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# Risk Management in Turkish Transport BOT Projects

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**Abstract**

Over the last three decades, Turkish governments have intended to privatize major infrastructure services, mostly through Build-Operate-Transfer (BOT) scheme to liberalize the economy and overcome budgetary constraints. After a fast and motivated start, the adverse effects of political instability, successive economic crises, and poor risk management slowed down the early Turkish BOT projects in the 1990s. The 2000s, on the other hand, backed by economic growth, political stability, and heavy use of demand and revenue guarantees, have experienced a boom in the infrastructure privatization and transport sector which has been getting the lion's share within the public investment budget for decades, is no exception to this trend. Because risk management is key for successful BOT project implementation, risk allocation practices play an important role in both the success and failure of the projects. In light of Turkish experience, this paper analyzes risk allocation practices in transport BOT projects, underlines both good and poor allocation of risks with respect to the specific characteristics of the transportation sector, and draws policy implications.

*Keywords:*Build-Operate-Transfer, Privatization, Risk Management, Turkey.

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## 1. Introduction

The role of the state in the economy has been questioned for many years. As the idea that the state should be a regulator and a policymaker rather than the owner and the operator of an economic activity becomes more widely accepted over time, the paradigm has shifted from state-controlled economy towards privatization and private sector participation. In this regard, privatization plays an important role in attracting private finance, especially to large infrastructure projects, and relevant literature also suggests the adoption of more efficient managerial skills and achieving value for money as other underlined benefits.

Although Turkey was one of the early countries to enact a Build-Operate-Transfer (BOT) law (even the term Build-Operate-Transfer was created by Turgut Ozal, who was the former prime minister and later president of Turkey (Kumaraswamy and Zhang 2001)), the past BOT experience of Turkey has been quite turbulent. After a fast and motivated start, the adverse effects of the political instability and successive economic crises damaged the applicability of the early Turkish BOT projects in the 1990s. In addition, poor allocation of risks among public and private parties caused further fruitless attempts and, more importantly, failures (mainly in the energy sector), which in turn resulted in a general criticism against BOT projects and a reluctance in the government officials to appeal to such models during the same period. On the other hand, backed by the relative economic and political stability, the 2000s have experienced a boom in the BOT projects in terms of project count, project value, and the number of sectors. However, despite the increase in BOT implementations, this time the misuse and overdose of traffic guarantees led to the questioning of the economic viability of some of the BOT projects. Because risk management is key for BOT project success, risk allocation policies and practices of the government agencies during the last three decades have shaped the success and failure of the projects.

In light of Turkish experience, this paper analyzes risk allocation practices in transport BOT projects, underlines both good and poor allocation of risks with respect to the specific characteristics of the transportation sector, and draws policy implications. To the knowledge of the author, this is the first study analyzing all of the Turkish transport BOT projects from a risk management point of view and providing comprehensive risk allocation matrices for each transport modes.

The focus of the paper is intentionally narrowed to the transport sector for three main reasons. First, transport investments have been outnumbering other sectors within the public budget for decades. Second, as discussed in the next section, the BOT model has been the most widely used in the transport sector in terms of both the project count and the project value. Last, from the governments' point of view, the transport sector has always been used as one of the top tools to claim voters' credit through major infrastructure investments such as airports, motorways, and high-speed rail lines. This paper is organized as follows. Section 2 provides a brief summary of the legal framework of privatizations and the preliminary experience in Turkey. Section 3 explains how the risks of BOT projects should be managed in various transportation modes according to the literature and outlines the risk management practices in Turkish transport BOT projects. The conclusion discusses the findings and the policy implications.

## 2. Preliminary Experience

The privatization experience of Turkey actually dates back to the Empire of Ottoman in the form of infrastructure and manufacturing concessions. These models were indeed simple BOT schemes in which the private party was responsible for the investment and services/goods provision while the investment was supposed to be transferred to the state after the private partner financed, built, and operated it. Many transportation projects were put into operation via this scheme, such as the Suez Canal, which is also accepted as the first modern BOT Project (Levy 1996); Istanbul Port; Izmir Port; the Istanbul Rail Tunnel; and the Istanbul Streetcar. The durations of these infrastructure concessions ranged from 20 to 99 years (Yilmaz 1996).

After the election of 1983, Turgut Ozal government initiated economic liberalization policies in which privatization (mainly in the form of the BOT model) was a notable policy measure. To establish the legal basis for these efforts, the Turkish parliament passed several privatization laws, including three BOT laws. Law Concerning the Realization of Certain Investments and Services in Build-Operate-Transfer Model (Law No: 3996) is the major BOT law covering many sectors, ranging from transportation, telecommunication, and manufacturing to irrigation. Law Concerning the Assignment of the Organizations Other Than General Directorate of Highways to Construct, Maintain, and Operation of Highway (Law No:3465) is a specific BOT law for motorways. Finally, Law Concerning the Production, Distribution, and Trade of Electricity by an Institution Other Than Turkish Electricity Institution (Law No: 3096) is the BOT law specific to the electricity sector.

In 1984, Turgut Ozal government began its privatization efforts in the transportation sector with the controversial issuance of Revenue Sharing Certificates (RSCs) for Bosporus Bridge of Istanbul, a 1560-meter bridge connecting Asia and Europe. The issuance of RSCs was indeed a kind of revenue privatization in which certificate holders gained ownership of the future bridge revenues for a pre-specified duration while the operation, management, and maintenance of the bridge remained totally in government responsibility.

