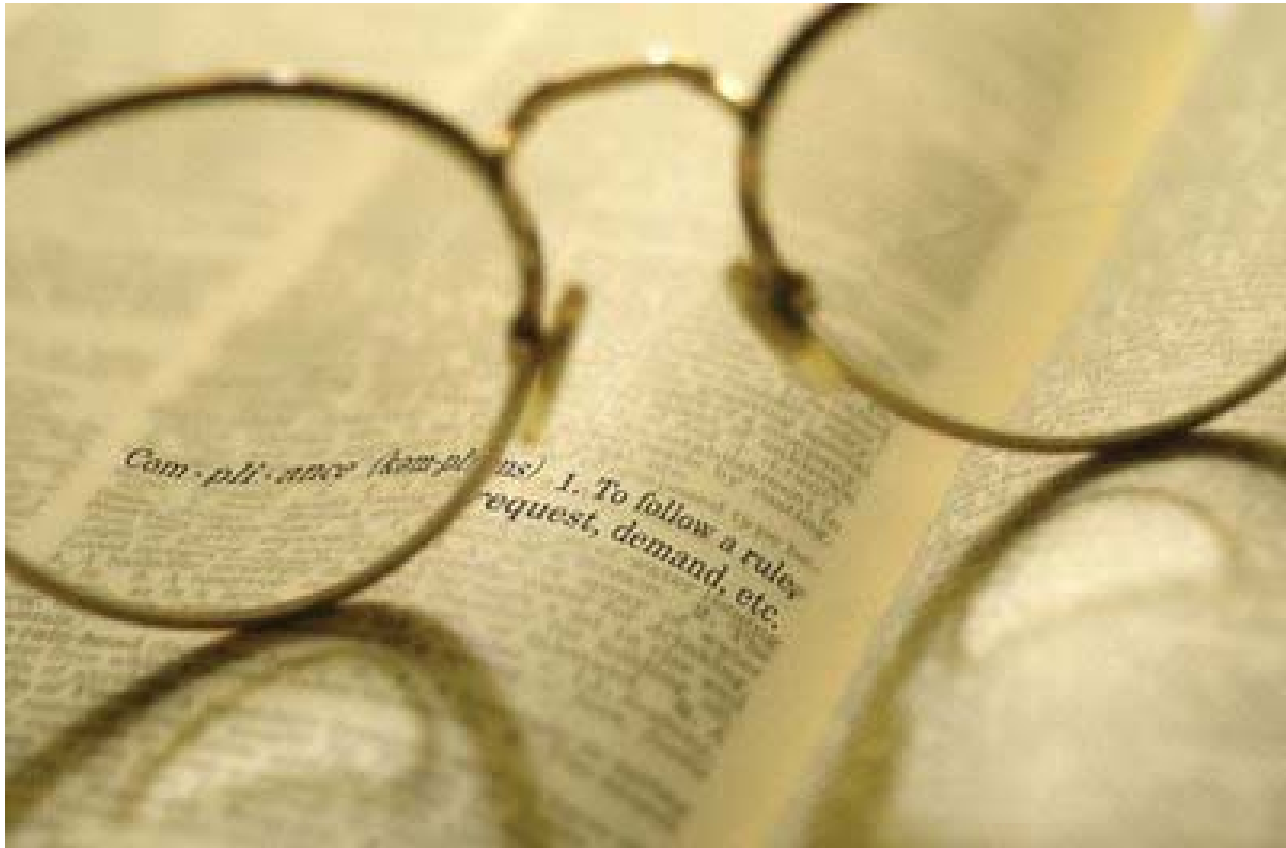


the **N**etwork Industries ^{quarterly}



Regulation and re-regulation

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Infrastructures are regulated and reregulated over time. Urbanisation at the start of the twentieth century increased the need for large infrastructures. The building of these infrastructures was often a combination of private, local and state interests. What was the impact of the local—possibly conflicting—needs and what role did the state play in the building and regulating of infrastructures? How are firms regulated to ensure public utility? The authors of this issue shed light on these questions with some giving a historical oversight of (re) regulation and the conflicting interests.

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ISSN 1662-6176 Published in Switzerland

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CROSS-SECTORAL

Bottleneck regulation in telecommunications, railways and post

Christian Jaag^a and Urs Trinkner^b

Various regulatory remedies deal with monopolistic bottlenecks in network industries. In telecommunications, railways and post, the European regulatory provisions seem appropriate.

Sector specific regulation in network industries has become a widely discussed topic among academics, policy makers, industry economists and regulators themselves. The issue of these debates has usually been on whether such regulation is necessary and, if so, what its optimal design should be. We briefly describe a general economic framework to assess regulatory remedies. On this basis, we discuss the need for market power regulation in the following network industries: telecommunication, railways, and post. The economic need for regulation is then contrasted with the implementation of actual legislation in the European Union.

