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İsmail Çağrı Özcan

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Regional Economics Applications Laboratory
65-67 Mumford Hall
1301 West Gregory Drive
Urbana, IL, 61801
Phone: (217) 333- 4740

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Dr. İsmail Çağrı Özcan

Assistant Professor
Ankara Yıldırım Beyazıt University
Department of Aviation Management

Mailing Address: Cankiri Cad. Cicek Sok. No: 3 Ulus - Altindag/Ankara
E-mail: icagriozcan@yahoo.com
Phone: +90 312 324 15 55

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Abstract
There has been a global drastic policy shift from the public provision of major infrastructure services to privatization, and Turkey is no exception to this tendency. Following the slow-down of privatization efforts in the 90s, the last decade has witnessed a jump in Turkish infrastructure privatizations. Despite this recovery, however, Turkish road privatizations still fail to significantly outperform other transport modes unlike global trends and especially lagged behind airport privatizations. In a country like Turkey, which is in need of substantial road investments and expresses its policy priority of enlarging its road network, this relatively lower performance needs elaborate evaluation. The aim of this paper is to fill in this gap by analyzing Turkish road privatizations, discussing implemented privatization schemes and their characteristics, and providing some policy lessons. The findings reveal that the lack of pre-bid studies such as accurate origin-destination matrices and surveys on the willingness to pay behavior prevent the effective risk management of road privatizations. In addition, the analyses also suggest that Turkish public authorities might unnecessarily employ traffic and revenue guarantees to stimulate greenfield road privatizations through the Build-Operate-Transfer scheme.

Keywords
Project Finance; Transportation; Road Privatizations; Public-Private Partnerships; Build-Operate-Transfer; Turkey

1. Introduction

The provision of fundamental infrastructure services by public authorities had been the norm for decades based upon a rationale that the private sector might not afford huge infrastructure investments and the public provision might be necessary given the strategic importance of these services. However, failure of governments to finance necessary investments due to budget deficits and criticism on the inefficiencies attributed to public management and control initiated a tendency in favor of privatization of such services. Within the scope of the privatizations, some countries transfer the total or partial ownership of infrastructures, whereas others rely on various Public-Private Partnership (PPP, also sometimes called concession) schemes such as Transfer of Operating Rights (TOR) where the private party pays a fee to the government in exchange of operating an already running public infrastructure (Privatization Administration, 2017) and Build-Operate-Transfer (BOT) where the private party finances, builds, and operates an infrastructure. In contrast to other privatization types such as asset sale and public offering where the private parties become the owner, TOR and BOT models help governments retain the ownership and the infrastructure returns to the government at the end of the contract.

Turkey is no exception to this trend. After the foundation of the Republic of Turkey in 1923, Turkish governments tended to implement mixed economic policies. During this period, the private participation in infrastructure services almost never existed. It was the new government in 1984 that initiated the shift to more liberal economic policies (Karatas, 1992). As parts of new economic policies, the new government liberalized the money markets, started privatization of state-owned enterprises, and encouraged the private sector to invest in major infrastructure services. In order to facilitate private participation, a couple of privatization laws were also enacted.

Despite the ambitious start, however, the pace of privatizations in the 90s failed to reach expected levels because of repeated economic crisis, unstable political environment, and failed projects. First, the repetitive economic and political crisis reduced demand, damaged the accuracy of the long-term demand forecasts, and made the exchange and interest rates quite unstable. In turn, private bidders failed to borrow debt from the financial institutions. Parallel to the dominant mood, transport privatizations also slowed down throughout this period. The priority in transport privatizations was given to those which were already generating high cash flows and those which were easier to privatize and get high privatization revenues. The stars of this period were the airports and seaports, which were already in operation and having reduced risks when compared to totally greenfield projects (new projects rather than rehabilitation or capacity expansion). The TOR model for the maritime ports and BOT model for the air passenger terminal expansion projects were the extensively used privatization methods. Rail projects, because of their unprofitability, and road projects, because of their higher amount of investment and higher projects risks, remained a low priority during this period.

But road investments have been too important to be neglected. The first reason is the great dependence on road transportation in Turkey where nearly 90% of inter-city passenger transport and about 89% of freight transport were realized through highways in 2014 (Ministry of Development, 2015). Secondly, the extensive use of the road network results in the quick deterioration of pavements, congestion, and the reduced level of road safety, all of which require additional investments. Thirdly, the Turkish government expressed its assertive political

commitment to extend the multi-lane highway network to 15,000 kilometers. In addition, it is a very common global behavior for politicians to use the road investments as a powerful tool to claim votes (Wilkinson, 2006; Panagopoulos and Schank, 2008; Harding, 2015). The budget constraints, however, have been preventing the fulfillment of such goals. For all these reasons, when the economic indicators started to stabilize, a policy shift occurred to launch road privatizations to address all these problems. Backed by high traffic and revenue guarantees, massive road privatizations (such as Gebze-Orhangazi-İzmir Motorway and Izmit Bay Bridge (Osman Gazi Bridge), Istanbul Strait Road Tube Crossing Project (Eurasia Tunnel), and Northern Marmara Motorway and Third Bosporus Bridge (Yavuz Sultan Selim Bridge) with a total investment of more than 10 billion United States Dollars (USD)) have been launched through the BOT scheme. From the public policy point of view, the relatively slower start of the road privatizations, recently launched huge investments, and state guarantees (which might bring additional burden to the state budget) given to these projects call for an analysis of these road privatizations.