However, despite the fast start to privatizations and the devotion of the government in the 1980s, the transport privatization efforts of the 1990s experienced a slowdown because of not only the relative political and economic instability but also the mismanagement of the project risks. From the political point of view, after the single party governments' period of 1983–1991 ended, the era of coalition governments started, adding to the political instability. Coalition governments not only contributed to economic instability by failing to implement sound (but politically unattractive) economic policies, but also they failed to set unified political commitment and support to attract the private companies to privatization projects. In addition, governments that were already heavily criticized for their economic policies and measures during the economic crises did not appeal to privatization to get rid of any further public opposition.

Another factor for the slowdown was the economic instability. First, successive economic crises decreased the derived transportation demand, which in turn reduced the economic and financial viability of transportation infrastructure projects. As all of the

BOT projects were supposed to be financed by the user fees, a demand reduction as a result of the economic instability, therefore, meant that the project might not be financially viable. Because of successive economic crises, private investors were not willing to assume the demand risks. Another implication of the economic crises was the instability and the generally up trend of the exchange and interest rates. The cost of capital increased as the interest rates increased whereas project revenues decreased in terms of foreign currencies if the tariff of the BOT project was set in terms of the local currency. In addition, BOT companies were mostly supposed to receive debt credits from foreign financial institutions in terms of internationally dominant currencies such as the United States dollar ($) or the German mark, and when the Turkish Lira depreciated against these currencies, the local equivalent of the foreign credit increased. As a result, the uncertainty in the exchange and interest rates created a major risk factor for private investors, which further added to the existing negative mood.

Last but not least, the mismanagement of projects' risks also damaged the viability of BOT projects in the 90s. Poor allocation of risks in the form of state agencies' excessive purchase guarantees created a large financial burden on the treasury (mainly due to energy projects), and these resulted in a general opposition against BOT projects and reluctance in the government officials to appeal to such models.

Following the enactment of the general BOT law (Law No: 3996), major risk management mistakes were made with the first tendered BOT project, Izmit Urban and Industrial Water Supply Project. The major investment of the project was Yuvacik Dam, which would be constructed and operated by a private consortium; the Izmit Municipality was supposed to buy the drinking water produced by the dam. The Turkish Treasury, on the other hand, was acting as a guarantor that was obliged to make payments for the purchase of the water in case of default by the Izmit Municipality. The government side not only provided excessive purchase guarantee to the BOT company for the water produced (even if it would not be consumed totally), but also failed to take into consideration also the significant imbalance in the water tariffs. The Izmit Municipality sold water to final consumers for 10 cents while paying nearly $4 to the BOT company for the same amount. The Turkish Treasury, as the guarantor of the BOT contract, had to pay $387 million to the private operator for the water which was even not consumed during the first two years of the operation period, alone, and it would make similar payments until the termination of the BOT agreement in 2014 (Turkish Court of Accounts 2002). Similarly, electricity BOT projects also created a large financial burden on the state budget due to poor allocation of risks. The tariffs were set too high to reduce the pay-back periods, and the government provided state guarantees to buy the generated electricity. Eventually, the price of electricity paid by the government was much higher than the market averages.

The BOT environment has begun to change in the 2000s as a result of Turkey's economic recovery period and relative political stability. In addition, the enactment of new public-private partnership (PPP) laws such as the Build-Lease-Transfer law for new hospital investments also increased the scope of the PPP/BOT projects. This trend is depicted in Figure 1, which shows the historical changes in the PPP project counts and values (investment value + lease payment) between 1986 and 2014. As Figure 1 suggests, the PPP projects showed a low profile in the 1990s, whereas there is an up tendency in both the project counts and total project values in the 2000s.

