



Munich Personal RePEc Archive

## **The process of highway privatization in Italy and Japan**

Laurino, Antonio and Grimaldi, Raffaele

DiAP - Politecnico di Milano

March 2010

Online at <https://mpra.ub.uni-muenchen.de/29146/>

MPRA Paper No. 29146, posted 26 Feb 2011 09:24 UTC

# THE PROCESSES OF HIGHWAY PRIVATIZATION IN ITALY AND JAPAN.

Antonio Laurino<sup>1</sup>, Raffaele Grimaldi<sup>2</sup>

## Abstract

*In the last decade, the private sector has increased its role in the highways sector both through the construction and management of new assets.*

*Private sector involvement, often justified by the need to ease public expenditure, allows a reduction in public participation for new investments. The public sector remains in charge of other important issues such as regulation, but privatization entails the transfer of a natural monopoly to another subject with completely different objectives compared with the public operator.*

*The present work wants to analyse the highway privatization processes in Italy and Japan focusing on the two approaches and on their differences; the paper tries to evaluate the policies applied and their consequences on the general economic well – being according to a public economics viewpoint. Italy implemented a real privatization process (even if some regulatory issues have risen) while Japan still faces a strong public presence.*

*keywords:* privatization, highways, natural monopoly, Italy, Japan

---

1 Corresponding author Address: DiAP - Politecnico di Milano, Via Bonardi 3, 20133 Milano (Italy). Tel.: (+39)02.2399.5424. E-mail: [antonio.laurino@polimi.it](mailto:antonio.laurino@polimi.it).

2 Address: DiAP - Politecnico di Milano, Via Bonardi 3, 20133 Milano (Italy). Tel.: (+39)02.2399.5424. E-mail: [raffaele.grimaldi@polimi.it](mailto:raffaele.grimaldi@polimi.it)

## Introduction

At the end of 1999 in Italy the former public company Autostrade was privatized. Few years later (2005) also Japan carried out a privatization programme of its expressway network. In both cases the main trigger for the privatization was the huge public debt faced by the two nations and the need to collect resources from the sale of the profitable motorway networks.

It thus seems worth to analyse and compare the two processes, underlining similarities and differences and trying to evaluate the consequences on the general economic well-being according to a public economics viewpoint.

The paper is structured as follows: in the first part the concept of natural monopoly with regard to the highway sector will be shortly discussed, then few significant information about the two nations will be provided. In the second part we will discuss the two privatization processes then in the last part of the paper we will provide some final remarks about the privatization processes.

### 1. Highways and Natural Monopolies

The concept of natural monopoly has been deeply analysed in literature, here we will shortly point out its main characteristics and implications.

Road networks, in particular the highways, are fundamental national assets that can influence the competitiveness of a country and influence national welfare. Highways are natural monopolies, mainly because they usually require large fixed investments that make the duplication of those assets not reasonable because generating a welfare loss.

High investments implies that it is cheaper (for the society) to let a single firm produce the whole output, rather than divide the production among different firms (Stiglitz, 2000). The most recent definition of natural monopoly considers the concept of cost subadditivity for which *a firm is a natural monopoly in a market if no more than one firm can serve the market and receive non-negative profits*<sup>3</sup>.

---

<sup>3</sup> <http://www.regulationbodyofknowledge.org/chapter2/narrative/02/>

The most relevant implication of natural monopoly concerns the risk of exploitation of market power in particular whereas travellers cannot choose an alternative mode that is time and price competitive to the same destination (Fielding and Klein, 1993). In fact the monopolist can set the price above the marginal cost of production of the last unit of output (Biggar, 2008), causing a reduction in social welfare (deadweight loss).

In order to avoid this inefficient outcome two approaches are possible, the first one entails the direct provision by the government while the alternative would be to franchise the asset to private operator regulated by an independent agency. Historically highways have been financed, built and managed by the public sector since they were considered public goods. In the last decades the involvement of the private sector has increased a lot worldwide both through PPP initiative and privatization of former public highways.