General analytical framework

Our theoretical framework starts from a free market primacy assumption: markets, if they function properly, provide firms with the right incentives to enter markets, set prices, and invest in innovation at a socially optimal level. Naturally, there are a number of obstacles for markets to function well in the above sense. Market failures are omnipresent and give rise to potentially beneficial regulation—at the risk of these regulations failing as well. Starting from a free market situation, if there is no market failure or no harmful potential market failure, there is no need to intervene. If the market fails persistently and government chooses to intervene, it sets up regulations. If the regulated situation still fails when confronted with the socially desirable outcome—either because regulation is not appropriate to cope with the initial market failure or due to other political or social goals—there is scope for re-regulation. However, if regulation in general is deemed not appropriate or detrimental to attain social goals, this should result in de-regulation.

There are various potential sources of market failure. In this contribution, we focus on natural bottlenecks and their specific need for regulation (see Jaag and Trinkner (2010) for a comprehensive discussion on market failures

in network industries). Monopolistic bottlenecks are present if an industry, network layer or value chain element exhibits the properties of natural monopoly (subadditive cost function), considerable sunk costs, and no substitutes (that is, no economic possibilities for bypass). Such bottlenecks are present in most network industries and raise the issue of natural market power being capable to distort competition in a harmful way.

Deriving regulatory models to cope with monopolistic bottlenecks

The goal of any regulation of a stable monopolistic bottleneck is to enable non-discriminatory access by third parties (which cannot bypass the bottleneck owner) while minimizing the infringement of property rights on the bottleneck resource.

There are a number of potential regulatory instruments. Among them are ex post or ex ante regulation of prices and/or access conditions, and separation of accounts, functions, structures, and/or ownership. Some of them can be applied ex ante or ex post, some of them interrelate with each other.

Combinations of these regulatory instruments into specific regulatory models can potentially be applied in practice. As a precondition, the models must be technically and commercially feasible. Figure 1 shows the range of possible regulatory levels in terms of bottleneck regulation (0 to M). In increasing order, the regulatory models become more intensive and intrusive with respect to property rights infringement. The stronger the property rights of one or all operators are confined, the stronger it will affect investment and innovation incentives in the long-run. For example, doing without sector-specific regulation (level 0) results in strong incentives to the bottleneck owner to develop it further, as it is the residual claimant of all profits resulting from its development. At the same time, all operators without access to the bottleneck have

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strong incentives to search for alternative technologies in order to bypass the bottleneck and offer substitute services. A structural separation of the bottleneck resource with regulated attractive access conditions (level V) adds to its

incentives, risks, and the effects of regulatory and organizational dynamics.

The instrument with the least net economic cost is then the one which should be chosen—if it sufficiently

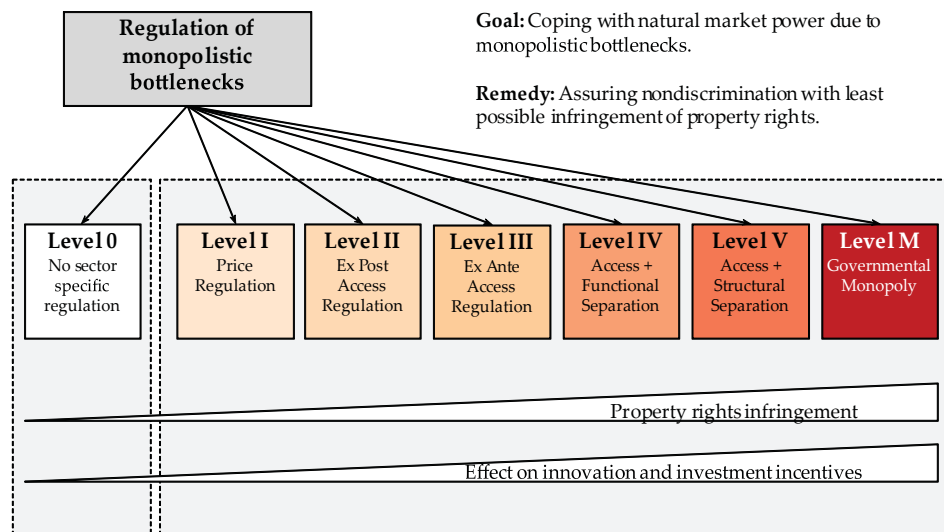


Figure 1 | Regulatory models designed to cope with monopolistic bottlenecks

stability and therefore creates the need for continuing (follow-up) regulation. At the same time, the owner's incentives to invest in its development are low as cost savings are automatically passed down to competitors. If there is an (unregulated) bypass opportunity, the bottleneck operator will rather invest there in order to bypass regulation.