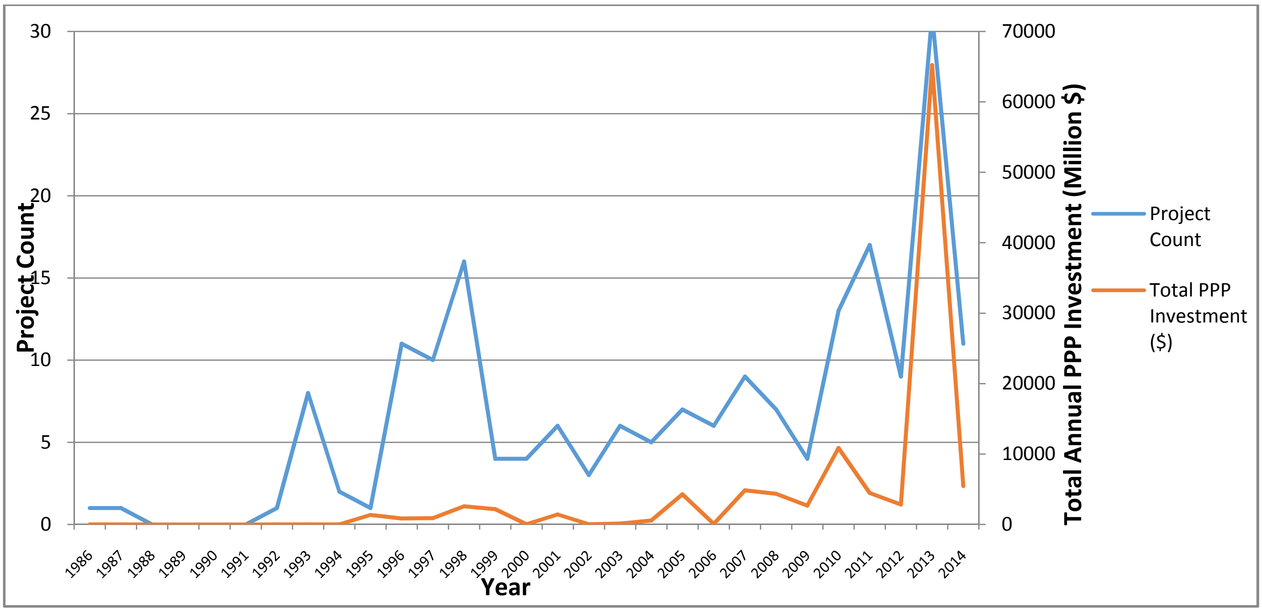


Figure 1: The historical changes in the PPP project counts and values (investment value + lease payment) in the 1986-2004 period
Source: Prepared by the author using Public-Private Partnerships Database of Ministry of Development

The BOT model has been the most widely used PPP scheme in Turkey in terms of both project count and project value, as depicted in Table 1. According to Table 1, almost 56% (97 out of 173) of all PPP projects and 66% (44 out of 67) of all transport PPP projects have been realized through the BOT scheme. Within the transportation sector, the BOT model has been used in all road projects, 65% (11 out of 17) of airport projects, and 19% (4 out of 21) of all seaport projects.

BOT model has also been the most dominant PPP scheme in terms of project value, which is expressed in term of the sum of total project investment and lease payment. The summary statistics presented in Table 1 reveal that almost 65% (64.6 out of 99.8) of all PPP projects' value and 86% (59.2 out of 68.8) of all transport PPP projects' valuehave been realized through BOT scheme. Within the transportation sector, the BOT model accounts for the 100%, 85.9%, and 6.3% of the total projects' value in road, airport, and seaport PPP projects, respectively.

The distribution of the Turkish transport BOT projects among transport modes differs significantly from the global trend, which is depicted in Table 2. According to Table 2, road privatization projects have globally attracted the highest private participation among all transportation modes in terms of both total investment and project count. Air transport privatizations, on the other hand, get the lowest share, in contrast to Turkey.

Table 1: The Distribution of PPP project counts and values (investment value + lease payment) among sectors and PPP types (the numbers in the parenthesis present the projects in the construction phase)

| PROJECT COUNT | | Road Projects | Airport Projects | Seaport Projects | Transport Sector Total | Other Sectors | Total |
|---|---|---|---|---|---|---|---|
| | Build-Operate-Transfer | 29 (4) | 11 (2) | 4 (1) | 44 (7) | 53 (11) | 97 (18) |
| | Build-Operate | - | - | - | - | 5 (0) | 5 (0) |
| | Build-Lease | - | - | - | - | 5 (5) | 5 (5) |
| | Transfer of Operational Rights | - | 6 (0) | 17 (0) | 23 (0) | 43 (0) | 66 (0) |
| | Sector Total | 29 (4) | 17 (2) | 21 (1) | 67 (7) | 106 (16) | 173 (23) |

| PROJECT VALUE (million American dollars) | | Road Projects | Airport Projects | Seaport Projects | Transport Sector Total | Other Sectors | Total |
|---|---|---|---|---|---|---|---|
| | Build-Operate-Transfer | 11,522 (11,314) | 47,520 (42,428) | 127 (76) | 59,169 (53,818) | 5,385 (911) | 64,554 (54,729) |
| | Build-Operate | - | - | - | - | 3,984 (0) | 3,984 (0) |
| | Build-Lease | - | - | - | - | 6,833 (6,833) | 6,833 (6,833) |
| | Transfer of Operational Rights | - | 7,779 (0) | 1,874 (0) | 9,653 (0) | 14,796 (0) | 24,449 (0) |
| | Sector Total | 11,522 (11,314) | 55,299 (42,428) | 2,001 (76) | 68,822 (53,818) | 30,998 (7,744) | 99,820 (61,562) |

Source: Prepared by the author using Public-Private Partnerships Database of Ministry of Development (Last access February 8, 2016).

Table 2: Distribution of the Private Participation in Infrastructure projects by transport modes in the 1990-2015 period

| Subsector | Project count | % project count | Total investment (million US dollars) | % 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 (Last access February 8, 2016).

## 3. Risk Management in the Turkish Case

Each transportation mode has unique characteristics affecting the risk structure of BOT projects. For example, as airport BOT projects are mostly capacity expansion projects, forecasting the future traffic demand based on the existing one is simpler and more accurate. In addition, airports' high cash-generating ability shortens their payback period, reducing the associated risks. As these projects are generally realized within the existing airport area, land acquisition risk is significantly reduced. Seaports, on the other hand, have large regulatory and political risks as the seaport traffic can easily be affected by a change in quotas and tariffs (Lam 1999). Similarly, highway, motorway, and railway projects involve large land acquisitions that make it difficult to estimate the necessary time to complete this task and the costs of the land acquisition before the commencement of the project. Their extensive construction sites increase the possibility of cost overruns during the construction phase because contracting authorities, in some cases, might fail to make a perfectly detailed ground survey before the tender of the project. Additionally, such projects tend to compete with alternative free routes, undermining the future traffic demand (Lam 1999).

