

# Competition in Railway Services – Historical Experience and Limits of Contemporary Development in the Czech Republic<sup>1</sup>

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## **Abstract**

The question to be examined in this paper is empirical evidence of path dependence of the Czech railways network, i.e. the question whether a way of founding of a particular line influence its economic efficiency and in that way the potential competition of train-operated-companies on it? The study is divided into three parts, beginning by an outline of the most important principles of competition – the competition in the market, and the competition for the market. Further, eight ways of the origin of Czech railways is set out with regard to their present importance: it is presupposed that the way in which a given railway was established predestines its economic efficiency and in that way the potential competition for the market.

## **Introduction**

Liberalisation and privatisation are the basic principles of contemporary reforms of railways in the EU (*European Conference of Ministers of Transport 1993, European Commission 2001*). Liberalized transport services operated by private companies are viewed as a precondition of economic efficiency – contrary to a past experience of strong state regulation of railway services that created inefficient monopolies. The aim of liberalisation and privatisation is a higher level of economic efficiency of the transport services by means of a higher level of economic competition. The competition is often viewed as an instrument *per se* – i.e. the ability of competition to promote efficiency of services' production is generally presupposed (e.g. *Campos – Cantos 2000, Estache – Rus 2000*).

However, the competition is not natural within the railway service market. There are many differences and divergences, compared with other kinds of services. Railways are very specific even in comparison with other modes of transport; at the same time, transport services are a relatively specific part of the services segment, and services as such have striking peculiarities compared with general markets of goods. Historical experience verifies this notion – Gladstone in 1844 wrote: "Railway competition are like lovers' quarrels – *breves inimicitiae, amicitiea sempiternae*" (quoted by *Cohn 1908, p. 520*), later *G. Cohn (1908, p. 524)* noted: "Free competition in the true sense of the term has never existed in the English railway system," and finally *E. B. Biggar (1917, p. 150)* commented on the situation in Britain at the turn of the 19<sup>th</sup> century: "... the waste of time, labour, money, and material in the illusory 'competition' of the private companies (...) has been demonstrated beyond question in the marvellous achievements under unified national control." The number of specific initial conditions means that a very abstract model can only be used with considerable difficulties to formulate alternatives of strategies of transport policy; it can only explain the function of a partial segment of railway transport (*Campos – Cantos 2000, p. 171*). That is why it is neither easy nor straight to use formal rules of competition as a tool to promote railway transport services' efficiency. The traditional point of view of competition has led to the presumption that railways operate within the condition of natural monopoly.

Anyway, speaking about railway transport services, two basic forms of competition can be distinguished there: competition in the market, and competition for the market (*Estache – Rus*

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2000, *Quinet – Vickerman 2004*). It is absolutely essential to emphasise which category of the competition is being talked about. Present strategies of railway reforms (as many studies show – e.g. *Nash-Rivera-Trujillo 2004*) are based on competition for the market for train-operated-companies (TOC) as the general principle<sup>2</sup>. But what is the framework the TOCs are competing within? The framework of the railway service market is formed (or should be formed – as the EU railway reform’s strategy requires) by the railway network separated from the operations and regulated and (usually) owned by the state. That means, nowadays, that TOCs are about to compete for the market which is created by the railway network established 170 years ago. The core question is whether the network is something to be competed about. Naturally, there is no question of the technical condition of the infrastructure (even if the infrastructure is generally heavy underinvested as for Eastern Europe), the problem is the network itself – its compactness, its shape, connected points (places), its capacity, lines’ duplicity, congestion etc. The right question is whether the network is suitable for the TOCs’ business plans, as well as for potential passengers’ willingness. The bigger the gap is between the network’s possibilities (limits) and TOCs’ / passengers’ demand, the higher is the level of the network’s imperfection (i.e. inefficiency). Speaking about the government’s transport policy, the level of this inefficiency correlates to the amount of public subsidy the government pays to private TOCs to operate non-profit lines.