Assessment Criteria

From an economic point of view, all regulatory models must first stand up a thorough economic analysis and comparison according to a number of qualitative and quantitative criteria. These are partly contradictory, which mirrors different interests of the various stakeholders in the marketplace: incumbent operators and their residual claimants, new operators, employees, business customers, private customers, and tax payers. The qualitative criteria include proportionality, expedience, competitive neutrality (including lightness, symmetry), incentive neutrality, subsidiarity, simplicity, transparency, and temporality. While these criteria are of qualitative nature and mostly have an indirect impact on welfare, quantitative criteria should also be included to compare the economic effects of any model compared to the (non)regulation in place in the short to medium and long run (market failure versus regulatory failure). Thus, static effects such as benefits from regulation, productive efficiency, and direct costs of regulation should be considered as well as dynamic aspects such as efficiency incentives, innovation and investment

conforms to the qualitative criteria. Of course, welfare effects are hard to quantify as they often take effect in the long-run (for example innovation incentives) and would therefore have to be explicitly considered in a dynamic setting.

Application to selected network industries

A common characteristic of all network industries is that they form a coherent and interrelated system. The central aspect of networks is their ability to transport goods or information between two geographically diverse locations. At the nodes in the network (which are connected by transportation means), the routing follows specific rules. For market power issues, networks can be subdivided into various network layers. Following the disaggregated approach of Knieps (2000), these layers can and should be analyzed separately—notwithstanding the strong connections among the layers. The underlying conviction is that some layers may be fully competitive while others constitute persistent monopolistic bottlenecks. An aggregate analysis would come to the imprecise conclusion that competition is not workable as one single non-competitive layer would bias the entire analysis. Figure 2 shows different network layers which are important in the framework of our discussion.

In the remainder below we identify monopolistic bottlenecks, derive the appropriate regulatory remedy based on the presented analytical framework, and compare our

findings with the current EC regulatory framework for Telecommunications, Railways, and Posts. We do not discuss the national implementation of EC directives and regulations as the latter constitute the common denominator and the legal basis and leeway for national regulation.

ioral remedies including non-discriminatory access rules to network elements and wholesale services. Recently, functional separation has been promoted by the Commission but largely rejected by the European Parliament. With the approval of a major overhaul of EU telecoms rules in late 2009 national regulatory authorities are provided with the

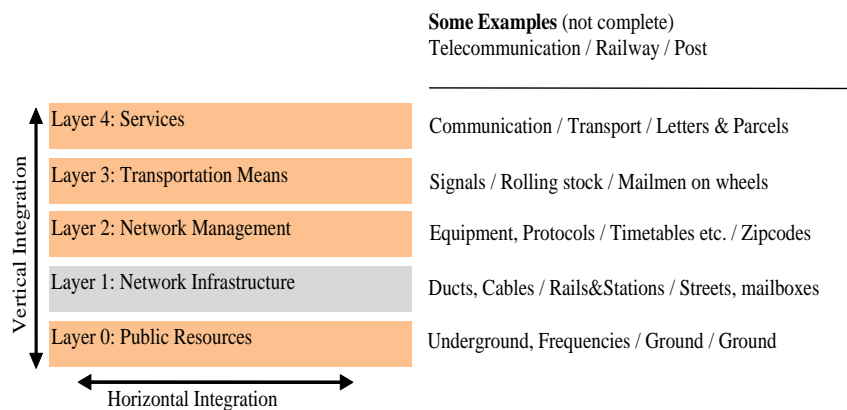


Figure 2 | Layers in network industries

Telecommunication

In the (wire-bound) telecommunications sector, the relevant network layers are the wide-area and last-mile passive infrastructures (ducts, cables), active infrastructures (electronic equipment) and services. While all last-mile infrastructures can be considered a natural monopoly due to subadditive costs, only the last-mile ducts and cables are a monopolistic bottleneck which cannot (sensibly) be duplicated. However, as there is increasing intermodal competition (for example, by wireless communication, in many developed countries also by local loops established by electricity and cable companies) and fast technological progress (fiber optics), the traditional copper bottleneck in the last mile becomes increasingly contested. Hence, from an economics perspective, access regulation—which can be phased out eventually—to these temporary (copper-based) bottlenecks is more appropriate than a persistent functional or structural separation which are considered to be irreversible by the European Regulators Group. Once new fiber optics are in place however, the fiber local loop might be a stable bottleneck in case consumers were to demand capacities that can be delivered by fiber-to-the-home infrastructures only.

Currently, national regulatory authorities in the European Union operate within the 2002 electronic communications regulatory framework. Providers considered having significant market power in the identified product and service markets may be subject to a variety of behav-

additional tool of functional separation as an exceptional remedy. The Commission has so far been very careful about giving guidelines with regard to when the separation might be used. It believes that in exceptional cases it may be justified where there has been persistent failure to achieve effective non-discrimination, and where there is little or no prospect of infrastructure competition within a reasonable timeframe. With the emergence of fiber-based networks, it is currently unclear, whether these will constitute a stable bottleneck in the future.

Railway

Railways in Europe carry both passenger and freight traffic. They provide vital economic and social links both within countries and across Europe. However, they have steadily lost market shares to other modes of transportation over the last decades. Railways also require high levels of subsidies; less than half of the total costs of rail transport in Europe are borne directly by passenger and freight customers.