Risk management is a crucial factor in the success of a BOT project. The basic idea of risk management in BOT projects is that the risks must be allocated to the party that can best manage them. In other words, the net economic cost of bearing all allocated risks must be minimized (Obeng and Mokgohlwa 2002). Risk management is even more important in developing countries such as Turkey since these countries are classified as more risky countries than their developed counterparts. Although risk structures vary within each transportation mode and even similar projects may have different risk factors, some basic risk allocation principles remain unchanged. For example, as is common practice, construction risks are allocated to the private partner in all transportation BOT projects based on the idea that private sector can better manage such risks; the same holds true for operation risks. On the other hand, the force majeure risks over which private operators have no control are mostly borne by the public authorities.

The literature contains many studies on the risk classifications and risk management practices/policies of PPP/BOT projects. Regarding risk classifications and groupings, Wang et al. (2004) grouped 28 risks items under three headings as country-level, market-level, and project-level risks in their study on the risk management of construction projects in developing countries. According to their classification, there was a hierarchy among the risk levels in which the country-level risks were supposed to be the most dominant and therefore affect both market-level and project-level risks, whereas market-level risks were likely to influence project-level risks. Bing et al. (2005) and Hwang et al. (2013) classified the risks associated with PPP/BOT projects as macro-level, meso-level, and micro-level risks. According to Bing et al. (2005), macro-level risks were related to a much higher level, such as national or industrial level, than the project itself and are therefore exogenous to the project. Meso-level risks, on the other hand, come directly from the project itself and are therefore endogenous to the project. Lastly, micro-level risks originate from the relationships among the stakeholders of the project. Shen et al. (2006) listed the risks of PPP projects as project-related, government-related, client-related, design-related, contractor-related, consultant-related, and market-related. Jin and Doloi (2008) listed 36 PPP-related uncertainties and grouped them as institutional, social and industrial, economic, organizational, and project risks. Similarly, Jin and Zhang (2011) identified 21 risk (uncertainty) items regarding PPP projects and classified them as institutional, social and industrial, economic, and project risks.

No matter what the risk classification, however, the fundamental philosophy behind proper risk management in PPP/BOT projects is that the risks should be allocated to the partner who can best manage it. Appropriate risk management [Other variations of the term “appropriate risk management” within the literature include; appropriate risk allocation and risk sharing ((Bing et al. 2005) and (Zhang 2005)), proper risk allocation (Abednego and Ogunlana 2006), and allocation of risks equitable (Chan et al. 2010)] is so important that it is generally expressed at the top of the success factors. Other notable success factors include transparent and competitive procurement process, strong private sector, favorable legal framework, stable economy, and economically feasible projects [(Bing et al. 2005), (Zhang 2005), and (Chan et al. 2010)].

Table 3 presents examples from the literature regarding the preferred allocation of PPP/BOT project risks. For a systematic approach, Table 3 classifies the project risks into five major risk groups: (1) construction, (2) operation, (3) economic, (4) demand, and (5) land acquisition. The summary of the literature in Table 3 suggests there exists a consensus that both construction and operation risks should be borne by the private partners in BOT projects. Similarly, regarding economic risks, there is a common consent that private partners should assume the risks associated with the availability and high cost of finance. For other economic risk items such as poor financial market, inflation, and interest rate, one part of the literature propose that these risks should be assumed by the private partners, whereas others recommend that these risks should be either shared by the both parties or that risk allocation should be negotiated.

Demand risks and land acquisition risks are the two main risk groups where the literature fails to come to an agreement. On demand risks, for example, Bing et al. (2005) and Hwang et al. (2013) claim that these risks should be borne by the private partners whereas Roumboutsos and Anagnostopoulos (2008) assert that the risks can best be managed by public agencies. According to Ke at al. (2010), on the other hand, both public and private partners should share demand risks. With respect to the land acquisition risks, Hwang et al. (2013), Roumboutsos and Anagnostopoulos (2008), and Ke at al. (2010) suggest that public agencies should handle such risks, whereas Bing et al. (2005) recommends that land acquisition risks should be assumed by the private partners.

Table 3: A summary of the literature on the Preferred Allocation of BOT Project Risks

| | | Hwang et al. (2013) | Roumboutsos and Anagnostopoulos (2008) | Lam et al. (2007) | Ng and Loosemore (2007) | Bing et al. (2005) | Ke at al. (2010) |
|---|---|---|---|---|---|---|---|
| Construction risks | Construction cost overrun | Private | Private | | Private | Private | |
| | Construction time delay | Private | | | | Private | |
| | Material/labor availability--Material availability--Delay in supply-- Availability of labor and equipment | Private | Private | Private | | Private | Private |
| | Site safety and security--Safety at site | Private | | Private | | | |
| | Quality of work-- Quality risk-- Poor quality of workmanship-- Poor quality of workmanship | | Private | Private | Private | Private | |
| | Quantity variations | | | Private | | | |
| | Construction completion | | | | Private | | Private |
| | Geotechnical conditions | | | | | Private | |
| Operation risks | Maintenance costs higher than expected | Private | Private | | | Private | |
| | Maintenance more frequent than expected | Private | Private | | | | |
| | Operation cost overruns | Private | Private | | Private | Private | Private |
| | Low operation productivity | Private | | | | Private | |
| | Operation revenues below expectation | | Private | | | Private | |
| Economic risks | Poor financial market | Private | Shared | | | Private | |
| | Inflation | Shared | Under negotiation | Shared | Shared | Private | Shared |
| | Interest rate | Shared | Under negotiation | | Shared | Private | Shared |
| | Availability of finance | Private | | | | Private | |
| | High finance costs-- High financing cost | Private | Private | | | Private | |
| | Foreign exchange and convertibility | | | | | | Shared |
| Demand risks | Level of demand in project-- Level of project demand-- Level of demand for Project-- Market demand change | Private | Public | | | Private | Shared |
| Land acquisition risks | Site availability | Public | | | | Private | |
| | Land acquisition | | | | | Private | Public |
| | Nationalization/expropriation | Public | Public | | | Private | Public |