The initial study I present here is divided into three parts, beginning by an outline of the most important principles of competition – the competition on the market, and the competition for the market. Further, I have set out eight ways of the origin of Czech railways with regard to their present importance. It is presupposed that the way in which a given railway was established predestines its economic efficiency, as well as its social significance within the national economy – and in that way the potential competition for the market. Each way of railways’ origin is elaborated in the second part of the study; resultant network of given railways according to their origin is compared with the density of transport on the Czech railway network. The last part of the study (conclusion) analyses the relationship between the identified ways of railways’ origin and the major presumption of their economic efficiency nowadays – their density of transport. The aim is to examine whether the present state of railways (regarding a potential competition for the market) is affected by their history. The study may offer an alternative view of a railway transport’s deficiency and may stimulate the debate on structure and quality of railway networks.

### **1. Methodological concept**

Analysing deficiency (i.e. defect) of the network, quite interesting questions appear: why the network is not efficient (i.e. perfect)? Was the network perfect at the time of origin? What are the explanations of the defects? Is it possible to overcome these defects? Will introduction of competition for the market bring efficiency of transport services? Will it bring about a greater demand for railway services? The questions above could be answered taking into account the railway network’s history. Railway networks were created in two ways: (i) the state had planned lines and then built tracks on its own account (to run trains or to licence services) or it gave over concessions to private companies to build tracks according to orders; or contrary (ii) the state gave over privileges to private companies to plan, build and run railways without any restrictions as for route planning. As for continental Europe, the state usually combines both these attitudes towards the network creation, from the middle of the 1800s the first way prevailed. Anyway, both the forms of competition appeared at the same time. The principle

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<sup>2</sup> Actually, there are two levels of competition on the railway service market: the one between TOCs, and the other between railways and other transport modes (especially coach services and air transport). The first of them only is discussed in this paper.

of competition in the market influenced the creation of the network: railway companies competed with each other in building their own parallel (duplicate) lines.

The hypothesis to be examined in this paper is an empirical evidence of path dependency of the Czech railways network, i.e. the question whether a way of founding of a particular line influences its economic efficiency and in that way the potential competition of TOCs' on it. The study is of relevance because the Czech Republic is carrying out reforms of railway transport nowadays, attempting to improve efficiency of the railway services by means of competition. The economic efficiency of railways - in principle - doesn't depend on direct costs only (i.e. on operation costs), but on the network's shape and suitability as well. Previous studies (for a review see *Nash et al. 2002*) have suggested that efficiency of railways is connected with a shape of a railway network by means of economies of scale, density of transport, and network effect. Many studies report the density of transport is the major factor to make profit from railway operations (first analysed by *Keeler 1974*); other factors – economies of scale, network effect – are strong connected or simply based on the density of transport (*Caves – Christensen – Swanson 1980, Winston 1985, Katz – Shapiro 1985, Walker 1992, Callan – Thomas 1992, Cantos 2000*). Even though the impact of history on the present state of railways is not easy to determine, the aim of this study is to elaborate on the idea that “history matters” – i.e. development of the network affects efficiency of operations at present. This interpretation is supported by earlier work of e.g. *Liebowitz – Margolis 1995, or Puffert 2002*.

Figure 1.1. The Czech railway network.



Resource: ČD – Czech Railways

The problem of the network's imperfection could be shown on the example of the Czech Republic. Czech railways belong to the oldest on the Continent, the density of the Czech network is one of the highest (see Figure 1.1) – but the network's shape and other attributes are inferior. The origin of the problems is – I assume – the way of the network's creation and development. As for the shape of the Czech railways network, the most important was the

period of the Austro-Hungarian Empire (the 1800s): the state changed the basic principles of the railway policy four times during 50 years. These changes – followed by the changes of political borders – resulted in an incompatible railway network consisting of several kinds of lines.