In the railways sector, the relevant network layers are tracks and railway stations, network management (slot allocation, safety measures), rolling stock, and services. The tracks and railway stations can be considered a monopolistic bottleneck due to subadditivity and significant sunk costs; hence, there is a potential for regulation. There is only little technological progress on that layer, meaning that the bottleneck will likely be persistent. However, rail-

ways find themselves in intermodal competition against transportation means on roads, water, and air. Rail market shares exceed rarely more than 20 percent in the modal split. Depending of the effectiveness of this intermodal competition, two main scenarios are thinkable. Either price regulation of existing incumbents might be appropriate (level 1, for example, Japan), or an intense regulation of the monopolistic bottlenecks to enforce competition on the service level (level IV or V, EC approach). The latter necessitates strong regulatory interventions, such as access regulation combined with functional or structural separation of infrastructures (tracks, train stations) and passenger services in order to assure non-discriminatory access conditions. Thereby, the decision on the intensity of the separation depends on the existing synergies between the various network layers. Caution might be indicated in well developed railway systems exhibiting tight synchronized schedules and scarce capacities on rail tracks and train stations.

Starting in the 1990s, significant structural reforms have been initiated within the railways sector on the EU-level. Many of the reforms followed the approach adopted in other network industries such as telecommunications and electricity. Through Directives 91/440/EC and the First railway package (Directives 2001/12, 2001/13 and 2001/14), the EU introduced and reinforced the principle of separation between infrastructure and operations. The EU directives oblige national railway systems to implement vertical separation. This includes, firstly, accounting and functional separation of infrastructure from operations; second separate accounts for passenger and freight; and third a structural or ownership separation of slot allocation management to organizations not providing rail services to passengers. This unbundling requires separate companies (as implemented in Germany, Italy, France), but not necessarily ownership separation (as implemented in UK and Sweden). The second and the third railway packages have not furthered separation issues but predominantly dealt with market opening, interoperability and rather technical topics.

Post

The postal sector is one of the oldest if not the oldest network industry. It is usually not analyzed along the layer framework as in the other industries. If so, the only layer exhibiting subadditive costs as well as sunk costs would be the road system positioned on layer 1. It is public and open to anyone on nondiscriminatory terms. Rather, a disaggregate analysis focuses on the various parts of the value chain which consist of collection, sorting, transport and delivery of mail and parcel items. Collection and delivery exhibit subadditivity and hence the characteristics of a natural mo-

nopoly. As there are no significant sunk costs, there is no bottleneck facility which would justify access regulation or even mandated separation in general. Hence competition law (level 0) should be sufficient. Nevertheless, access to post office boxes or information on change of addresses is often regulated in liberalized markets. Note that these are no monopolistic bottlenecks. In our general framework as presented in Jaag and Trinkner (2010), regulation can still be justified on the basis of market failures arising from network externalities (here between operators, in analogy to termination issues in mobile telecommunication). In such cases, ex post access regulation (level 2) might be justified.

The purpose of the recent postal sector policy in the European Union is to complete the internal market for postal services and to ensure that efficient, reliable postal services are available at a good quality throughout the EU to all its citizens at affordable prices. Directive (2008/6/EC) foresees full market opening by 2013. The directive gives the member states the right, but not the duty to regulate access. Nevertheless, the directive suggests that access for certain elements of the postal infrastructure might be granted, such as information on change of address and postcodes, P.O. box delivery, redirection and return to sender services (Article 11 of the Directive).

Conclusion

When determining the appropriate regulatory model for network industries, not only the (non-)existence of a bottleneck facility has to be considered, but also qualitative criteria and their impact on competition. From an economic perspective, separation seems to be an adequate regulatory model in the railway market, but not necessarily in telecommunication where the appropriateness of separation remedies will depend on the future development of consumer demand towards very fast bandwidths that can only be provided with fiber wires. In the postal market, there is no need for separation. EC regulations are about in line with the regulatory need as derived from our analytical framework. ★

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PUBLIC TRANSPORT

Why metropolitan transport has become regulated in Paris?

Pascal Désabres*

Paris, whose mass transit railways was known as the *Métropolitain*, began its exploitation under a regime of concession. The City started to regulate it, however, in view of its economic importance.

At the station Porte Dauphine, in Paris, we can see over the entrance a sign, made of green art nouveau letters on a yellow background, which indicates 'Métropolitain'. This is a historical remaining of a mass transit railway system that entered into service in 1900. By then, a granted private company, the *Compagnie du Métropolitain*, was having the concession for its exploitation. By 1930, however, the public transportation system has become highly regulated.

Why, during that period of time, did the City of Paris start to regulate the exploitation of the *Métropolitain* more closely? By going back to the beginning of the twentieth century, I will demonstrate that the advent of this new regulatory regime have to be explained by economic reasons. Before entering into the details, we have to recall in which circumstances a regime of private concession had been established.