The reasons behind these opposite decisions are, in the former case, mainly the greater efficiency attributable to the private operator while the latter derives from the necessity of assuring financial resources to reduce national deficit.

In fact most privatization in the European nations issued from the need to respect the financial restriction imposed by Maastricht Treaty; this implied a strong reduction in public spending in order to cap public debt.

In the next paragraphs we will discuss Japan's and Italy's ways to privatization of highways in order to evaluate the two approaches.

## **2. General comparison between Japan and Italy**

We present here a short overview aimed at evidencing the similarities of the contexts in which the two highway systems are placed.

Japan and Italy present some common aspects ranging from territorial characteristics (both are mountainous and of similar shape) to some issues related to the economic development (Molteni, 2002). Japan's land area is slightly larger than Italian one while the total population is about 46% larger. Concerning the highway extension the main difference between the two countries regards the age of the network since most of Italian highways were built 30 to 40 years ago (Greco, 2005), while in Japan only 57% of the present network were opened by 1985 (Tomoyuki, 2009).

Tab.1: Data Comparison

Nation	ITALY	JAPAN
Total Area ( <i>thousand km<sup>2</sup></i> )	301	378
Population ( <i>thousand</i> )	58,126	127,078
Density ( <i>people/km<sup>2</sup></i> )	200	337
Urban Population (of total)	68%	66%
Highway Extension ( <i>thousand</i> ) *	5,694	9,200
Traffic Volume ( <i>million pax-km/year</i> ) **	823.5	913.6
Public Debt ( <i>% of GDP</i> )	115.2	192.1
Average unit toll ( <i>€/km</i> ) ***	~ 0.06	~ 0.2

Source: CIA, *The World Fact Book*, 2009

\* World Bank, *Excerpt Highway Financing in India, 2007*, Aiscat, *Aiscat in cifre*, 2008

\*\* ITF, *Annual Data, 2008 - Total road transport (private cars + buses and coaches)*

\*\*\* Ragazzi, 2005 and Mizutani, 2006

The most relevant aspect common to both the nations is probably the huge public debt; according to the most recent classification that considers public debt as percentage of GDP, Japan and Italy rank, respectively, at the second and seventh position in the world. We may say that the two public debts had different origins; for the Italian case it is the result of wrong policies applied within a context of strong political interference where the primary objective was to accommodate the requests of the constituencies (Molteni, 2002). In the case of Japan, national debt has increased in the late 1980s because of falling tax revenues (Molteni, 2002) and of various spending increases to overcome the recession.

### 3. The privatization process in Italy

In the last decade, the Italian highway industry has undertaken a significant privatization process that changed not only the ownership of most of the concessions holders but also the regulatory framework (Benfratello et al, 2005). In the following paragraphs we will firstly discuss the history of Autostrade and then we will present the privatization path.

### 3.1 Road to privatization

*Autostrade Concessioni e Costruzioni* was established in 1950 inside the government – owned holding group IRI (Istituto per la Ricostruzione Industriale); six years later, Autostrade and ANAS (the national agency for roads) signed the first Agreement for the construction and management of the highway link between Milan and Naples. Italy's highway network grew very quickly until 1975 (Greco, 2004), Autostrade played a major role since during the years was granted several concessions while the other concessionaires were awarded concessions for single route per company.

In 1968 Anas and Autostrade signed a new agreement which foresaw that by the end of 2003, the whole network should have been given back to the State (Ragazzi, 2008). Until 1975, when the construction of new highways was stopped by the law 492/1975 due to the petrol crisis that caused a deep slump in the highway sector, Italy's network accounted about 5000 km, one of the longest in Europe.

Between 1982 and 1987<sup>4</sup> the public Autostrade increased its role in the highways sector acquiring financially troubled concessionaires and obtaining new concessions in exchange of the extension of the concession period to the end of 2018<sup>5</sup>.