The way of origin of the Czech railways could be divided into eight groups. Making that division I take into account the principal purpose of establishing a given railway (line). I have also confronted the purpose with the present conditions. The consequent distribution of the ways of origin is as follows:

A – Railways built as an economically efficient business

1. Lines built by private companies to make a profit (other than in the groups B and C)
2. Lines built by the state as backbone lines

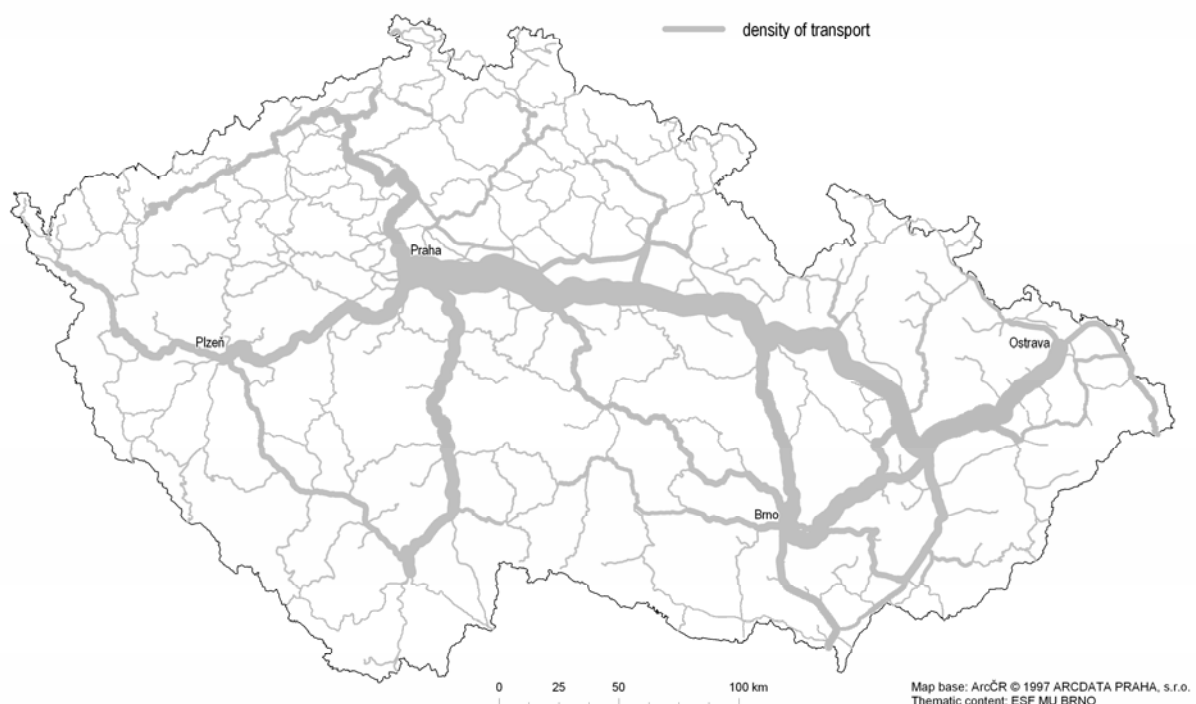
B – Railways built as an economically inefficient business

3. Lines built by private companies as duplicate connections
4. Lines built by private companies on order from the state for strategic and/or political reasons
5. Local lines built by private companies and supported by the state

C – Railways that began to be inefficient due to changes of external conditions

6. Coalmine railways (other than in section A)
7. Branch lines built by private companies without state support
8. Lines built in the time of different geopolitical circumstances

Figure 1.2. Density of transport on the Czech railway network.



Resource: ČD – Czech Railways

The analysis I have carried out in this paper is based on the following assumption: parts of the Czech railway network that were built as inefficient lines or became inefficient lines due to changes of external conditions (i.e. railways included in the groups B and C) will be

deficient even after the privatisation and liberalisation of services. TOCs will be interested in operating such lines only if the operations are heavily subsidised by the state. The analysis results in finding that there is a big disparity not only between services – e.g. between city-suburb transport and long-distance inter-city transport – but between parts of the network, too. It is clear that we can easily see this disparity when measuring the density of traffic<sup>3</sup> on the network (see Figure 1.2). The reason why I take into account historical circumstances of particular lines' origin is the fact that the effect of privatisation and liberalisation of services is often overvalued by the government and other authorities. Naturally, it is a pretty hard work to predict the effect of liberalisation on the service's efficiency – I do not doubt about the general positive influence of competition on the service's efficiency, but in the case of the Czech railways this effect will work very differently within the network. The analysis of the lines' origin can help to understand these differences and to predict potential changes in demand for transport services.