The goal of this paper is to fill in this gap by analyzing the road transport privatizations in Turkey, examining the goods and the bads, and discussing policy implications. Section 2 summarizes the related literature together with the theoretical background for infrastructure privatizations. Section 3 outlines Turkish road privatizations. Section 4 discusses the policy implications and recommendations. The last section presents the conclusion.

2. Literature review

Increasing populations, evolving mobility needs, and aging infrastructure necessitate new road investments in the form of both greenfield and rehabilitation projects. However, because of limited funding from the general budget, the pace of the road investments generally fails to meet the actual needs. Therefore, governments try to create alternative sources to fill this financial gap. One option is road funds. Road related charges, fines, and fees coming from congestion management, vehicle licenses, gasoline sales, and overloading may be classified as sources of road funds (Heggie, 1999). Nonetheless, road funds established in many developing countries during the 1970s and 1980s, and in many ex-Eastern European countries during the early 1990s were not successful (Heggie, 2003).

Privatization is the other option. In Argentina, toll revenues increased more than 300% via intercity highway concessions between 1991 and 1996 (Estache and Carbajo, 1996). Mexican road networks enlarged from 4500 kilometers to 9900 kilometers in the 1989-1994 period through the private toll road program (Ruster, 1997). Private toll roads have a wider application in developing countries such as Argentina, Chile, China, Colombia, Ecuador, Hungary, India, Indonesia, Malaysia, Mexico, the Philippines, and Thailand (Fishbein and Babbar, 1996). Some forms of shadow toll models where public authorities make payments to the private operators in return for the utilization of the road infrastructure are implemented in United Kingdom, Finland, and the Netherlands (Bousquet and Fayard, 2001). Road privatizations in the form of PPPs constitute the majority of the intercity motorways in developed countries like France, Italy, and Spain while there are notable private toll projects such as Dulles Greenway Toll Road and SR 91 Express Lanes in the United States (Palma and Lindsey, 2000).

In addition to providing private capital when governments lack necessary funding, there are many other arguments supporting privatizations, such as transferring managerial skills of the private sector to public projects and achieving efficient use of public resources. Several theories such as property rights theory, public choice theory, agency theory, and organizational theory try to explain the inferior performance of the public sector. According to these theories, public sector operates inefficiently because: (i) its performance is not monitored enough since the real owners (citizens) are ambiguous, (ii) its agency costs are high since reward and punishment (carrot and stick) mechanisms for its managers are not well-defined, (iii) the politicians exploit the resources of public sector enterprises in accordance with their political interests, and (iv) it does not have the right organizational structure to succeed. For all these reasons, privatization is also evaluated as a mean of improving the efficiency of the poor performing public sector.

Road privatizations can also be useful in satisfying the efficient use of public funds and eliminating wasteful government spending. It is sometimes possible that a both financially and socially unfeasible public project may be started with political concerns. However, in the case of financially self-viable road privatizations where no public funding is provided, privatization becomes a tool for testing the feasibility of the projects. If the project is not financially viable, no private party will be interested. Similarly, public sector comparator mechanisms used in privatization tenders enable the public officials to compare economic consequences of public procurement methods with those of privatization schemes. Privatization should only be applied if it provides value for money. In other words, privatization should only be preferred if it offers some cost advantages and efficient risk allocation.

In spite of their numerous advantages, infrastructure privatizations also suffer from several drawbacks. First, as the cost of capital of the private sector is higher than that of the state, the financing cost of the privatization projects is higher when compared to the traditional public procurement methods and in turn, this high financing cost tends to increase the overall costs of the PPP projects. Using a database of European Investment Bank-financed road projects in the 1990-2005 period, Blanc-Brude et al. (2009) documented that the ex-ante unit costs of road PPP projects were 24% higher than those of the road projects procured through traditional methods. Blanc-Brude et al. (2009) underlined that this 24% higher cost was very close to the amount of cost overruns in the public projects and they claimed that this cost difference was a kind of risk premium which the public sector was paying to transfer the risks of cost and time escalation during the construction phase. Similarly, Rajan et al. (2014) compared, using Indian data, the road PPP projects with those procured with traditional methods in terms of cost and time overruns. They revealed that PPP road projects performed worse than traditional road projects regarding cost overruns whereas the authors could not document a difference with respect to the time overruns. Since the financing costs tend to be higher in private road projects, the efficiency gains due to the better management of the private sector have to be high enough to offset this cost disadvantage.

Second, as there are so many parties involved and many separate contracts to be drafted in a privatization project, the tender process is lengthy and costly when compared to traditional procurement methods. A study on private finance initiative projects pointed out that the tender costs of such projects in the United Kingdom could be more than 0.6% of the total project costs compared to less than 0.15% for traditional projects (Birnie, 1997).

Third, the structure of privatization projects may lead to unnecessary cost increases when the rate of return regulation is used. As the profit of the private party is linked to the cost incurred in such schemes, the private partner may have an inclination to overinvest and overspend which might reduce project feasibility from the public point of view. Similarly, the failure of the governments to use their strong regulatory tools may encourage the private operator to exploit its nearly monopolistic power against consumers in the form of charging abnormal toll rates or offering inferior quality services.