A sensitive issue on the political agenda

In the 1890s, the French State and the City of Paris were having a quarrel about which level of government should control the *Métropolitain* (Désabres 2003). On the one hand, the City of Paris was claiming control, by pretending it was obviously of local interest. On the other hand, the State was claiming that it was of a national interest. Besides, it wanted to keep control over the city through this infrastructure project, because Paris had experienced revolutionary troubles and was under strict administrative supervision since then. The *Métropolitain* was, thus, a sensitive issue on the political agenda of the time.

Both level of governments paid political attention to the project given its pivotal importance into the overall network system of transport. Paris, being France's most important city and the capital, was an important node in the flow of passengers through the national railway system. Travellers pass through Paris when they go from North to South, from East to West. Yet the City Counsellors want-

ed a transport system that would serve only metropolitan Paris. The network should only be linked with the train terminus stations in the city such as the Gare du Nord. The private railway companies, who were exploiting the lines connecting Paris to other cities of importance in the provinces, were more in favour of a design that would facilitate the interconnection from one national station to another. A passenger that comes from Lille and going to Lyon, for example, had to cross the whole city of Paris in order to make his connection from one train to another. They voiced their concern, hence, for a system that would transport these transit passengers.

At the same time, they cast doubts on the proposition of the City of Paris, which wanted to deserve the transport needs of the working class. Paris, lead by a city council from the left, refused to implement a plan that would deserve the interests of the private railway companies. Despite this ideological opposition, the city council relied on private companies to build up the *Métropolitain*, because they were having both the technical expertise and the financial resources.

The political quarrel over the *Métropolitain* ended on the eve of the 1900 Universal Exhibition. Paris, who was about to welcome millions of visitors from all over the world, could not host the exhibition without having one of the last technological marvel, an underground transport system. The Secretary of Public Works was charged in carrying on the project. He proposed that the building being under the City's control, while the general scheme of transport was under the State's. After negotiations between parties, the City of Paris got full control over the project.

The *Compagnie du Métropolitain*

Paris, with the control on the project, started to build the *Métropolitain*. It achieved certain emancipation from the State. For example, the City created a new, illegal, council in its administration to manage the transport system. Even

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if this initiative had been outlawed due to the fact that the City was under state control, the State allowed the City to proceed with it. The council had a twofold purpose of supervising the buildings of the Métropolitain, while giving the City an opportunity to emancipate from the State in its administration.

The *Compagnie du Métropolitain de Paris (CMP)*, a granted private company, has been created, in 1898, to operate the new mass transit system. In its board of control, there was a former City councillor, and men linked with the Baron Edouard Empain, a famous Belgian entrepreneur who built several tramway lines. The works were under a concession regime. Private entrepreneurs tunnelled and built under the cityengineers control. Line 1 opened a few days after the Universal fair had begun, during the summer of 1900. The most important parts of the network were built during the following decade.

Paris chose a concession regime to build and operate the new underground railway. This was probably the best option for several reasons. First, Paris could obtain lower interest rates than the private civil engineering entrepreneurs to finance the construction. Second, it allowed the entrepreneurs to offer their skills without bringing in huge amounts of capital themselves, hence the concession duration could be reduced. Finally, after the end of the concession, the Métropolitain would become the city's property.

The City took out several loans and had to refund them later on. Paris generated revenues through the tariff paid by users for the use of the Métropolitain. The amount the tariff increased as more and more Parisians ride underground. From 1902, Line 1 became the basis for fee calculations and traffic attendance estimations for future lines. A judiciary structure proceeded to the calculation of the tariff, but soon, it was forced by economic constraints to change its policies. The Métropolitain had become too important for the organisation of economic activities. The City of Paris started to pay close attention to CMP.

The effects of a growing use

It is reasonable to accept that this increasing political attention had come from the fact that the flow of passengers increased as the transport network extended (see Table 1). Engineers, though, were surprised by this development. They thought at first that further lines would dilute the passengers flow in a network with a larger capacity. A member of the Secretary of Finance observed, in 1906, that a flow of 190 million passengers was much more than foreseen. The Métropolitain, by being so successful among Parisians, has become in fact a public service.

The CMP could develop further with this success. Over the period ranging from 1898 to 1929, the company had an annual profit of 1.2 millions of Francs. Meanwhile

the loan was increased by 27 percent, whereas the tariff increased by 32 percent. Revenues and expenses were increasing by following more or less the same rhythm. Several loans financed the expansion of the network. The total loan amount, from 1898 to 1935, reached 1 billion francs. To give a comparison, the Métropolitain works had cost almost the same at the transformation of Paris's avenues and buildings under Georges Eugène Haussmann.

The concession regime worked out. Everything was running smoothly up until the First World War. The financing system based on passenger traffic could not be kept. Moreover the inflation that followed the aftermath pressured the financing system even more. If CMP expenses had become too heavy, it could not go into bankruptcy, because of the public interest it represented. In the anxious afterwar atmosphere, politicians, engineers and entrepreneurs had to find a solution.