## 2. Origin of the Czech railway network

### 2.1 Lines built by private companies to make profit

Private railways were built in Austria<sup>4</sup> at the very beginning of "the railway age" – i.e. between 1828 and 1841– without any state subsidy. The state licensed the railways without any restrictions or requests as for route planning. This means that the first lines were built clearly with regard to economic criteria and connected the most important cities of the economy. What is important, there were little to compete about as a railway service market was emerging gradually. The first railway was built from České Budějovice (Budweis) to Linz in 1828, crossing the Danube-Elbe watershed. The other railway – Kaiser Ferdinand Nord Bahn – connected Vienna with Brno in 1839. This railway became one of the biggest private enterprises on the Continent; finished in 1855, the line connected Vienna with Ostrava and Krakow. The next stage of building private railways began in 1855 and lasted till 1875. During this stage the state influenced routing of private lines according to political and strategic (nowadays we could say "public") concerns – e.g. passing a royal military stronghold, the line had to call there, etc. In return, the state began to support private railway companies using three ways: (i) guarantee of a minimal gain from invested capital (usually 5%), (ii) direct subsidy, and (iii) purchase of railway shares by the state. The first private railways were followed after 1855 by several private lines connecting Vienna, České Budějovice (Budweis), Plzeň (Pilsen), Liberec (Reichenberg) and other major cities.

The private railways built during the first or the second stage connected the most important regions of the country – speaking about economic, as well as political importance. During the last century a few was changed in this importance. Figure 2.1 shows the network of railways of the 1<sup>st</sup> group – these railways correspond to the lines of the highest transport density. 1,538 km of these lines were built between 1828 and 1874 with the average length of 102.5 km. As for competition, these railways competed in the market freely (during the second stage, they competed with some slight restrictions as for routing). Anyway, it could hardly be described as a throat-cut competition – the railway companies didn't compete each to other as the potential market was open and wide. Quite strong competition appeared in that time between railways at the one side and road service and navigation at the other side – this development was naturally based on technological advantage of railway transport. The network was shaped according to demand for transport services – what's the most important there was not (and