During the 90s, due to the high national public debt, the critical financial condition of IRI and the strict constraints imposed by the Maastricht Treaty for the integration of the EU, Italy launched a considerable programme of privatization aimed at dismantling the public holding IRI.

The sale of Autostrade's shares was held in two stages. The first phase was between June and October 1999 (ASPI, 2007), when 30% of shares were sold to a stable core of shareholders, Schema28 spa, a company controlled by the Benetton family<sup>6</sup>. The second stage was in December 1999 when the remaining shares were listed on the stock market.

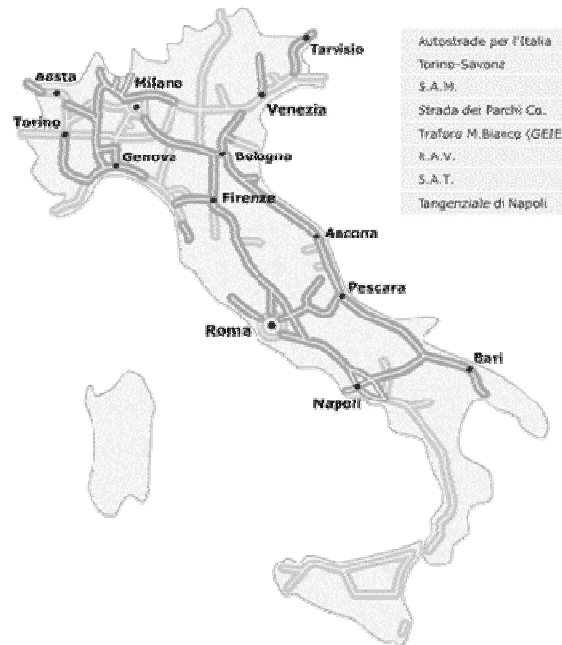
---

<sup>4</sup> Autostrade per l'Italia - Bilancio Sostenibilità 2007

<sup>5</sup> Law 531/1982

<sup>6</sup> To date Schema28 holds a 50.1% stake of the company

Fig. 1 Autostrade network<sup>7</sup>



### 3.2 Ex post considerations

Concerning the first phase of the privatization, it is important to notice that there was only a group (“Schema28 S.p.A.”) that made the final offer, this mainly because of the complexity of the clauses present in the convention and the high political risk of the investment (Ragazzi, 2008).

Another relevant aspect concerns the new Agreement drafted between Anas and Autostrade SpA just before the privatization; this was the occasion to extend again the concession period from 2018 to 2038. The new convention was signed in 1997 and it foresaw the application of CIPE<sup>8</sup> Directive n.219/1996 that introduced *price cap* method to adjust tolls. The mechanism defined toll increases as follows:

$$\Delta T \leq \Delta P - \Delta X + \beta Q$$

<sup>7</sup> [www.autostrade.it](http://www.autostrade.it)

<sup>8</sup> Italian Interdepartmental Committee for Economic Planning

where  $\Delta T$  is the change in toll rate (weighted average for the entire network of each concessionaire),  $\Delta P$  is the projected rate of inflation,  $X$  is the expected increase in productivity,  $\beta\Delta Q$  is the factor related to the quality of service (measured by the structural state of paving and the accident rate).

There is a widespread belief that it was a *price cap* only in name due to a series of flaws that compromised the whole mechanism, making the investment very profitable (Beria and Ponti, 2009). First of all the scarce transparency in the interpretation of the  $X$  parameter (Ragazzi, 2006) that entailed wide discretionary powers to ANAS with high level of negotiation; moreover the value of this parameter in the different years was set identically for 9 (out of 20) concessionaires (Benfratello et al., 2005). The choice to assign the traffic risk to the concessionaire did not consider that traffic growth depends mainly on a series of variable (fuel price, macroeconomic condition, modal alternatives, etc) that are outside the control of the licensee; this aspect together with ANAS “prudent” traffic forecasts seem to have offered a wide opportunity for extra profits (Ragazzi, 2006).

