | 021-523651/9852021591 | Multiple | RGF- 17000 RN- 3000/yr RGP-7050 RN-3000/yr |
| 3 | Koshi T.E.A | Bidhapati Upadhyaya | 800 | 025-580590/025580590 | Single | RG-10,100 RN- 18000/yr |
| 4 | Purwanchal Truck Syndicate | J.B Khadka | 255 | 025-533180/9852045234 | N/A | N/A |
| 5 | Himali T.E.A | Om bhakti Mainali | 115 | 035-420240/9852835001 | Single | RG-25000 RN- 200/yr |
| 6 | Janakpur Anchal T.E.A | Babu Saheb Shah | 150 | 041-522191/9854026635 | Single | RG- 3500 |
| 7 | Terai T.E.A | Om Karki | 1500 | 053-521347/9855024108 | Single | RG-10,000 |
| 8 | Narayani T.E.A | Gokarna Parajuli | 4600 | 057-521034/9855067616 | Single | RG- 30,000 RN- 1200/month |
| 9 | Nepal T.E.A | Rohit Shrestha | 300 | 01-4036157/9841213323 | Single | RG- 15000 RN-3000 |
| 10 | Gandaki T.E.A | KrishnaHari G.C | 900 | 061-521490/9856021871 | N/A | N/A |
| 11 | Paschimanchal T.E.A | Ganesh Panta | 300 | 071-438552/9857020938 | Single | RG-100,000 RN- 500/yr |
| 12 | Band Ganga T.E.A | Altarfahaman Kha | 600 | 076-550097/9857020516 | Single | RG-25000 RN-1200/month |
| 13 | Ratpi Anchal T.E.A | Janak Pra. Kharal | 185 | 082-561482/9857820052 | N/A | N/A |
| 14 | Bheri Anchal T.E.A | Mohan Singh K.C | 199 | 081-550336/9848021560 | Single | RG- 35000 RN-1200/month |
| 15 | Mid western T.E.A | Prakash Adhikari | 615 | 083-521399/9858021879 | N/A | N/A |
| 16 | Seti Mahakali T.E.A | Meghraj Bhatta | 635 | 091-526355/9858420570 | N/A | N/A |
| 17 | Dhankuta T.E.A | Mohan Shrestha | 25 | 026-520060/9842061693 | No reg | No reg |
| 18 | Sarlahi T.E.A | Rajan K.C | 200 | 046-530490/9854035463 | Single | RG-2500 RN-1000 |
| 19 | Rautahat T.E.A | Sudip Raj Kandel | 150 | 055-540253/9855040128 | N/A | N/A |
| 20 | Tanahu T.E.A** | Devkumar Shrestha | 120 | 065-560608/9856023985 | Simple Objective Associative Special | RG-1400 RN-300 RG 3000 RN- 1500 RG 3000 RN-1500 RG- 100,000 |
| 21 | Karnali Anchal T.E.A | Karma Buda | 200 | 057-520143/9848320543 | Permanent temporary | RG-40000 RN-1500 RG-20000 RN-1500 |
| 22 | Nepal Truck Container T.E.A | Raj Kumar Paudel | 980 | 01-6635040/9851021832 | N/A | N/A |
| | TOTAL | | 13208 | | | |

** Tanahu TEA offers four types of memberships: Simple, Objective,Associative and Special. Simple Membership only provides support to the truck owners by giving the association name. It does not include any kinds of benefits.Objective and associative registration are similar in terms of benefit offered but these registration are done according to the route where the trucks operate.And includes

insurance benefits in case of undetermined circumstances. Special registration provides the truck owner the entire benefits of insurance and Valai kosh and this registration need not be renewed, it is for full time.