It was impossible to follow the inflation rates. The ticket had to stay at a low price; the Métropolitain could not become a luxury transport. For the first time, the decision maker of CMP faced a public service dilemma: keeping performance without control over the profit. The tariffs were part of a contract decided before the war, but, in the meantime, economic conditions have changed. Facing this point, the notion of public service meant the service could not be interrupted but in the case of an absolute necessity. The CMP raised an important problem of ownership.

Table 1 | Annual passenger traffic on the Paris Métro

Year	Passengers
1900	17 660 000
1901	55 882 000
1902	72 018 300
1903	118 202 000

From private to public

The Métropolitain has been transformed in public service, even though that the CMP was still operating it as a private company. Indeed the State started to get involved during the First World War in such a way that it transformed the very notion of public service. The concession contract for the exploitation of the Métropolitain had been modified to face an unforeseeable risk, that is, a very high inflation rate.

A new concession contract was drawn in 1921. CMP remained the same, while the City of Paris was now controlling its management. The City had control over all financial activities. The CMP continued maintenance and construction work, while Paris provided the funds for the infrastructure, superstructures, trains and wagons. The

new concession contract erased the link between benefits for the CMP and results of the exploitation. Thus, CMP profits were lower but predictable, and, in a certain way, paid by the City of Paris.

Yet the Métropolitain became again the subject of a quarrel between public and private sectors. At the end of 1926, new laws allowed the municipalities to participate in the financing of companies providing public services, or, even, to be a direct manager of a local transport network. By 1925, the City of Paris financed the works and took the decisions regarding the Métropolitain for about a quarter of a century. The Métropolitain became a public and industrial service as the law defined it at that time; that is, same activity as the private sector, financing with tariffs paid by passengers, search for profit and a balanced budget.

The CMP made profit out of three sources of revenues: the passenger traffic; the type of fare (first or second class, single or return); and the by-products of the exploitation (publicity advertisements and bookshops in the underground lobbies). Instead of choosing a system where the City of Paris would pay the debt of the CMP, the two partners adapted the concession contract. But the fare price remained three times cheaper than before the war, at par with spending power.

With the inflation of the price of coal, it was necessary to increase the fares, and to avoid a clog in the underground network, while passengers would all take this cheaper mass transport network. But increasing fare prices meant increasing profits to CMP. The city wouldn't accept the company to get such important benefits. In the new concession contract signed in 1921, a special stipulation reduced the profits while the passenger traffic was increasing. This stipulation is known as the muzzle. The Métropolitain, as a transport administrated by a private company, was also a heavy regulated public service on profits. Actually, in order to share the weight of inflation, fare price was calculated on a double basis: the average income and the value of coal. Thus, both passengers and CMP were enduring inflation.

After 1926, while economic conditions were getting better, CMP wanted to go back to the contract drawn in 1898. The muzzle stipulation had shrunken its profits, while the traffic reached the figures of the national networks, and so should provide some comparable benefits to the great railway companies. A third concession contract was signed in 1930, almost resembling the first one. The third contract gave more liberty to CMP and increased the rents to the City of Paris. In turn, the City could get new large loans more easily resulting in 250 million Francs. Profits and losses were now shared by the City of Paris (40

percent) and the CMP (60 percent).

The City withdrew not only a part of the transport fees, but also a fee in order to pay its own loan charges. In 1925, it reached an amount of 25.3 millions of Francs, while the loans charges were 18.3 millions of Francs. So, the withdrawal generated profit for the city itself. But the City control over the whole process, from the drawing of the lines to the negotiations with the CMP, certainly explains why the network never passed through the City limits or just for a few stops behind.

Conclusion

The Métropolitain begun under a concession to a private company and ended up under the high regulation of the City of Paris. It was necessary for public authorities to insure that the underground network stayed in hands of the French capital. As this case shows, larger economic developments influences the way transport infrastructures are governed in relation to the development of cities. In the initial stage, a public private partnership between the city of Paris and CMP reassured a steady flow of capital and enough knowhow for a fast development of the system. After the first part of the system was build, income from traffic provided further financing for its development.

The First World War altered the overall economic situation and decreased access to capital, just as the postwar inflation dried out capital. New concession and contracts were signed to safeguard public interests and at the same time preventing bankruptcy of the private company operating the system. Public office became more involved. After the economic situation became more stable it was possible to return to the concession initially made in 1900's with slight changes. ★

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WATER

Regulation of water supply in Great-Britain in the nineteenth century

Charles-François Mathis*

In nineteenth century Britain, competition arose between industrial towns for reservoir-building. A national regulation had to be implemented by Parliament, notably on broad environmental questions.