Finally, the absence of the “claw back” of profits represented the main flaw of the Italian price cap scheme since claw back foresees that at the end of the regulatory period, the extra profits gained by the concessionaire thanks to the increased efficiency in productivity should be transferred to the users in tariff. Today profits are collected entirely by the concessionaire.

According to Ragazzi (2006), tolls should have been abolished at the end of the 90s or lowered to cover the operating costs, because the network was built 30 – 40 years ago thus it was completely amortized. The new Agreement, signed just before the privatization within the extension of the concession period, aimed at maximizing the selling price (Ragazzi, 2006), in practice the State sold the future cash flow with high actualized rate in order to attract private investors (Greco, 2004).

The common rationale that justifies privatization is that private actor can achieve greater efficiency than public, this mainly because privatization entails competition. In the case of Autostrade seems that no efficiency motivation was carried to justify the privatization.

The new Single Concession Agreement signed on 12<sup>th</sup> October 2007 and in effect from 8<sup>th</sup> June 2008, following the approval of Law 101/2008



foresees a shift from the former conditions defined in the previous convention. The modifications entail a new formula for tariff adjustments and the revision of the claw back idea. Concerning the first point, the formula for calculating the annual adjustment of toll charges has been modified as follows:

$$\begin{array}{l}
 \text{Before 2008} \\
 \Delta T \leq \Delta P - \Delta X + \beta Q \\
 \text{After 2008} \\
 \Delta T \leq \alpha * \Delta P
 \end{array}$$

The new simplified formula, which lasts for the full term of the agreement, considers a fixed percentage (70%) of the real inflation rate, plus specific tariff components for work performed that were not included in the original 1997 agreement (X parameter)<sup>9</sup> and for new investments (K parameter)<sup>10</sup>. According to the Agreement, the adjustments are to be prorated to the actual stage of completion of works. The most significant difference between these two formula is the different function of the X parameter that in the former expression represented the efficiency gains achievable (defined every five years between the concessionaire and the grantor) during the regulatory lag; more precisely, the new concession still foresees the X parameter that now has a purely accounting function. Concerning the new formula and in particular the absence of the claw back, the Italian Antitrust Authority, has strongly criticised this new normative framework (July 4th, 2008), underlining that it makes not possible to verify *the productivity performance of the concessionaire in the regulatory period, to regularly review the charges and to reallocate to the users portion of any benefits arising from productivity gains, which are bound to turn into monopoly rents.*

#### 4. The privatization process in Japan

On October 1<sup>st</sup>, 2005, Japan completed the privatization of four highway related public corporations that became six expressway companies. In the next paragraph we will discuss the path that lead to the privatization.

<sup>9</sup> Atlantia, Financial Statements 2008 – Annual Report.

<sup>10</sup> Not included in the financial plan before 3th October 2006.

## 4.1 Highway framework

Japanese highway system started to grow in the aftermath of the Second World War when the nation had to face the reconstruction and the improvement of the road network in order to stimulate industrialisation and economic growth. During the 50s a series of law were enacted to tackle the problem, these laws marked the establishment of a different road policy that shifted *from the view that roads should be free, to the idea that a toll system was needed in order to repay the maintenance and expansion of the road network* (Mizutani, 2006). Between 1956 and 1970, several public companies were established to construct and manage the highway network:

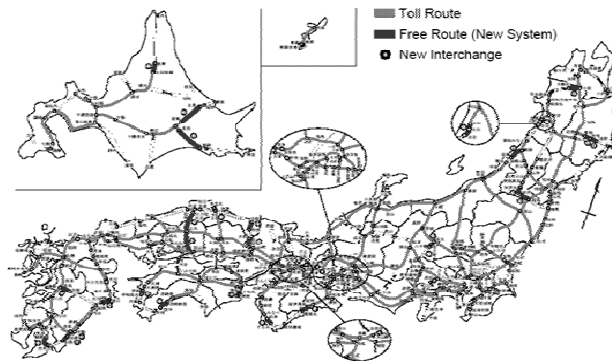
- Japan Highway Public Corporation;
- Metropolitan Expressway Public Corporation;
- Hanshin Expressway Public Corporation;
- Honshu - Shikoku Bridge Authority.