**List of trucks under Nepal Yatayat Rastriya Mahasangh:**

| S. NO | Organization name | President | Number of trucks | Contact number | Membership offered | Membership cost |
|---|---|---|---|---|---|---|
| 1 | Garuda TEA | **Kapil Pandey** | 25 | 9855055932 | **Single** | **RG-10,000 RN- 1500** |
| 2 | Bhaktapur Truck EA | **N/A** | 407 | 6612970 | | |
| 3 | Om Halesi Transportation Entrepreneur Association | **Shatrughan Karki** | 130 | 9852820684 | **Single** | **RG-70,000 RN-1000/yr** |
| 4 | Far Western Truck and Tractor Enterpeneur Association | **Padam Singh Raul** | 150 | 9858420566 | **Single** | **RG-15,500 RN-500/yr** |
| 5 | Waling Truck EA | **Chet Narayan Shrestha** | 52 | 9856027590 | **N/A** | **N/A** |
| 6 | Nepal T.E.A | **Rajendra Shrestha** | 1100 | 01-4036157/9851035548 | **Single** | **RG-18000 RN-1000** |
| 7 | Gandaki Midsize Truckers Association | **Dharma Raj Adhikari** | 205 | 9856027444 | **N/A** | **N/A** |
| 8 | Nepal India Transportation Entrepreneur Welfare Association | **Sunil Bishta** | 175 | 9847060082 | **Single** | **RG-32000 RN-1000/month** |
| 9 | Bheri Karnali Truck and Tractor Entrepreneur Association | **Surya Raut** | 180 | 9858051183 | **N/A** | **N/A** |
| 10 | Lumbini TEA | **N/A** | 70 | 987024684/061-520088 | **Single** | **RG- 10,000 RN- 50/day** |
| 11 | Truck TEA, Dang | **Bharatnath Yogi** | 200 | 9857830561 | **Single** | **RG- 20,000 RN- 1500 yearly** |
| 12 | Kalaiya TEA | **N/A** | 185 | 053-551260 | **N/A** | **N/A** |
| 13 | Nepal Tripper &truck TEA | | 18 | 01-4288640 9851045581 | **Single** | **RG- 5000 RN- 1000/year** |
| 14 | Kathmandu Mini truck TEA | **Narayan Ghimire** | 30 | 9841405949 | **Single** | **RG-5000 RN-1000 yearly** |
| 15 | Municipality Mini truck TEA | **Nir Ratna Newa** | 35 | 01-5535300 | **Single** | **RG-5000 RN-1000 yearly** |
| 16 | Koteshwor Minitruck TEA | | 18 | N/A | **Single** | **RG- 5000 RN-1000/year** |
| 17 | Manohara Local Truck and Mini Truck TEA | **N/A** | 25 | N/A | **Single** | **RG- 8000 RN- 1500/year** |

\* for organizations 12-17 above, the truck size, registration and renewal are just an approximation and are provided by Ramesh Bohora Karyalaya pramukh Nepal Truck *Yatayat Mahasangh.*

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**NOTE:**
*RG- initial registration charge paid to the transportation association by the truck owners.
*RN- Membership Fee renewal charge to paid by the truck owners
*RGF- registration fee for the full membership
*RGN- registration fee for the partial membership
(P.S these all registration fees are paid at once at the initial registration of the trucks)
*S.NO 17 does not provide any kind of membership to the truck owners, instead it provides
membership through Koshi TEA and Purwanchal TEA

## Appendix 21: Current operating cost of a typical truck in birgunj-Kathmandu corridor

| S.N | description | Rate | quantity | Rate per year | Average (from survey) [Rounded] |
|---|---|---|---|---|---|
| 1 | Salary and allowance | | | | |
| | a) driver | 7000/Month | 1 | | 9383/Month |
| | b) helper | 1000/ Month | 1 | | 3138/Month |
| | c) Allowance | 600/day | 2 | | 906/day for driver 359/day for helper |
| 2 | Taxes | | | | |
| | a) Income tax | 11,500/year | | | 18621 |
| | b) Transport tax | 600/per tip | | | 2246/per trip |
| | c) Billbook Renewal | 380/ Month | | | 1041/month |
| | d) Permit | 12000/year | | | 6101/year |
| | e) Fitness | 200/year | | | 3452/year |
| | f) Pollution | 80/year | | | |
| | g) Jaach Paas | 75/per trip | | | 709/trip |
| | h) Municipality | 3000/year | | | 2810/year |
| 3 | Insurance | 6000/month | | | 2868/month |
| 4 | Maintenance | | | | |
| | a) Engine overall | 45000 for 4 years | | | 63608/year |
| | b) Gear + differential | Gear oil 50000 4 year Crown – 37000 for 3 years | | | 42875/year |
| | c) General maintenance | 5000/ month Air 100 Grease 150 | | | 3672/month |
| 5 | Battery | 17000 / 2years | | | 20000/2 years |
| 6 | Depreciation | 10 % / Year | | | |
| 7 | Interest | 12% / Month | | | |
| 8 | Overhead | | | | 55597/year |
| | Variable costs | | | | |
| 9 | Diesel | | | | 138958/month |
| 10 | Tyre | 32,000/Year | | | 196832/year |
| 11 | Lubricant | Crown oil: 7000 Gear Oil: 2800 Mobil: 9750 | | | 8868.8/month |