In the nineteenth century, British towns were faced with a great number of problems concerning their water supply. The growing urban population—Glasgow, for instance, grew from 25 000 inhabitants in 1750, to 70 000 in 1800 and 345 000 in 1850—rendered inadequate the previous supply, which relied on public wells, rivers and fountains, more and more polluted by industries and sewage (Wohl, 1983; Bernhardt and Massard-Guilbaud, 2002). These difficulties were first met, in the first half of the 19th century, by resorting to private companies (Hasan, 1985), but the recognised failure of such a solution led to municipalisation from the 1840s onward.

Nonetheless, this movement of municipalisation initiated a new kind of competition, particularly when huge waterworks, such as reservoirs, were contemplated. Indeed, some cities decided to launch gigantic projects to transform some lakes or valleys into reservoirs. Four of these projects—those of Glasgow in 1855, Manchester in 1879, Liverpool in 1880 and Birmingham in 1892—stand out for their gigantism, the discussions they raised in Parliament as well as in the press, and for the relations which were established between them; they will therefore constitute the main focus of the present study.

This article will demonstrate that in these cases, municipalisation, even though it was an improvement on water supply by water companies, did not exclude market mechanisms and had thus to be submitted to a national regulation, which started to consider broad environmental problems.

A continuing market failure?

Indeed, corporations could be seen as just another, often bigger, economic agent who wanting to secure its share of water before its rivals, and to sell it with some profit—at least outside the limits of its territory. This was made clear in 1892 in the case of the debates on the Birmingham Corporation Water Bill, during which London and Birmingham fought over the water from Wales, each asserting

its priority on it. A Welsh MP, Sir Hussey Vivian, strongly disliked seeing London and Birmingham debating on who should get the water from Elan without at any point taking into account the interests of the Welsh population.

The problem could not be easily dismissed and was well-founded: to whom belonged the water resources? Should they be reserved for the population living in the same area? In 1869, a Royal Commission on the Metropolitan Water Supply, led by the Duke of Richmond, had tried to suggest a few rules to settle the problem. It proposed, among other guidelines, that ‘no town or district should be allowed to appropriate the source of supply which naturally and geographically belonged to the town or district nearer to that source, unless there were special circumstances which justified the appropriation’ (Royal Commission, 1869).

Yet, these rules of good conduct were of no effect, though they were systematically quoted during the debates on Manchester, Liverpool and Birmingham waterworks. They did not answer the main question, which was on the level of regulation which should be applied to water supply. Many engineers and politicians, in the Society of Arts for instance, called for a rationalisation of the problem and a national scheme for water supply, which would take into account all the resources in Great-Britain and distribute them adequately and fairly.

Even though no such scheme was finally proposed—the cost of the enterprise may have deterred anyone to try it—everyone agreed that a national regulation was necessary to arbitrate between conflicting local, national, or public interests. This appeared clearly in three domains which could be broadly related to environmental questions as they were understood at the time.

Compensating water

The first instance of what could broadly be considered an environmental regulation in the building of reservoirs for the water supply of great cities was the question of compensation for the water taken. Naturally, when a whole

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area was drained and rivers monopolised to fill a reservoir, there was bound to be some water missing further down the valleys. Very early, therefore, clauses were included in the Acts to impose compensation for the lack of water. Corporations were never allowed to completely dry a river, and they had to discharge a certain amount of water every day. Usually, approximately one third of the total available rainfall was discharged as compensation water (Silverthorne, 1884). Moreover, debates occurred on the frequency of these discharges: should they be intermittent, which was more or less advantageous to the mill-owners, who had then the strength required for their machines during working-hours, or should they be continuous? The usual practice was to provide a compensation discharge for 12 hours 6 days a week to satisfy the interests of industry. But, in 1888, in the case of the Halifax Corporation Waterworks Act, the House of Lords imposed a continuous flow (Sheail, 1986).

The problems raised by the question of compensation were clearly illustrated in the case of the Birmingham Corporation Water Bill. Some MPs indeed expressed great concern for the valley of the Wye, which would be deeply affected by the waterworks proposed by Birmingham. On the 8th of March 1892, the Member for Hereford, Sir Joseph Bailey, insisted on the multifarious impacts of the shortage of water on its town and its surroundings. The supply of water would of course become problematic.

The fisheries would suffer too – and they were usually, in those cases, the first to complain against the corporations and their waterworks plans. But he also added a very interesting remark on the aesthetic role played by the Wye in the economic development of the town. Eventually, in the final Act, the interests of the Wye fisheries were preserved, as well as those of numerous canal and railway companies, and the flow of water was regulated, with Hereford granted a very interesting rate on the water distributed by the corporation (Barclay, 1898). Of course, the main concern here was absolutely not environmental, but was turned towards the interests of industries or fisheries. Nonetheless, by maintaining a flow of water down the streams, those measures did preserve some environmental features.