Last but not least, the poor performance of the private operators and overuse of guarantees (traffic, tariff, and revenue) can bring an additional financial burden to the state budget. When the project company fails to make the debt payments because of the lower than expected road traffic and revenues, governments may be forced to take over the project as in the case of South Bay Expressway in California (Wang, 2015) or the concession agreement may be restructured to extend the concession period as in the case of Dulles Greenway in Virginia (Wang, 2015). In the Sydney Harbour Tunnel Project, the contract was designed in a way that all of the demand and construction cost overrun risks were borne by the public agency and the private operator assumed a very limited extent of the risks (Chung, 2009), which is clearly against the philosophy of the PPP arrangements. In the Mexican mass toll-road privatization, the financial situation of the toll operators was so bad that the extension of the concession terms failed to help and the government had to take over 23 of them (Carpintero and Gomez-Ibanez, 2011). Feng et al. (2015) asserted that a minimum traffic guarantee tends to decrease the quality of the road and increase the toll charge. To address the problems associated with high demand risks, governments can adopt several mechanisms. In the least-present-value-of-revenue (LPVR) model, which is a form of flexible term privatization methods, the contract ends when the revenue of the private operator reaches a predetermined level (Engel, Fischer and Galetovic, 1997). To reduce the initial traffic risks, public money might be injected into the project before the private partner does (Beck, 2015).

**********Insert Table 1 here**********

In addition to the discussed drawbacks of the privatization schemes, road privatizations have their own unique difficulties and risk characteristics when compared to other transportation modes. Toll roads tend to compete with free roads serving the very similar routes. Therefore, demand risk has always been an important issue. In addition to demand risks, unanticipated geological and weather conditions and possible problems associated with the acquisition (or nationalization) of extensive land necessary for road construction may increase the risk of the projects (Fishbein and Babbar, 1996). Although road privatization projects seem to be riskier than the privatization of the other transport modes, road industry has attracted the highest private participation among all transportation modes in terms of both total investment and project count. The statistics, which are derived from World Bank Private Participation in Infrastructure Database, reveal that the share of the road transport was about 51.4% and 45.9% of all transport privatization projects in terms of project count and total investment during the 1990-2015 period, respectively (Table 1).

3. Analyses of Turkish Road Privatizations by Privatization Schemes

In Turkish road transportation, there are three enacted laws that set the rules of privatization methods. Law No.3996[1] is the general BOT Law that can be applicable to many sectors and projects including motorways, airports, seaports, communication, drinking water, water treatment facility, sewage system, investments in prevention of pollution, and dams. Law No.3465[2] is a specific BOT law only for motorway projects whereas general Privatization Law No.4046[3] manages many privatization methods including the TOR which has been used widely in the transport industry. Through the related legislation, three major privatization models have been implemented in road transport industry so far: issuance of revenue sharing certificates, BOT, and TOR.

3.1 Revenue Sharing Certificates

In 1985, Revenue Sharing Certificates (RSCs) of the Bosporus Bridge (July 15th Martyrs Bridge), 1560 meters long bridge connecting Asia and Europe in Istanbul, initiated the idea of privatization of the Turkish roads. Issuance of RSCs was actually a kind of revenue privatization where the holders of the certificates gained the ownership of the future revenues of the bridge for a pre-specified duration while the operation, management, and maintenance of the bridge remained totally in government responsibility. The Turkish Government transferred the revenues coming from the RSCs to support the Public Partnership Fund (PPF) that in turn financed the construction and operation of infrastructure projects. Once these new investments were completed, their revenues would be used for the payments to the owners of the RSCs. As these RSCs could be listed on the stock exchange, the government aimed at not only financing the PPF, but also helping to empower the domestic capital markets. In addition, these RSCs were also the symbol of the liberal policies of the new government after the 1983 election.

Between 1985 and 1994, the Turkish Government issued RSCs for continuously money making public assets such as dams, state-owned enterprises, and the two bridges on the Istanbul Strait (both the terms Istanbul Strait and Bosporus Strait are used interchangeably): Bosporus Bridge and Fatih Sultan Mehmet Bridge (Akcay, 2006). Initially, the owners of the RSCs, with the help of some populist concerns, enjoyed quite high returns. However, as new investments financed by the PPF were not completed on time, the government had problems in payments to the owners of RSCs. Therefore, the government quitted issuing new RSCs to the public after 1991 and offered them only to the construction companies in exchange for the completion of the public works (Akcay, 2006).

3.2 BOT Projects

Two Unsuccessful Attempts in the 90s: Canakkale Strait Bridge and Izmit Gulf Bridge Projects

In 1995, Turkish government decided to construct a bridge over the Canakkale Strait via BOT scheme to connect Asia and Europe. The new bridge was proposed to serve in many ways. First,

[1] Law No.3996 Concerning the Realization of Certain Investments and Services by the Build-Operate-Transfer Model.

[2] Law No.3465 on Granting Authorization to Institutions Other Than the General Directorate of Highways for Construction, Maintenance and Operation of Highways.