*Transport tax, income tax, permit & Renewal is to be paid to the government*
*Municipality charges is to be paid to the  local municipality where the vehicle belongs to.*

## Appendix 22: Total Number of trucks registered in Nepal

| Year | Total Numbers |
|---|---|
| 046/47 | 6532 |
| 047/48 | 834 |
| 048/49 | 1524 |
| 049/50 | 1491 |
| 050/51 | 1740 |
| 051/52 | 1629 |
| 052/53 | 1151 |
| 053/54 | 907 |
| 054/55 | 1291 |
| 055/56 | 978 |
| 056/57 | 829 |
| 057/58 | 1271 |
| 058/59 | 1798 |
| 059/60 | 1212 |
| 060/61 | 1477 |
| 061/62 | 1592 |
| 062/63 | 2263 |
| 063/64 | 3278 |
| 064/65 | 3594 |
| 065/66 | 3643 |
| 066/67 | 4524 |
| 067/68 | 1969 |
| 068/69 | 1333 |
| 069/70* | 2544 |

(Note: Year is in Bikram Sambat. Bikram Sambat is 56 years 8 months ahead of AD. Hence 069/70 roughly corresponds to 2012/13 AD. Year reported above changes at June 15th.)
*-First 9 months only.

**Appendix 23. Spatial (Zonal) Distribution of Vehicle Registration in Nepal from 2047-2070**
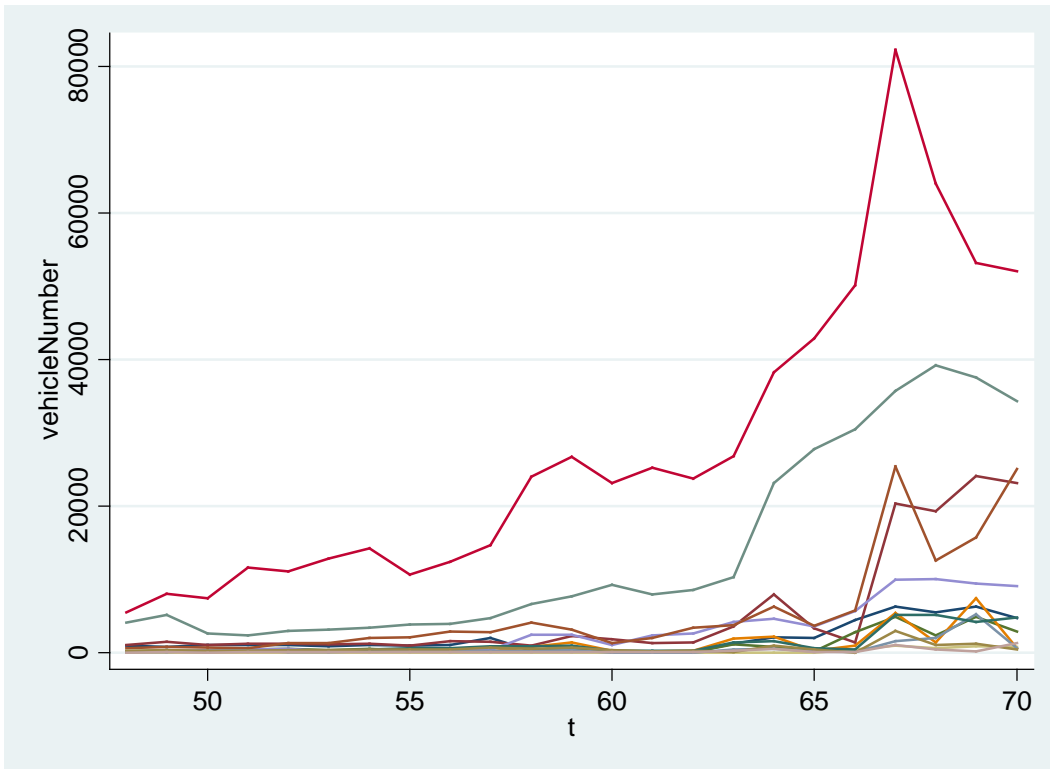