### *3.1 Air Transportation*

As noted before, at a global level, airport privatizations have lagged behind roads, seaports, and railroad privatization in terms of both total investment and project count. In Turkey, however, airport BOT projects have dominated not just the transport sector but all sectors in terms of project value. One reason for the wide application of the BOT model in airports is the low level of construction and land acquisition risks for such projects. Compared to road projects, airport construction sites are much smaller, implying that the risks of construction cost overrun and delay tend to be smaller. In addition, since all of the Turkish airport BOT projects except Zafer, Cukurova, and Istanbul New were constructed within the existing airport area, land acquisition risk generally did not exist and the environmental impact assessment approvals and development plan amendments were easier to obtain, eliminating most of the predevelopment risks. Table 4 shows the risk allocation matrix of Turkish airport BOT projects.

Another factor contributing to the pace of Turkish airport BOT projects is their shorter pay-pack periods. Large airports, especially those having higher shares of international air traffic, can create high cash flows because of the duty-free revenues and passenger facility charges. In addition, the General Directorate of State Airports Authority of Turkey (SAA) has been providing passenger guarantees to BOT companies, which helped reduce the already lower pay-back periods. According to terms of reference of airport BOT projects, if the actual traffic falls below the guaranteed level, SAA makes a payment to compensate the difference. For example, assume that the passenger facility charge is $15 per passenger and SAA guaranteed an annual air passenger traffic of 4,000,000 passengers. If the airport BOT project experiences an annual traffic of 3,000,000 passengers, then SAA is supposed to make a payment of $ 15,000,000 [(4,000,000-3,000,000)x15] to the private operator. Such guarantees, provided that they are set based on objective traffic forecasts, come into action to keep the pay-back periods lower when the expected level of air traffic does not occur. We should also note that if the passenger traffic exceeds the guaranteed level, SAA receives a share of the revenue coming from the passenger facility charges of the exceeding traffic—sometimes even the whole amount, depending on the terms of the BOT contract.

The higher accuracy of airport traffic forecasts also added to the broader coverage of such BOT airport projects. These projects tend to be capacity expansion projects Since past statistics of passenger traffic and detailed records of the commercial revenue of the operating concessions and other business units are available for such projects;predicting future traffic and revenue is much easier. In addition, the shorter pay-back periods also help make more reliable and accurate forecasts.

The base tariffs for the passenger facility charges are set in terms of dollars or euros at the BOT contracts. For example, if the passenger facility charge is determined as $15 and if SAA decides to reduce the passenger facility charge to $13 per passenger, then SAA must pay the difference of $2 to the private operator for each passenger using the airport. On the other hand, if SAA decides to increase the passenger facility charge to $17 per passenger, then SAA must be paid the difference of $2 by the private operator for each of the passenger using the airport. Since such a base level for the tariff is capped for each BOT project and both SAA and the private operator can be compensated depending on the actual tariffs, it can be argued that the tariff risk is shared by the both parties. It must also be underlined, however, that the share of the tariff risk borne by SAA is significantly higher than that of the private partner. By

## Table 4: Risk Allocation Matrix of Turkish Airport BOT Projects

| | | Antalya I | Istanbul Ataturk | Antalya II | Dalaman | Ankara Esenboga | Izmır Adnan Menderes | Istanbul Sabiha Gokcen | BodrumMilas | Cukurova | Zafer | Istanbul New Airport |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction risks | Construction cost overrun | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Construction time delay | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Material/labor availability--Material availability-- Delay in supply-- Availability of labor and equipment | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Site safety and security--Safety at site | - | - | - | - | - | - | - | - | - | - | - |
| | Quality of work-- Quality risk-- Poor quality of workmanship-- Poor quality of workmanship | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Quantity variations | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Construction completion | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Geotechnical conditions | - | - | - | - | - | - | - | - | - | - | - |
| Operation risks | Maintenance costs higher than expected | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Maintenance more frequent than expected | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Operation cost overruns | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Low operation productivity | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Operation revenues below expectation | Public | Public | Public | Public | Public | Public | Private | Public | Public | Public | Public |
| Economic risks | Poor financial market | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Inflation | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Interest rate | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Availability of finance | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | High finance costs-- High financing cost | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| | Foreign exchange and convertibility | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private | Private |
| Demand risks | Level of demand in project-- Level of project demand-- Level of demand for Project-- Market demand change | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) |
| Tariff risks | Tariff change | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) |
| Land acquisition risks | Site availability | Public | Public | Public | Public | Public | Public | Public | Public | Public | Public | Public |
| | Land acquisition | - | - | - | - | - | - | - | - | Public | Public | Public |
| | Nationalization/expropriation | - | - | - | - | - | - | - | - | Public | Public | Public |

setting the tariffs in terms of strong foreign currencies instead of the Turkish Lira, SAA also helped reduce exchange rate risks. In developing countries where large and unexpected fluctuations in exchange rates may occur more often, the exchange rate risk is substantial, especially for foreign firms that intend to transfer their profits abroad. In addition, setting the tariff in strong currencies helps reduce credit risks if the debts are borrowed in these currencies.