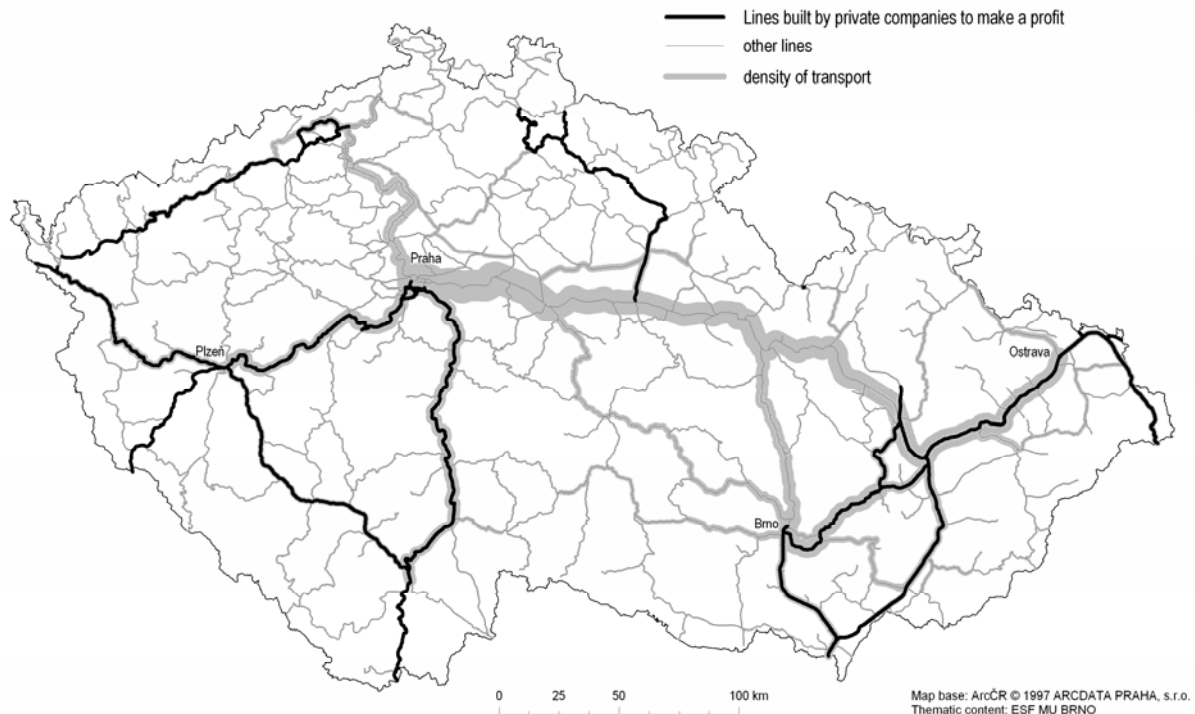
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<sup>3</sup> The density of transport measures a relative volume of transport operations on particular lines; for further quantitative analysis more exact data are required.

<sup>4</sup> The territory of the Czech Republic belonged to the Austrian Empire till 1918.

still is not) the reason for any change of the demand other than a switch from the transport mode to another<sup>5</sup>. According to the initial assumption, this part of the network could be suitable for TOCs to compete for the market.

Figure 2.1. Lines built by private companies to make profit.



## 2.2. Lines built by the state as backbone lines

The state changed its policy towards the railways completely at the beginning of the 1840s: the empire's authorities decided to build the railway network on their own account. The first state trunk line was opened in 1841 and connected Prague with Vienna via Olomouc. The next line, opened in 1849, made this connection shorter via Brno. The last state line was opened in 1850, connecting Prague with Dresden via Podmokly. The capital of Austria – Vienna – was connected with the Saxon capital – Dresden, and the capital of Prussia – Berlin. As for the Czech network, the lines made a real transport backbone of the economy from the west to the east, connecting the major north-south line from Vienna to Krakow.