(Note: The plot above shows the total vehicle registration in 13 zonal offices of Nepal since 2047. The highest number of vehicle registration was seen in Bagmati zone, followed by Narayani zone. Karnali zone is not represented above, as it doesn't have any vehicle registration office yet.)

**Appendix 24: Time trend of total vehicles in Nepal**
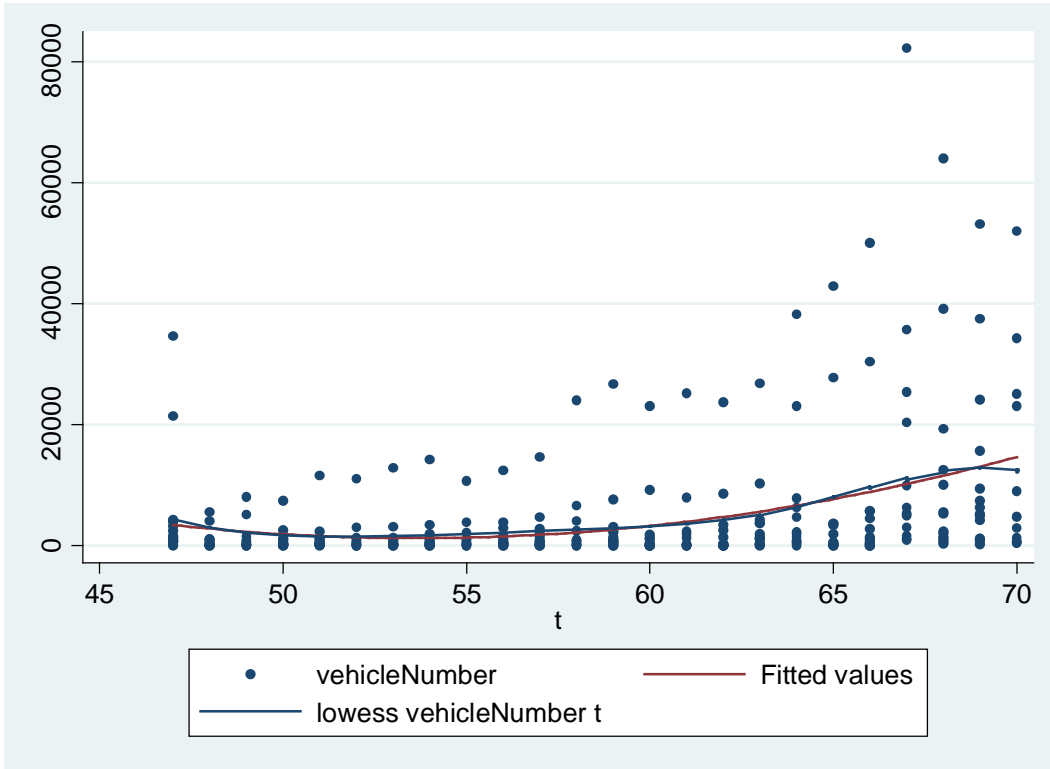


(Note: When fitting vehicle numbers over time, the quadratic fit is almost similar to nonparametric fit (lowess). The vertical axis shows the total number of vehicle registered, and the horizontal axis shows the years (2047-2070). The quadratic fit had both coefficients of t and t_square significant and R-square was 0.42. Quadratic regression of log vehicle number on time also shows that the growth rate of total vehicle is increasing by 2% each year.)