As the airport BOT projects (their tenders, constructions, and operations) proceeded smoothly over time, private investors' and creditors' perceptions of the risks associated with the country and the airport industry (meso-level risks as Bing et al. (2005) described) began to change positively. This resulted in cheaper debts from the creditors, increased competition in the following tenders, and, accordingly, more favorable tender bids from the government point of view. The BOT tenders of both Bodrum Milas Airport Foreign Passenger Terminal Project and Cukurova Airport Project ended up with much lower operation periods than expected due to such effects.

Table 5: The comparison of guaranteed and actual air traffic and corresponding guarantee payment at Zafer Airport BOT Project

| Year | Guaranteed Passenger Traffic* (for departure) | | | Actual Passenger Traffic*** (annual total) | | | Guarantee Payments to the Operator by SAA**** (euro) | | |
|---|---|---|---|---|---|---|---|---|---|
| | DPT (a) | FPT (b) | TPT (c) | DPT (d) | FPT (e) | TPT (f) | FOR DPT : (a-d/2) X 2 € | FOR FPT : (b-e/2) X 10 € | For TPT: [(a-d/2) X 2 + (b-e/2) x10] € |
| 2012 | 50,000** | 35,000** | 85,000 | 3,181 | 0 | 3,181 | 96,819 | 350,000 | 446,819 |
| 2013 | 535,000 | 374,500 | 909,500 | 63,872 | 20,902 | 84,774 | 1,006,128 | 3,640,490 | 4,646,618 |

DPT: Domestic Passenger Traffic, FPT: Foreign Passenger Traffic, TPT: Total Passenger Traffic
(*): The guarantee figures used in the analyses are derived from an article published in Hurriyet Gazette on January 12, 2015.
(**): These figures correspond to partial passenger guarantee for the operation period between November 25 to December 31. The passenger guarantees for the first full operation year were 500,000 and 350,000 for domestic and international passengers, respectively.
(***): These figures are derived from SAA Statistics Database.
(****): It is assumed that departure traffic is equal to the half of the total traffic.

Despite its benefits, can the use of traffic and revenue guarantees with some political motivations rather than economic and financial needs/analyses lead to unnecessary government spending? In the Turkish case, a concrete example pertinent to this question is Zafer Airport. Despite its very low air traffic potential, the airport was constructed through BOT model with abnormally high passenger and accordingly revenue guarantees to attract the private investors to the financially unviable project. However, the actual traffic failed to reach the guaranteed levels. As a result, since its opening on November 25, 2012, SAA has been making annual guarantee payments to the private operator. Table 5 presents the guaranteed and actual air passenger traffic of Zafer Airport in the 2012–2013 period. The last three columns of Table 5 show the guarantee payments made by SAA: as the passenger traffic fell well below the guaranteed levels, SAA had to pay 5.1 million euros to the private operator in the 2012–2013 period. If it is assumed that the current air traffic will continue until the end of the operation period of 29 years and 11 months, SAA might expect to make an additional of at least 100 million euros of guarantee payments to the private operator.

*3.2 Road Transportation*

Motorway BOT projects have long segments that increase the land acquisition and construction risks (Fisher and Babbar 1996), since larger construction sites increase exposure to legal problems in land acquisition and unforeseen geological and weather conditions that may adversely affect the smooth operation of the construction works. In the Turkish practice, the private partners have, in line with what the literature suggests, assumed the construction and operation risks of the BOT projects. The government side, on the other hand, assumes the land acquisition risks, which include site availability, land acquisition, and nationalization/expropriation risks. Table 6 outlines the allocation of risks among public and private parties in the Turkish road BOT projects.

**Table 6.** Risk Allocation Matrix of Turkish Road and Maritime Port BOT Projects

| | | Road Projects | | | | | Maritime Port Projects | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Gocek Tunnel | Istanbul Strait Road Tube Crossing Project | Northern Marmara Motorway and Third Bosporus Bridge | Gebze-Orhangazi-İzmir Motorway and İzmit Bay Bridge | Sabunceli Tunnel | Kepez Port Superstructure Project | Gulluk Pier | Bodrum Pier |
| Construction risks | Construction cost overrun | Private | Private | Private | Private | Private | Private | Private | Private |
| | Construction time delay | Private | Private | Private | Private | Private | Private | Private | Private |
| | Material/labor availability--Material availability-- Delay in supply-- Availability of labor and equipment | Private | Private | Private | Private | Private | Private | Private | Private |
| | Site safety and security--Safety at site | Private | Private | Private | Private | Private | Private | Private | Private |
| | Quality of work-- Quality risk-- Poor quality of workmanship-- Poor quality of workmanship | Private | Private | Private | Private | Private | Private | Private | Private |
| | Quantity variations | Private | Private | Private | Private | Private | Private | Private | Private |
| | Construction completion | Private | Private | Private | Private | Private | Private | Private | Private |
| | Geotechnical conditions | - | - | - | - | - | - | - | - |
| Operation risks | Maintenance costs higher than expected | Private | Private | Private | Private | Private | Private | Private | Private |
| | Maintenance more frequent than expected | Private | Private | Private | Private | Private | Private | Private | Private |
| | Operation cost overruns | Private | Private | Private | Private | Private | Private | Private | Private |
| | Low operation productivity | Private | Private | Private | Private | Private | Private | Private | Private |
| | Operation revenues below expectation | Private | Public | Public | Public | Private | Private | Private | Private |
| Economic risks | Poor financial market | Private | Private | Private | Private | Private | Private | Private | Private |
| | Inflation | Private | Private | Private | Private | Private | Private | Private | Private |
| | Interest rate | Private | Private | Private | Private | Private | Private | Private | Private |
| | Availability of finance | Private | Private | Private | Private | Private | Private | Private | Private |
| | High finance costs-- High financing cost | Private | Private | Private | Private | Private | Private | Private | Private |
| | Foreign exchange and convertibility | - | Private | Private | Private | Private | Private | Private | Private |
| Demand risks | Level of demand in project-- Level of project demand-- Level of demand for Project-- Market demand change | Private | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Private | Private | Private |
| Tariff risks | Tariff change | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Shared (mostly public) | Private | Private | Private |
| Land acquisition risks | Site availability | Public | Public | Public | Public | Public | Public | Public | Public |
| | Land acquisition | Public | Public | Public | Public | Public | Private | Private | Private |
| | Nationalization/expropriation | Public | Public | Public | Public | Public | Public | Public | Public |