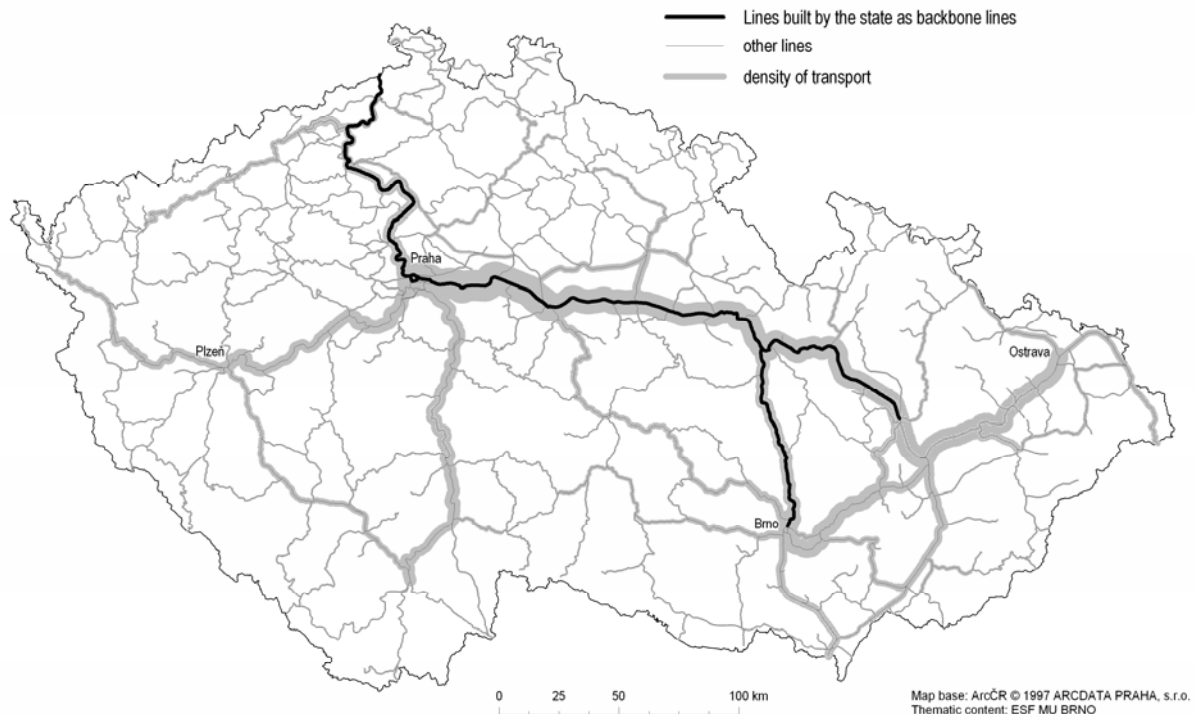
No other state railways were built after 1850. The Austrian state budget became short of money quite quickly (due to huge military expenses) – that is why the state changed its railway policy again (and again completely): further development of the railway network was based on private enterprise, slightly regulated and supported by the state (as I described in the section above). 472 km of the state trunk lines were built between 1845 and 1850 in the average length of 157.3 km. Figure 2.2 shows the network of railways of the 2<sup>nd</sup> group – again, these railways correspond to the lines of the highest transport density. As for competition, there was no competition in the market because the lines were planned and built by the state. These lines created the basic (backbone) network connecting the major economic and political centres – the demand for transport services was ensured, there is no reason for

<sup>5</sup> The competition of the other transport modes (road, air) is conducive uniformly to the network – so that I eliminate it as for this analysis.



any change of demand today (other than the switch to other transport mode as I mentioned above). According to the initial assumption we can again conclude, that this part of the network could be suitable for TOCs to compete for the market as well.

Figure 2.2. Lines built by the state as backbone lines.