[3] Law No.4046 on Privatization.

it would ease the cross-strait traffic at the Canakkale Strait, which is still served by the ferries. Second, it would help divert some of the long-haul road traffic between the Asian part of the Turkey and Europe from the congested bridges at the Istanbul Strait so that there would be a congestion relief, even though being minor, at the intercity traffic of Istanbul. 19 Turkish construction companies meeting the technical and financial eligibility standards were invited to the tender with the condition that they would form joint ventures with qualified foreign companies. No company submitted an offer, but a consortium expressed its willingness to negotiate on the terms of the contract. However, no settlement was reached during the negotiations and later the project was canceled.

The second failed attempt in the 90s was about to construct a bridge in Izmit Bay via BOT scheme that would shorten the route between Istanbul (the largest Turkish city), Izmir (the third largest), and Bursa (the fifth largest). In 1996, 6 consortiums meeting the eligibility standards were invited to the tender. Among the 3 submitted offers, the tender was awarded to a Japanese-Turkish consortium and a contract was mutually drafted. However, the awarded consortium decided not to sign the final contract. Later the 3 consortiums that submitted an offer earlier were reinvited to renew their offers. As no solid offer in compliance with the specifications was received, the Ministry of Transportation canceled the project.

Gocek Tunnel

The Gocek Tunnel has been the first[4] road BOT project in Turkey. It is constructed in Mugla province located at the Aegean Sea shoreline. Being a tourism center, the region experiences high vehicle traffic during the summers. The 960 meters long Gocek Tunnel and its approach roads shorten the existing free route by 2750 meters. Although this reduction seems to be small at a first glance, the time saved is significant due to the sharp curves and rough topography of the existing mountainous route.

The selection criterion of the BOT tender was the shortest operation period. After the tender, the operation period was determined to be 26 years. When the construction period of 2 years was added, the total project period became 28 years (Table 2). The investment was about 12.3 million USD in 2015 values. The project is opened to service in September 2006. The maximum allowable toll rate was set in the BOT contract and it can be escalated with the inflation. As of 2006, the toll rate was 2.5 TLs which was approximately equal to 1.75 USD for cars. As of the beginning of 2016, the comparable rate was 4.5 TLs which is around 1.48 USD. General Directorate of Highways (GDH) did not provide any traffic guarantee for the project and accordingly, the private operator (Tinsa Construction), assumes all of the demand risks.

**********Insert Table 2 here**********

Gebze-Orhangazi-Izmir Motorway and Izmit Bay Bridge

Two bidders submitted their offers to the BOT tender whose awarding criterion was the shortest contract period. The consortium consisting of 1 foreign (Astaldi) and 5 domestic construction companies (Nurol, Özaltın, Makyol, Yüksel, and Göçay) was awarded the BOT contract with a total contract period (construction and operation) of 22 years and 4 months, 7 years of which is the

[4] And the only one in the operation phase at the time of submission of this paper.

construction period whereas the rest is for the operation (Table 2). The total investment is around 7.6 billion USD in 2015 prices (Ministry of Development, 2016). If the construction is completed sooner, the saved time will be added to the operation period. Otherwise, the lost time in the construction will be deducted from the 15 years 4 months operation period.

Gebze-Orhangazi-Izmir Motorway and Izmit Bay Bridge will shorten the existing north-south axis of the western part of the Turkish road network. In addition to the length reduction, when the enhanced speed increases are taken into account, the time savings of the journeys will be around 1.5-2 hours in the Istanbul-Bursa route, 3-4 hours in the Istanbul-Balikesir route, and 4.5-6 hours in the Istanbul-Izmir route (Otoyol AS, 2016a).

The project includes 4 sections (Otoyol AS, 2016b):

- Gebze-Orhangazi Section with a traffic guarantee of 40,000 automobile equivalency per day
- Orhangazi-Bursa Section with a traffic guarantee of 35,000 automobile equivalency per day
- Bursa-Balikesir Section with a traffic guarantee of 17,000 automobile equivalency per day
- Balikesir-Izmir Section with a traffic guarantee of 23,000 automobile equivalency per day

In addition to the traffic guarantees, GDH provided tariff guarantees. The guaranteed tariff of 35 USD plus 18% value-added tax for the Izmit Bay Bridge, however, has attracted criticism especially after the depreciation of TL against USD in 2015. This tariff was more acceptable at the time of tender as it was equivalent to around 64 TLs when compared to the ferry service costing almost 50 TLs. In addition, the new bridge was supposed to provide a time saving of around 1 hour. After the depreciation of the TL, the new equivalent of the tariff is around 120 TLs as of the beginning of June 2016. If the traffic demand will fall below the guaranteed level, the BOT company will not incur any revenue loss since it will be compensated by the state through tariff and traffic guarantee. In such a case, however, the state will have to bear the financial burden and the project will fail to bring the expected economic benefits in terms of time, energy, and emission savings.

Sabuncubeli Tunnel

Sabuncubeli Tunnel aims at reducing the travel time, increasing road safety, and eliminating possible road closures in the winter by bypassing the existing Izmir-Manisa Highway at the mountainous Sabuncubeli Region where the traffic speed decreases compared to the rest of the route. The project would reduce the travel time between the two major cities, Izmir and Manisa, to 15 minutes.