For all of the road BOT projects but Gocek Tunnel, the maximum allowable toll rate is set in terms of strong foreign currencies like dollar or euro, and the BOT company can make the annual toll rate adjustments based on a prespecified formula using inflation rates and the exchange rates between the Turkish Lira and foreign currencies. In Gocek Tunnel, on the other hand, the base toll rate was set in terms of the Turkish Lira. Although an upper limit for the tariff is capped for each BOT project, it can be claimed that the tariff risk is shared by the both parties; the great majority of the risk, however, is assumed by the public agencies, since the private partner is free to set the tariff below the cap, which is determined based on foreign exchange rates and inflation.

From the demand risk point of view, Turkish governments tend to provide traffic guarantees, the only exception being Gocek Tunnel BOT Project. This approach aimed to improve the attractiveness of the projects, but the provision of tariff and traffic guarantees is not free from criticism. In the case of the Gebze-Orhangazi-İzmir Motorway and the İzmit Bay Bridge BOT Project, for example, the maximum allowable tariff for the İzmit Bay Bridge was determined as $35 plus value added tax (which is currently 18%), and the tariff for the rest of the motorway was set as $0.05 plus value added tax per kilometer. At the time of the tender in 2012, $35 was worth around 75 Turkish Liras for the İzmit Bay Bridge, not very high compared to the competing ferry service, which cost around 50 Turkish Liras and takes about an hour. After the significant depreciation of the Turkish Lira in 2015, $35 is now worth approximately 120 Turkish Liras. This significant increase raised concerns even before the start of the operation of the project. If the demand does not reach the guaranteed traffic as a result of the very high tariff, then the private operator will be financially compensated by the government and the intended economic benefits from the project will not be achieved. Similarly, Northern Marmara Motorway and Third Bosporus Bridge have been criticized for its low traffic potential and high traffic guarantees. It has been claimed in the media (Munir; 2010, 2012a, 2012b) that the Third Bosporus Bridge is being constructed where there is not sufficient potential and that it will barely help reduce the congestion at the two existing bridges of the Istanbul Strait. As a result, according to the terms of the BOT contract, the government might be required to reimburse the private operator for the traffic and accordingly revenue difference. Checking the validity of such criticisms will be possible when the projects are opened to service.

### *3.3 Maritime Transportation*

The BOT model has achieved a more limited scope in the seaport projects compared to air and road projects. One reason is the liberalized structure of the Turkish port sector. Once the legal and environmental approvals are completed, a private operator can build, own, and operate a maritime port. In other words, if a private operator forecasts that it can pursue a profitable port operation, it can enter to port business without a barrier to entry and without a need to take part in a BOT project. Hence, unlike an airport, road, or rail projects where either there is a legal barrier to entry or there is a financial barrier to entry because of the huge investment requirements, the entry and the exit of the private sector are much easier in the seaports. The liberalized structure of the industry accordingly reduces the need for public intervention when there is a capacity bottleneck.

Another reason for the limited scope of the seaport BOT projects is the policy preference of the Turkish governments to focus more on the transfer of the operational rights of the existing state seaports instead of creating new capacity through BOT scheme. In the case of transfer of operational rights, an operating port with relatively stable and predictable traffic is transferred whereas in new BOT projects the level of demand risk is quite high and the new investor has to compete with existing neighbor ports to get a piece of cake of the market. Therefore, Turkish governments inclined to reduce the political risks tend to abstain from starting new (BOT) projects with a higher likelihood of failure both in the tender and operation phases and prefer to give priority in privatizing the existing ports. In addition, privatization of the existing ports helped governments earn privatization revenues and liberalize the port sector more quickly compared to BOT projects.

Last, unlike the airport and big road BOT projects, no traffic, tariff, and revenue guarantee was provided to the private partners for the Turkish seaport BOT projects. As noted earlier, in a relatively competitive market where the private sector can enter easily, some kind of traffic and revenue guarantees might easily distort the competition.