Rights of Commons

The second domain in which what could be considered an environmental regulation was established concerned the rights of the commoners on the lands bought by the corporations in order to build their reservoirs and protect the purity of the water collected. The lands thus purchased were gigantic: Manchester bought 11 000 acres of drainage area around Lake Thirlmere, Liverpool more than 22 000 acres around the river and the lake Vyrnwy and Birmingham

more than 45 000 acres of gathering ground for the rivers Elan and Claerwen. That these corporations became such wealthy landowners worried some MPs, who wanted to protect the rights of the people on the commons thus purchased. Some talked about gigantic private enclosures.

The question naturally awoke the interest of the Commons Preservation Society, created in 1865 and which quickly became one of the leading environmental societies. Its founding member, George John Shaw-Lefevre, was a liberal-radical MP and systematically intervened to protect the rights of commons. He was mostly concerned with the rights of fishing or of grazing for instance, but he also fought to maintain a free public access to the places bought by the corporations, in order to allow recreation grounds for the growing British urban population. This was of course hardly acceptable for the corporations, who wished to preserve the quality of the water they were taking in those remote places, and thus refused any possible public interference. Here again, two different public rights were being opposed, and an arbitrary regulation was needed from the Parliament.

The Manchester Corporation Waterworks Act is the first to contain a clause preserving the right of access to the lands around the reservoir (Manchester Corporation Waterworks Act, 1879). But it is during the discussions on the Birmingham Corporation Water Bill, in 1892, that the question became prominent, due to the immense tracts of lands to be enclosed by the corporation. George John Shaw-Lefevre, and the other radical MPs of the House of Commons, strongly acted in favour of a regulation allowing access to the grounds secured by Birmingham, for instance during a long debate which included Joseph Chamberlain on the 11th of March 1892. Shaw-Lefevre rightly asserted that the enclosure of such lands was in direct opposition to the legislation and the practice adopted since the mid-1870s, thanks to the action of the Commons Preservation Society. His insistence was such that Chamberlain finally suggested a compromise and offered to include in the Bill what he called 'the 'Thirlmere' clause'. The Bill was sent to a Committee and, thanks to the action taken by the CPS, the act finally included such a clause. The corporation was allowed to make bylaws, strictly regulated—they had to be agreed by the Board of Agriculture—to maintain the purity of its water and control the rights of the public and the commoners.

Landscape preservation

The third domain in which an environmental regulation was decided concerned the preservation of landscapes. The reservoirs built by the great cities were often situated in some of the most scenic regions of the country, and mainly in Wales and the Lake District. Surprisingly, no aesthet-

ic debate occurred in 1880 or in 1892 when Liverpool and Birmingham respectively drowned the Welsh valleys of Vyrnwy and Elan, whereas such fierce debates aroused in 1879 in the case of Lake Thirlmere which was to be transformed in a reservoir by Manchester. The explanation for these different attitudes is to be found in national(ist) considerations.

The debates which took place on the Thirlmere case were indeed of the utmost importance in the building of an environmental movement in England (Mathis, 2009), as it opposed Manchester, considered as the embodiment of the modern and industrial world, to the Lake District, seen, since the poet Wordsworth, as one of the cradles of English identity. Manchester was accused of defacing the region by raising the level of Lake Thirlmere, thus destroying its natural features, and of intervening, for commercial reasons, in a region which should be considered, to quote Wordsworth, 'a sort of national property', and protected as such. Though Manchester was finally authorized to take water from Lake Thirlmere, the Parliament decided to include a clause in the Manchester Corporation Waterworks Act of 1879, stating that 'all reasonable regard shall be had to the preservation, as well for the public as for private owners, of the beauty of the scenery of the said Lake District' (Manchester Corporation Waterworks Act, 1879).

The victory of the environmental movement can be explained here by the particular place of the Lake District in the public imagination, as one of the vestiges of English identity. This also explains why the cases of Vyrnwy and Elan, in Wales, raised far less problems on the aesthetic ground: they did not play, for a mainly English Parliament, that important a role in the national culture. Moreover, even the Welsh MPs did not fight on that ground. As no particular value more than aesthetic was attached to these places, the Manchester Clause could not apply to them.

Conclusions

National regulation was needed for four reasons: the effect of water works of one city on the delivery of water to other cities, protecting traditional industries like fishery, regu-

late industries affecting the waterflows for energy purposes and finally for environment reasons of the reservoirs themselves. At first, solutions were sought in informal rules and codes of conduct between rival cities; however, these solutions tended to forget the local populations nearest to the water reservoirs. This was very unsatisfactorily and, therefore, national government had to intervene. Water supply shifted from a private undertaking to inter-municipal and finally to a matter of national interest.

Municipalisation thus raised a few environmental problems in the case of water supply by huge reservoirs, though it was a great improvement from supply by private companies. Despite the success and the growing influence of the environmental movement, most of those problems persisted far ahead in the twentieth century: in 1964-1965, for instance, the building of Keilder Water reservoir by the Tees Valley and Cleveland Water Boards raised strong opposition from botanists and ecologists (Sheail, 2002). Hence, the issues of nineteenth century Britain are still relevant today. ★

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