Japan Highway Public Corporation (hereafter JH) was a non-profit government corporation with a leading role in Japan's highway development. Japanese road network was realized in three phases: the first one between 1950s and 1960s focused on the main trunk lines, in the next decade five longitudinal lines were constructed then from the latter half of the 1980s transversal links were built (Kimura and Maeda, 2005).

The 90s saw a decline in the performance of JH due in part to new routes planned in the latter half of the 1980s that entailed high construction costs with relatively small traffic and in part to the economic recession occurred in the latter half of the 90s (Kimura and Maeda, 2005).

At the end of 2003 JH debts reached 2,070 billion yen (about 14.3 billion Euro; Mizutani, 2006), this was the main reason that lead to the privatization.

Fig. 2 Japanese network (Source Morichi, 2007)



In the next paragraph we will shortly present the pricing method that allowed the construction of the Japanese network.

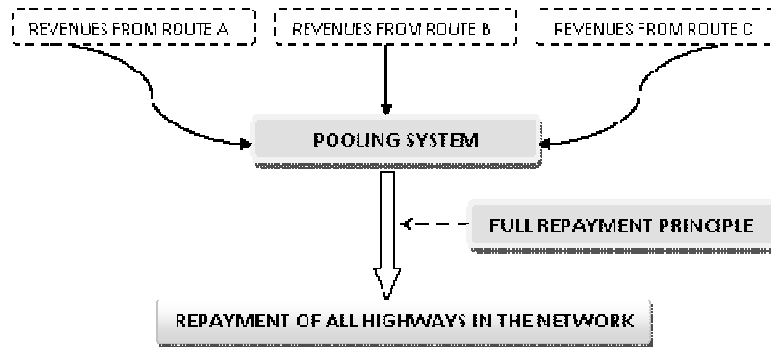
#### 4.2. Pricing system

Japan's pricing system is characterized by two peculiarities: *the full repayment principle* and *the toll pooling system*.

The first one foresees that total toll revenues during a pre fixed period of time must cover the total cost of the construction of the highways, including land acquisition, operation, maintenance, financing costs and others.

With the toll pooling system toll revenues from each route are pooled together and used for the repayment of the entire national expressway system. Then the same level of toll is applied on the whole network, its value is defined by equalising total revenues from all routes for a set of time period to total costs of highways (Mizutani, 2006). The rationale for the system considers different aspects (World Bank, 1999) like the view that (i) cross subsidization facilitates network expansion and the construction of costly parts of the network deemed essential for the network as a whole, (ii) profitability of some routes is improved by the opening of connecting routes, etc.

Fig. 3 Pricing system



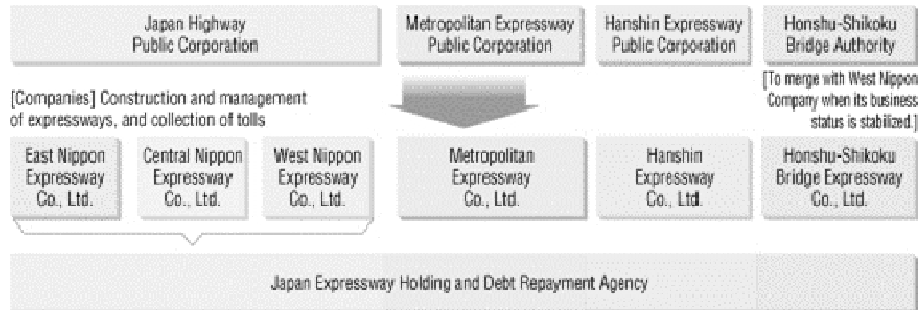
It is important to say that thanks to this mechanism, Japanese network increased greatly, particularly whereas the construction of routes was less profitable due to lower demand and/or higher construction costs (World Bank, 1999); on the other hand this system may have caused very high toll levels.