### 2.3. Lines built by private companies as duplicate lines

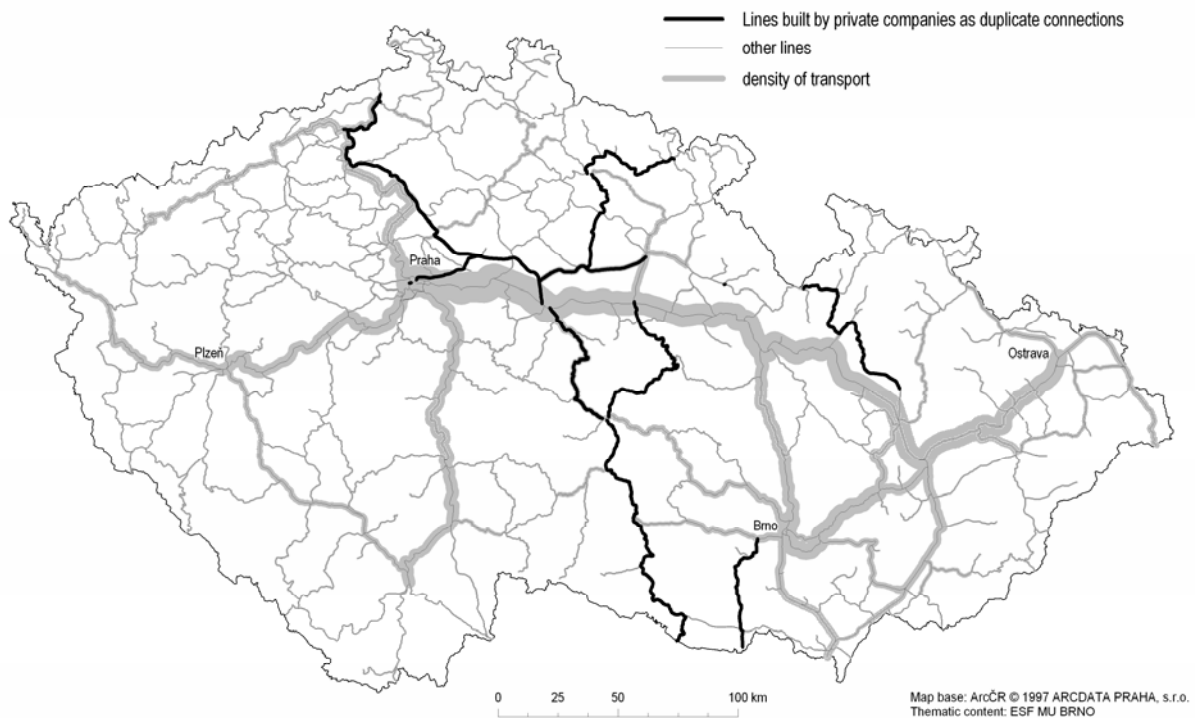
Railmania seized Austria in the 1870s; railway companies expanded their lines, trying to exploit the network effect and/or economies of scale. Because the most profitable (i.e. the most efficient) lines had already been engaged, the companies tried to find alternative connections between connected places, i.e. duplicates of existing profitable lines. The problem was the fact that there was no competition for the market there – just competition in the market. Each railway company owned its own infrastructure (tracks and signalling) – sharing a particular track together with another company was not an option. Let us take into account that at the same time the state subsidised private companies to build and run its own lines. That all together led to establishing many duplicate lines. Their existence resulted from competition in the market – but in unequal conditions (due to non-transparent interventions and support of the state).

The major problem of duplicate lines is their operational inefficiency, as the lines were built on less convenient grounds. The very typical duplicate lines were built by the Österreichische Nordwestbahn company at the beginning of the 1870s. The lines connected Vienna with Dresden, crossing the Moravian Highlands and by-passing Prague – that is why the lines recorded less operational efficiency and less density of transport.

Figure 2.3 shows the network of railways of the 3<sup>rd</sup> group – these railways correspond to the lines with low density of transport. 801 km of these lines were built between 1869 and 1874 in the average length of 101.1 km. This part of the network resulted from a very strong competition in the market – however, the competition had evolved under special

circumstances which I mentioned above (non-transparent subsidy from the state). Nowadays, there would be little interest of TOCs to compete for the market there; in the same time the state will not be probably interested in support of these lines due to their little public importance.

Figure 2.3. Lines built by private companies as duplicate connections.