The BOT contract for Sabuncubeli Tunnel Project was signed on August 19, 2011, with a total investment of 56.9 million USD in 2015 values (Table 2). The total contract period was 12 years, 11 months, and 11 days (3 years of which was for the construction phase). The project consisted of a tunnel of 4 kilometers long and a 2.5 kilometers of connecting roads. A maximum allowable toll rate of 2.5 USD was set for each direction and a value added tax of 18% would also be added to the toll rate. The toll rate could be adjusted with respect to the US inflation rate through a pre-specified formula. The private operator was free to set lower toll rates but GDH would not compensate the private operator in the case of lower rates. Unlike Gocek Tunnel, a traffic guarantee was given to the private partner. If the traffic would fall below the guaranteed level of 30,000 vehicles per year, GDH would compensate the private operator.

The construction paused after the private partner, Kocoglu Construction, went into bankruptcy in 2014. GDH later terminated the BOT contract and then tendered the project through traditional public procurement methods. The project is expected to be completed in 2018.

Istanbul Strait Road Tube Crossing Project (The Eurasia Tunnel)

Istanbul Strait Road Tube Crossing Project aims at reducing the traffic congestion at the two bridges of the Bosporus Strait connecting two continents: Asia and Europe. The project consists of a 5.4 kilometers long tunnel and 9.2 kilometers long of connecting road investments such as the expansion of the current roads and construction of junctions. The two-deck double-lane highway tunnel will pass underneath the seabed of Bosporus. The total investment will be around 1.3 billion USD at the 2015 prices (Ministry of Development, 2016). Once the investments for connection roads will be completed, they will be transferred to the Municipality of Istanbul whereas the tunnel will be operated by the private partner under a toll-scheme during the operation period of the project. At the end of the operation period, the tunnel will be transferred to the Ministry of Transport, Maritime Affairs, and Communications (MTMAC).

As a common practice in Turkish BOT projects, the shortest contract period was determined as the selection criterion of the awarded bidder. During the tender, on 30th of June, 2008, the best offer was submitted by a private consortium (Yapi Merkezi-SK) consisting of Yapi Merkezi Construction of Turkey and SK Engineering & Construction Co. Ltd of South Korea. The construction period is 4 years 7 months and the operation period is 25 years, 11 months, and 9 days making the total contract period 30 years, 6 months, and 9 days (Ministry of Development, 2016). After a long pause following the tender, the BOT contract was signed on January 30, 2013.

MTMAC provided tariff and traffic guarantees for the project. The toll rate was determined as 4 USD (Milliyet, 2015) plus value-added tax and the toll will be collected on both directions. MTMAC (2016) discloses that it also provided a traffic guarantee of 25 million vehicles per year, which corresponds to a daily traffic of almost 68,500 vehicles (Table 2). If the vehicle traffic falls below the guaranteed level, the government will compensate the private operator for the difference. On the other hand, the toll revenue coming from the vehicle traffic above the guaranteed level will be shared by the BOT company and the state with a ratio of 70%-30%, respectively (MTMAC, 2016).

Yapi Merkezi-SK claims that the project will reduce the journey time from 100 minutes to 15 minutes between the two sides of the Bosporus (Yapi Merkezi-SK, 2016). Accordingly, it will be supposed to contribute to significant time savings, trip comfort, and green house reduction. The Chamber of City Planners of Istanbul (CCPI), on the other hand, asserted that The Eurasian Tunnel would induce additional traffic and accordingly the short run emission and congestion savings would reverse in the long run (CCPI, 2011). CCPI (2011) also questioned whether the traffic shift from the two existing bridges to the new tunnel would justify such a big investment. CCPI (2011) also underlined that the proposed connecting road investments would not be sufficient to handle the traffic growth initiated by the Tunnel and that there would be new bottlenecks leading to worsened congestion.

Northern Marmara Motorway and Yavuz Sultan Selim Bridge (Third Bosporus Bridge)

Yavuz Sultan Selim Bridge (Third Bosporus Bridge), which is the major component of the Northern Marmara Motorway and Third Bosporus Bridge Project, is constructed in the northern part of the Bosporus Strait. The major goal of the project is similar to that of the Eurasia Tunnel; to reduce the traffic congestion between the two sides of Istanbul. But unlike Eurasia Tunnel which will only serve light duty vehicles, Third Bosporus Bridge is supposed to direct the heavy duty vehicles, especially transit freight traffic through Istanbul, from the relatively intra-city corridors to the north. The project consists of a bridge and a network of connection motorways. The bridge will consist of 8 lanes of motorway and two lanes of the railway. The connection motorway consists of 115 kilometers of the road (GDH, 2017).

On the 29th of May, 2012, the Minister of Transport, Maritime Affairs, and Communications announced that the BOT tender was awarded to a private consortium, which was made up of Turkish construction company (Ictas) and Italian construction company (Astaldi) (Sabah, 2012). The contract period was 10 years, 2 months, and 20 days 2 years and 6 months of which was for the construction (Ministry of Development, 2016). If the construction will exceed this period, the exceeded part will be deducted from the operation period. If the private partner will be able to complete the construction earlier, the saved time will be added to the operation period.