For all these reasons, only three seaport BOT projects were put into service in Turkey. In all of these projects, construction, operation, economic, demand, and tariff risks were all assumed by the private partners (Table 6). The land acquisition risks, on the other hand, are split: both site availability and nationalization/expropriation risks are borne by the public authorities, while the land acquisition, which corresponds to the cost of land acquisition, is assumed by the private operators. If we compare the risk allocation of the transport BOT projects in Turkey (Tables 5 and 6), it can be concluded that seaport BOT projects are the ones which least distort the market and bring the least financial obligation to the public authorities, since no traffic and revenue guarantee are provided to the private partners.

### *3.4 Rail Transportation*

As rail transportation provides a limited number of profitable operations concentrated in high speed, freight, and subsidized regional lines (Link, 2004), private participation remains limited throughout the world, and Turkey is no exception. Despite a few attempts, no rail project has yet been realized through a BOT scheme.

The first and only concrete attempt for a rail BOT project was the Antalya-Alanya railroad project, which was tendered in 1999. The proposed project consisted of constructing and operating a 121-kilometer rail line between two very popular international tourism destinations, Antalya and Alanya. At the time of the tender, Alanya was lacking air services crucial for attracting international tourists, and travel companies were facing difficulties moving tourists from Antalya Airport to Alanya. The awarded consortium was expected to finance the construction phase in addition to land acquisition costs without any government grant. However, as no offer was received during the tender, the project was withdrawn by the Ministry of Transportation. The reluctance of the private sector may be attributed to the high uncertainty associated with the project.

First, demand uncertainty made it difficult to estimate project revenues. The proposed route was a completely new one, reducing the accuracy of the rail traffic forecasts. In addition, the new rail line was expected to experience strong competition from other transportation modes. The construction of a new airport at Alanya was underway at the time of the tender, and the proposed route was relatively short (121 kilometers), making road transportation a strong competitive alternative. Moreover, the Turkish government provided no passenger guarantees, which transferred all the demand risk to the private partner. It can be claimed that the Turkish government made the right decision by not providing any form of traffic/revenue guarantee for increasing the attractiveness of the already financially unviable project and did not waste public money.

Second, land acquisition risks created a barrier to entry. Although land acquisition works were supposed to be done by the Ministry of Transportation, the costs of land acquisition would be afforded by the private partner. However, no accurate cost estimation was available for land acquisition before the offers were submitted and the total amount of these costs would be determined after signing the contract, leaving a huge uncertainty for the private companies before the submission of their offers. In addition, land speculation in the touristic Antalya and Alanya regions contributed more to the uncertainty of the land acquisition costs.

Last, tariff risk was not properly managed since no concrete and objective tariff setting mechanism was drawn within the tender documents. According to the terms of reference of the tender, although the tariff and proceeding tariff adjustments would be determined by the BOT company during the operation period, it would need final approval from the Ministry of Transportation. Accordingly, a possible tariff conflict between the Ministry of Transportation and the BOT company would undermine the projected revenues of the project.

## 4. Conclusion

Risk management is a strategic success factor in the implementation of BOT projects, where the underlying principle is that the risks should be allocated to the partner who can best manage it. Past experience has shown that Turkish public agencies sometimes failed to design the right balance of risk allocation in transport BOT projects, and accordingly, excessive use of traffic and revenue guarantees created a financial burden on the state budget.

Public investments in the transport sector have been getting the lion share of the public investment budget for decades. As a developing country, however, Turkey still needs huge transport infrastructure investments. If the problems experienced during the previous BOT projects can be analyzed and some policy lessons can be drawn, future BOT projects can be more effectively and successfully managed.

The major lesson learned from a review of the Turkish experience is that the BOT model is not a magical tool to use at every transport project, as demonstrated during the tender of the Antalya-Alanya Railroad BOT project. The project was hardly promising a profitable operation from the private sector point of view, and public agencies opted not to provide any form of traffic and revenue guarantee for the project since its economic and financial viability was questionable. No private bidder was interested in the project, and it was eventually canceled, which in turn eliminated unnecessary government and private spending. However, in the case of Zafer Airport, traffic and revenue guarantees are used as a direct financing mechanism for the realization and operation of the project through BOT scheme. The traffic potential of the airport was not promising and criticism was raised since it would likely be a wasteful government spending to build the project. However, backed by political motivations to claim voters' credit rather than traffic forecasts and cost-benefit analyses, the project was tendered and the current air traffic is less than 10% of the guaranteed levels. The gap between the actual and guaranteed air traffic has been and will be financed by the SAA throughout the project life. Similarly, high traffic and tariff guarantees at the large road BOT projects such as Istanbul Strait Road Tube Crossing, Northern Marmara Motorway and Third Bosporus Bridge, and Gebze-Orhangazi-İzmir Motorway and İzmit Bay Bridge can bring additional load to the state budget once they are opened to service.

Another policy lesson is that there exists a learning curve in the Turkish transport BOT projects. The increase in the number of bidders in the late airport BOT projects shows that as the initial projects run smoothly, the risk assessments for the latter ones changed considerably. After it was seen that the BOT model works well in airport projects, more and more bidders submitted their offers in the following tenders. In addition, the smoothness of the ongoing projects persuaded the banks to offer lower interest rates for the debts, and in return, the cost of financing decreased. As a result, the bidder would be able to offer shorter operating periods at the bids that in turn profited the government. In other words, if public agencies can manage the risks of the transport BOT projects effectively, Turkey will benefit from lower operation periods and/or higher privatization revenues.

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