#### 4.3. From public to private?

In 2005 the four highway public corporations in Japan were privatized as part of reform spearheaded by Prime Minister Koizumi. At the end of 2001, Koizumi Government decided to reorganize and privatize four highway-related corporations; the decision on a number of matters and the reform plan was referred to the “Committee for Promoting Privatization of Four Highway related Public Corporations”. The Committee discussed many issues, for example whether to proceed with the privatization of the existing four public corporation as a single unit or as separate units, the expensive toll level, the huge debt accumulated by the corporations, the extra costs due to the Corporation’s family companies, etc.

In October 2005 privatization took place with the establishment of six new commercial companies (Central NEXCO, West NEXCO, East NEXCO, Honshu – Shikoku Bridge Expressway Company Ltd., Metropolitan Expressway Company Ltd., Hanshin Expressway Company Ltd.) along with an independent administrative agency, the Japanese Expressway Holding and Debt repayment Agency (JEHDRA), owned by the Japanese government.

Fig. 4 Privatization framework (Source JEHDRA)



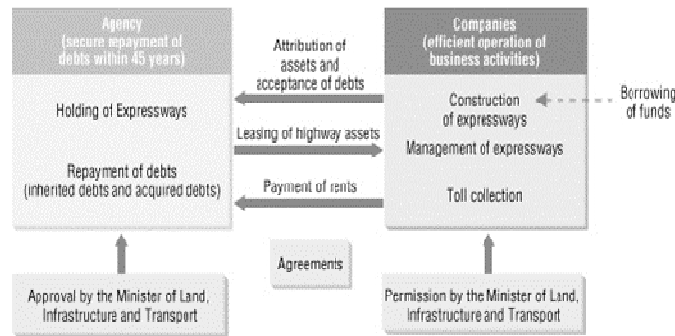
Three were the objectives of the privatization (JEHDRA, 2009):

- Secure repayment of interest-bearing debts, amounting to 40 trillion yen (336 billion Euro);
- Construction, without delay, of genuinely needed expressways with a minimum burden on the general public, while paying due respect to autonomy of the Companies;
- Offering of diverse and flexible prices and services by utilizing the private sector's know-how.

#### 4.4. Japanese highways reorganization

According to the recommendations of the Committee's final report, a new organization (JEHDRA) was founded in order to reduce the financial burden for highways companies and to support the successful implementation of highway services. JEHDRA holds highway facilities and leases them to expressway companies; its objectives (JEHDRA, 2009) are to secure the repayment within 45 years of the debts inherited from former public corporations and the new debt determined by the six private operators in order to extend the network, the second role is to exercise legal authority on behalf of road administrators in order to secure proper management and maintenance of the highways. Finally JEHDRA's last function is to enhance the transparency and disclosure of information about the projects. The Agency owns both expressway already constructed and the new assets; the lease fees paid by the Companies are equal to tolls received minus the expressway maintenance and management costs so the private operator can only make profit from business activities related to expressways such as rest area operations (restaurant, gas station, etc).

Fig. 5 Interaction between JEHDR and Companies (Source JEHDR)



#### 4.5 Ex post considerations

As stated above, the main rationale for the privatization of public corporations was the huge amount of debt accumulated during the years for the construction of the Japanese network. Toll road projects have been financed mainly through four financial sources (Mizutani, 2006):

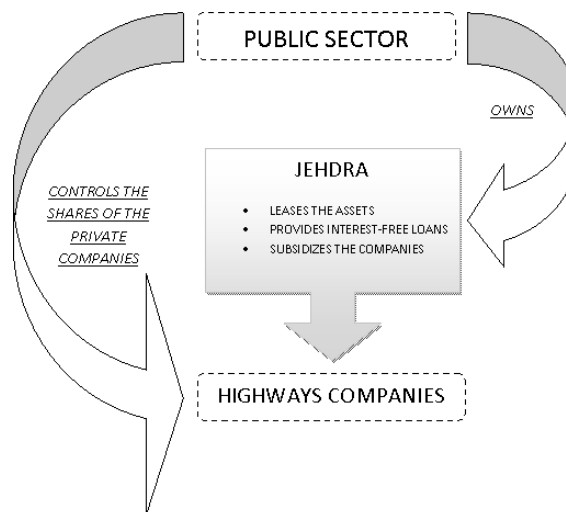
- Toll revenues;
- Highway bonds;
- Loans from banks;
- Government subsidies and social capital fund.