A traffic guarantee both for the motorway and the bridge are given by the state. For the motorway, the traffic guarantee will be 135,000 automobiles equivalent (both directions) whereas the guarantee for the bridge is 135,000 automobiles equivalent (one direction). The toll rate for the motorway is set as USD 0.08 per kilometer and the toll rate for the bridge is set as USD 3 for the automobiles (Hurriyet, 2016). A value added tax of 18% will also be added to these rates. The private partner will be free to set lower rates. However, the government will not compensate the private operator in the case of voluntary toll reductions.

The benefits of the Third Bosporus Bridge includes the congestion reduction at the current two bridges, provision of bypass for transit traffic, ease of the movements of trucks carrying goods across the strait which are currently subjected to several time limitations, and supply of a second rail connection between the two sides of Istanbul. Despite such claimed benefits, the project has been criticized. Metin Munir, who used to be a columnist at a major daily newspaper (Milliyet), asserted that the location of the bridge lacked enough potential and the bridge would fail to help reduce the congestion the two existing bridges (Munir; 2010, 2012a, 2012b). CCPI, on the other hand, brought a more comprehensive approach when analyzing the possible impacts of the bridge from the transport, environment, and sustainability point of view. Regarding transport impacts, CCPI (2010) suggested that after the introduction of Marmaray, a massive rail transit project passing underneath the Bosporus, the need for a new bridge would disappear. In addition, CCPI (2010) indicated that the share of the transit traffic at the existing bridges was only around 2-3% and this quite low share would not justify a huge investment aiming to direct and serve the transit traffic. With respect to the environment and sustainability, CCPI (2010) stressed that the new bridge would add a new population of 7.3 million, which would further damage the sustainability of the city, and would contaminate the forests, dams, and the water resources at the northern part of the city.

3.3 Transfer of Operating Rights

On the 15th of October, 2010, Privatization High Council (PHC) decided to privatize and two bridges on the Istanbul Strait and eight tolled-motorways as a bundle through TOR for 25 years (Privatization Administration, 2016). After the tender on the 12th of December, 2012, a global consortium consisting of Koç (Turkey), Ülker (Turkey), and UEM (Malaysia) offered the highest bid of 5.72 billion USD which was then the second-highest privatization revenue at the time of the tender after the privatization of Turkish Telekom with a privatization revenue of 6.55 billion USD. However, PHC later canceled the tender claiming that the privatization revenue was lower than expected. The Turkish Privatization Administration is now working on privatizing this portfolio through a public offering.

4. Discussion and Policy Recommendations

Eurasia Tunnel and Third Bosporus Bridge will both serve the Istanbul region and they will be competing not only with each other, but also with the two existing bridges (Bosporus Bridge (July 15th Martyrs Bridge) and Fatih Sultan Mehmet Bridge). In such a complex case, the tariff and traffic guarantees become more critical. Table 3 presents the tariff, past traffic, and guaranteed traffic comparison of the two existing bridges and the two ongoing projects at the Istanbul Strait. In 2014, the most recent year whose published traffic statistics are available, the total annual average daily vehicle traffic at the Bosporus Strait was 411,323 (188,670 vehicles at the Bosporus Bridge and 222,653 vehicles at Fatih Sultan Mehmet Bridge). The fifth column of Table 3 shows the guaranteed annual average daily traffic figures for the two ongoing projects. These statistics suggest that, assuming the vehicle traffic remains unchanged until the start of the operation of the two new BOT projects, these new projects will be expected to attract almost 49% of the traffic. However, it should be noted that the toll will be collected in one direction at the Third Bosporus Bridge and accordingly the expected traffic of this bridge should be (based on the traffic guarantee) 270,000 vehicle per day. If we recalculate using this figure, the share of the new BOT projects should be around 82%.

**********Insert Table 3 here**********

However, such a leakage from the existing bridges might be unlikely for three main reasons. First, Third Bosporus Bridge, which is expected to attract almost 66% of the 2014 vehicle traffic according to the traffic guarantees, is being built at the very northern side of Istanbul where the residential and business settlement remain very limited. Even with a new possible regulation directing the heavy vehicle and transit traffic to the third bridge, the new bridge will very likely fail to attract this amount of traffic. In addition, the remoteness of the bridge to the city center also reduces its attractiveness as a bypass for congestion-relief. The distance between the city center and the Third Bosporus Bridge is more than 20 kilometers and it seems unlikely that one would prefer to use it to bypass the congestion at the city center. Besides, the introduction of the Eurasia Tunnel should contribute to the congestion relief. Therefore, the motivation to use the Third Bosporus Bridge will be further reduced.

The second focuses on the (un)affordability of the new tariffs. The current tariff for both Bosporus and Fatih Sultan Mehmet Bridges is 4.75 TL and the toll is collected in one direction. The toll of the Eurasia Tunnel has been set at 4 USD plus 18% of value-added tax. Using a conservative exchange rate of 1 USD=2.9 TL, the toll stands at around 13.7 TL, which is almost 188% higher than the current tolls. Taking the fact into account that the toll will be collected at each direction

at the Tunnel, then this equivalent rate becomes 477% higher. Such a significant gap between the toll of the two current bridges and that of the Tunnel makes it quite unattractive to use the new tunnel.