Bonds have been the most important tool used to finance highway expansion; two types of government guaranteed bonds (World Bank, 1999) were provided through the Fiscal Investment and Loan Program<sup>11</sup> (FILP, also translated as Treasury Investment and Loan), Government Acceptance Bonds and Government Guaranteed Bonds. The first type of bonds are purchased by the Ministry of Finance and the Ministry of Posts and Telecommunications with funds from sources such as postal savings accounts, employee pension funds, national pension funds, etc while

<sup>11</sup> According to the FILP report 2000 (Financial Bureau of Ministry of Finance), FILP undertakes large-scale and long-term projects that the private sector would find difficult to accomplish as well as supplies long-term interest-bearing funds that private financial institutions can't obtain. This is done not by using tax money, but by making available interest-bearing funds. FILP funds could be used to realize highways under the condition that the financing be repaid from tolls collected for their use.

Government Guaranteed Bonds guaranteed by the State are purchased by private financial institutions. The result of this policy is an incremental amount of debt that the Government tried to solve with the privatization and the creation of JEHDRA whose primarily role is the repayment of the debt.

Fig. 5 Public sector – JEHDRA – Private Companies



Highways in Japan face a strong public presence through JEHDRA and, in general, the Government that guarantees the majority of the bonds issued. JEHDRA provides also interest-free loans financed with subsidies granted by the national government or local public entities, besides the Agency can subsidize the Companies to facilitate a reduction in cost for the construction, maintenance and management in general (JEHDRA, 2009).

Concerning the private involvement we may say that it is very limited since the shares of the six joint-stock companies are mostly controlled by the public sector. The common rationale to involve the private sector is that it entails more efficiency and a better service than the public. In Japan the private presence seems only formal, the pricing system does not encourage the companies to be more efficient, innovative or to implement commercial

campaigns to attract more users (Mizutani, 2006) since expressway companies do not make any profit from toll operation. Moreover because JEHDRA has to take over all roads built by the new companies, as well as the debts newly incurred by them, efficiency and cost reduction becomes unlikely. Finally, the private sector should have been involved through competitive tendering in order to introduce incentives towards efficiency.

## **5. Final remarks**

This paper aimed at analyzing two different approaches to the privatization; in general, there seem to be less similarities between the two cases than one would expect, in particular considering that both processes started with the same aim of reducing the huge national public debt.

The analysis seems to underline that the privatization of formerly public highways network is a very complicated process: the Italian case presents difficulties in the public economic regulation, with particular respect to the limitations of extra-profits, while the Japanese process does not seem to have reached his objective (the reduction of public debt).

In Italy the privatization has been completed and the national government has somehow reached his objective, by earning 6.7 billion Euros and giving 1.7 billion Euros of debt away (Corte dei Conti, 2010). However, the analysis of the results rises many doubts about the socio-economical convenience of the whole operation, in particular with respect to the current high level of tolls and the mechanisms related to new investments (Corte dei Conti, 2010; Beria and Ponti, 2009; Ragazzi, 2008). However, an improvement in the quality and safety of the privatized network is generally reckoned (ASPI, 2007).

In Japan, instead, the intentions to privatize the highways network seem to have somehow diverted toward a new organization which still assigns a major role to the public sector that can determine and influence the motorway sector leaving scarce room for the private presence. The actual framework that does not clearly separate public and private interests, risks and responsibilities, affects and does not bring out the real benefits that privatization could entail. Accordingly, the term “privatization” seems at least inadequate since very little seem to have changed in the management of the highways.



## Acknowledgements

The authors would like to thank Mr Kodo Ogata for his valuable comments.

## References

- Autorità Garante della Concorrenza e del Mercato, (2008), *Schemi di convenzione con la società ANAS S.P.A. sottoscritti dalle società concessionarie autostradali*, Segnalazione AS455, bollettino No. 18. Roma (Italy).
- Albalade D., Bel G., Fageda X., (2009), "Privatization and regulatory reform of toll motorways in Europe", *Governance: An International Journal of Policy, Administration and Institutions*, Vol. 22, No. 2, pp. 295 – 318.
- ASPI, (2007), *Autostrade a 7 anni dalla privatizzazione – Fatti, numeri e risultati*, Autostrade per l'Italia.
- Benfratello L., Iozzi A., Valbonesi P., (2005), "Privatization, regulation and productivity in the Italian motorway industry", *Marco Fanno working paper series n.0002*, University of Padua.
- Beria P., Ponti M. (2009), *Regulation of investments on transport infrastructures in Italy*, 2nd Annual Conference of Competition and Regulation in Network Industries, Brussels, Belgium, November 20, 2009.
- Biggar D. (2008), "Is Protecting Sunk Investments by Consumers a Key Rationale for Natural Monopoly Regulation?", *Review of Network Economics*, Volume 8, Issue 2.
- Corte dei Conti (2010), *Obiettivi e risultati delle operazioni di privatizzazione di partecipazioni pubbliche*, Sezione centrale di controllo sulla gestione delle amministrazioni dello Stato, Collegio di controllo sulle entrate, Magistrato istruttore e relatore: Luigi Mazzillo. Italian Court of Audit. Roma (Italy)
- Fielding J.G., Klein D.B. (1993), "How to franchise highways", *Journal of Transportation Economics*, Volume 2, No 27, 113-130.
- Greco A., (2005), "Regulation and licensee companies in the Italian Highways Network", paper presented at the workshop "Highways", Bergamo (Italy), November 26 – 27, 2004.
- Kimura F., Maeda M., (2005), "Transport Infrastructure Development in Japan and Korea: Drawing Lessons for the Philippines", paper presented at Regional Conference on Investment Climate and Competitiveness in East Asia: From Diagnostics to Action, 21-22 November 2005, Kuala Lumpur (Malaysia).
- Mizutani F., Uranishi S., (2006), "Privatization of the Japan Highway Public Corporation: Policy Assessment", paper for the 46th Congress for the European Regional Science Association.
- Molteni C., (2002), "The economic performance of Italy and Japan: comparative reflections", *Occasional papers in Japanese studies*, No. 4, Edwin O. Reischauer Institute of Japanese studies, Harvard University.
- Tomoyuki F., (2009), "Expressway in Japan – Toll road system and status", presentation at International Seminar on Road Development, Dushanbe (Tajikistan), 4 - 5 November 2009.
- Ragazzi G., Greco A., (2005), "History and regulation of Italian highways concessions", *Transportation Economics*, Volume 25, 121-133.

- Ragazzi G., (2005), "Are highways best run by concessions? The Italian experience", paper submitted to the 4<sup>th</sup> Conference on Applied Infrastructure Research, Berlin (Germany), 8 October, 2005.
- Ragazzi G., (2008), "I signori delle autostrade", Il Mulino, Bologna (Italy).
- Stiglitz J. E., (2000), *Economics of the Public Sector*, W. W. Norton & Company, Third Edition, New York City (USA).
- The World Bank and Ministry of Construction Japan (1999), "Asian Toll Road Development Program, Review of Recent Toll Road Experience in Selected Countries and Preliminary Tool Kit for Toll Road Development", proceedings of the seminar "Asian Toll Road Development in an Era of Financial Crisis", Tokyo (Japan), 9-11 March 1999.
- Vassallo J. M., (2008), "Analysis of the Japanese expressway system in the framework of the current trend of the toll road business in the world", Executive Report.