Third, Marmaray Rail Project, which was opened at the end of 2013, has been emerging as a major competitor for the road crossings of the Istanbul Strait. Through its undersea tunnel, the project is connecting the urban rail networks of both sides of Istanbul. Accordingly, it is very likely that there will be a modal shift from road traffic to rail and the new BOT projects at the Istanbul Strait will be negatively affected by this modal shift.

Our overall analyses for the Turkish road privatizations suggest that there are several barriers for improving Turkish road privatizations. The first barrier for more effective road privatizations is the high demand uncertainty of the greenfield road privatizations. The high demand risk of the private road projects has been acknowledged by many studies (Vassalo et al. 2012; Wang, 2015; Carpintero and Gomez-Ibanez, 2011). What makes this problem even bigger in the Turkish case is the lack of necessary studies, which might help better predict the demand such as accurate origin-destination matrices and surveys on the willingness to pay behavior of the road users. The failure to complete such studies before the privatization tenders leave both the public agencies and the private companies in a big uncertainty. The public authorities cannot precisely decide whether the submitted offers are good enough to stick to privatization alternative instead of traditional public procurement methods. On the private sector side, the participants of the tenders tend to keep a margin of safety within their offers considering the demand uncertainties. Such a situation eventually leads to a deficiency to capture higher economic and financial benefits from both parties' point of view. We should note that even the availability of such technical studies like origin-destination matrices and willingness to pay surveys, may not ensure the desired level of accuracy in the traffic forecasts. Previous research on the accuracy of the demand forecast concludes that there is a bias to overestimate the demand of the transport projects (Flyvbjerg et al., 2006; Vassallo and Baeza, 2007).

Negative attitudes towards toll systems also hurt the predictability of the demand for new toll roads. In Turkey, according to the legislation, a toll road can be initiated only if there exists a free alternative road. Therefore, an intention to set the toll rates high to improve the financial attractiveness of the project can easily lead to a major shift of the traffic to the free alternative route. Because it is a common behavior of the road users to focus more on the direct costs (tolls) incurred instead of the indirect costs such as longer travel time, more fuel consumption, and lowered traffic safety in the alternative free routes.

When the demand uncertainty is high, appealing to flexible term road privatizations might work. For example, the least-present-value-of-revenue (LPVR) model, where the term of the contract ends when the revenue of the private operator reaches a predetermined level, can help reduce the associated demand risks of the privatized road projects (Engel, Fischer and Galetovic, 1997). Variants of flexible term road privatizations have been adopted in the UK, Chile, Portugal, and Colombia (Vassallo, 2010). As a different approach to handle the demand risk, Beck (2015) underlined the example of a 33 kilometers long toll project (WestConnex project of Sidney) where the initial sections of the project were financed by the public sources and the private money was injected only after the demand and accordingly the revenue became steady. Another solution to

reduce the demand risks might be to keep the privatization period shorter in combination with a final reversion value paid by the government to the private company (Vassallo, 2004). In such a case, once the operation period has expired, the public agency may award a second privatization contract for the project. This will help reduce the uncertainties which become even bigger when the contract period increases. It should be, however, noted that keeping the privatization terms shorter might reduce the benefit coming from a privatized road project. Because shorter privatization terms will lower the incentive of the private parties to build the infrastructure in a way that will keep the life time cost of the project at the minimum level. With respect to the negative attitudes towards toll systems, the informative actions (and maybe public campaigns) underlining the need for tolled roads given the budget constraints might help change, at least to some extent, the driving and route selection decisions of the road users (Odeck and Brathen, 2002). Podgorski and Kockelman (2006) documented that the public perceptions against the toll roads might deviate significantly depending on the major characteristics of the road users such as location, age, gender, employment status, educational attainment, and the frequency of using the toll roads. Therefore, informative actions to underline the need for the toll roads should be designed to appeal to each segment of the public. We should also note that past experience also suggested the opposition against the toll roads could decrease year-by-year as the drivers become familiar with the benefits of using the toll-roads (Odeck and Brathen, 1997).

The second barrier for more effective road privatizations comes from the overuse of project guarantees. Measures to mitigate the demand risks in the transport privatizations are always a dilemma. On the one hand, transferring the bulk of the traffic risks to the private partners might not only make the private parties abstain from submitting a tender for the privatization projects, but also it might provoke the renegotiation of the contracts in the future. Moreover, such a risk allocation mechanism might bring financial burden to the state budget if the government decides to bail out the concession company (Vassallo et al., 2012). On the other hand, leaving the significant portion of the traffic risks at the public agencies might reduce the incentive of the private operators to perform better. In addition, overuse of traffic guarantees might lead to substantial financial liabilities at the public budget the traffic falls below the guaranteed level. Therefore, a delicate balance should be maintained when deciding the traffic and revenue guarantees. The review of the past experience in Turkey suggests that there is a room for employing the traffic and toll guarantees in a more realistic way. Especially as in the case of competing BOT projects in the Istanbul Strait, there exists a considerable risk of failing to attain the guaranteed traffic and income guarantees when the actual potential is taken into account. Since these projects are still under construction, it is not possible to make a comparison between the guaranteed and actual traffic levels. However, although not being a road project, the case of Zafer Airport BOT Project of Turkey showed how excessive use of traffic and revenue guarantees can result in a financial load on the state budget. If the traffic and revenue guarantees are really necessary to reduce the overall risks of the privatization projects, such guarantees should be employed based on objective traffic forecasts, willingness to pay surveys, cost-benefit analyses, and other related economic impact assessments.

5. Conclusion

Infrastructure privatizations have become popular during the last three decades. Whereas developed countries focus more on the efficiency gains, the main motivation behind the privatization efforts of the developing countries is to attract private capital to handle the capacity

constraints. Among the infrastructure sectors, the transport sector has been only second to the energy sector in terms of private participation project count. Global statistics suggest that road transportation has been getting the largest share among all transportation modes in terms of private participation (The World Bank, 2016). However, Turkish experience reveals that the number of the road privatizations remained relatively limited despite the significant policy preference and capacity bottlenecks. As of the submission of this paper, there is only one road project completed through a BOT scheme whereas 4 road BOT projects are still in the construction phase. Turkish governments instead have been inclined to privatize the transport infrastructure with higher traffic predictability such as already operating airports and seaports.

The review of the Turkish road privatizations reveals that demand uncertainties limit the successful risk management of road privatizations. Moreover, the basic comparisons between past traffic trends and traffic guarantees suggest that public agencies might overuse traffic and revenue guarantees to stimulate greenfield road privatizations through the Build-Operate-Transfer scheme. To overcome such barriers, public agencies should take into account the findings of the technical studies like origin-destination matrices and willingness to pay surveys when designing the privatization tenders. In addition, flexible term privatization models can be employed to reduce the traffic risks. Last but not least, investment and risk management decisions should be made free from political motivations.

This paper provides a preliminary assessment of the large Turkish road privatizations before their operational start. However, the financial greatness and economic significance of these projects require further analyses. After they are completed and once at least medium-term traffic statistics are available, future research should be able to compare the provided traffic guarantees with real traffic figures and discuss the policy implications if there is a gap between the two. In addition, the public's acceptance and attitude towards these projects can be a great research topic similar to what Odeck and Brathen (1997) and Podgorski and Kockelman (2006) did before.

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Tables

Table 1: Distribution of private participation in infrastructure projects by transport modes in the 1990-2015 period

Subsector	Project count	% project count	Total investment (million USD)	% total investment
Airports	35	8.4%	5,547	6.1%
Railroads	29	6.9%	22,249	24.5%
Roads	215	51.4%	41,729	45.9%
Seaports	139	33.3%	21,353	23.5%
Total	418	100%	90,878	100%

Source: The World Bank Private Participation in Infrastructure Database

Table 2: The descriptive characteristics of the Turkish road privatization projects

BOT Project	Public Partner*	Private Operator	Operation Period	Construction Period	Traffic Guarantee	Phase**	Total Investment (in 2015 prices in USD)
Gocek Tunnel	GDH	Tinsa Construction	26 years	2 years	No	In operation	12.338.872****
Gebze-Orhangazi-İzmir Motorway and İzmit Bay Bridge	GDH	A consortium of Nurol, Özaltın, Makyol, Yüksel, Göçay, and Astaldi	15 years and 4 months	7 years	Yes	Under construction	7,607,415,278
Sabuncubeli Tunnel	GDH	A consortium of Kocoglu Construction and Makimsan Construction	9 years, 11 months, and 11 days	3 years	No	Under construction***	70,367,000****
Istanbul Strait Road Tube Crossing Project (Eurasia Tunnel)	GDII	A consortium of Yapi Merkezi Construction of Turkey and SK Engineering & Construction Co. Ltd of South Korea	24 years and 5 months	4 years and 7 months	Yes	Under construction	1,339,252,350
Northern Marmara Motorway and Third Bosporus Bridge	GDH	A consortium of Ictas of Turkey and Astaldi of Italy	7 years, 8 months, and 20 days	2 years and 6 months	Yes	Under construction	2,446,377,383

*: GDH stands for General Directorate of Highways whereas GDII stands for General Directorate of Infrastructure Investments

**: As of June 15, 2016.

***: The BOT contract was terminated as the private partner went into bankruptcy. GDH tendered the project through traditional public procurement.

****: Based on the author's calculations using the historical investment figures of the projects in TL.

Table 3: The traffic and tariff comparison of the bridges and tunnel in Istanbul

Facility	2014 Light Vehicle Annual Average Daily Traffic	2014 Heavy Vehicle Annual Average Daily Traffic	2014 Total Vehicle Annual Average Daily Traffic	Guaranteed Annual Average Daily Traffic	2016 Tariff*	Toll Collection Method
Bosporus Bridge	174,343	14,327	188,670	-	4.75 TL	Toll collected in one direction
Fatih Sultan Mehmet Bridge	171,830	222,653	222,653	-	4.75 TL	Toll collected in one direction
Istanbul Strait Road Tube Crossing	-	-		68,493	13.7 TL (4 USD PLUS 18% TAX)	Toll collected in both directions
Third Bosporus Bridge	-	-		135,000 (270,000)	10.3 TL (3 USD PLUS 18% TAX)	Toll collected in one direction

* Taking 1 USD = 2.9 TL which was the average exchange rate in July 2016.