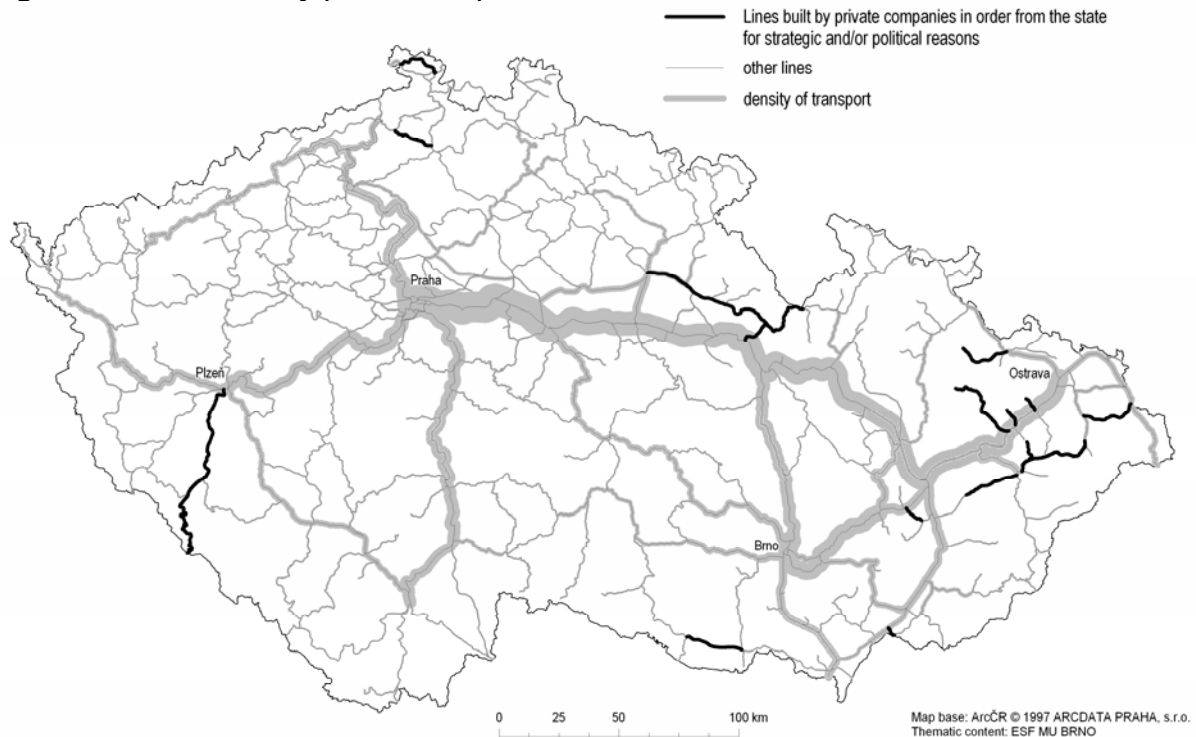
#### **2.4. Lines built by private companies on order from the state**

The state – especially the military authority – recognised the importance of railways for transport of troops during a war time (namely after the lost war against Prussia in 1866). That is why the state charged railway companies to build on their own account several lines which had little economic but great strategic sense. Inefficient lines and/or duplicate lines appeared within the Czech network. One of the longest duplicate strategic lines built according to the political order doubled the old line from Vienna to Krakow along the section which went too close to the Prussian frontier. Several other lines had to be built to reinforce connection with strategic friend-countries – Bavaria and Saxony. All of them went across hilly areas – these lines have little economic importance but high operating costs.

461 km of these lines were built between 1870 and 1892 with the average length of 30.7 km. Figure 2.4 shows the network of railways of the 4<sup>th</sup> group – these railways correspond to the lines with a low density of transport. As for competition, there was not any competition in the market there and there will hardly be the competition for the market there. TOCs will not be interested in operating on these lines, authorities will not be (or should not be) interested in subsidising operations on these lines.



Figure 2.4. Lines built by private companies in order from the state.



### 2.5. Local lines built by private companies and supported by the state.

The building of main lines was nearly completed at the end of the 1870s, but a lot of towns still lay out of the railway network. There was a problem there because connecting of these towns with the main lines of the network was not seen as a good business – that is why it was hardly possible to involve private capital in such business without any state support. To solve the problem the state issued a special law in 1880 which supported building of the 2<sup>nd</sup> class railways – i.e. local, branch, regional lines etc. The support had two forms: (i) financial subsidies, and (ii) technical allowances. As for the financial subsidies, the state guaranteed a minimal gain from invested capital, supplied railway companies with capital (a company had to invest 25% of the total amount of capital only, the rest was provided by the state without interest), the loan had to be paid back in 90 years, and so on. As for the technical allowances, local railways could be built according to lower standards compared with main lines: light track, turns of small diameter, slope up to 50%, maximum speed up to 15 mph, no signalling due to a presupposed low density of transport (of about 1 or 2 pairs of trains a day). As for planning and building the local railways, the key role was played by local lobbies: there had to be someone there interested in building a local line to make an extra profit from the new line – an owner of a local (usually small) factory, sugar mill, sawmill, quarry, etc. as well as a big farm. An important role was played by local politicians as well – they tried to attract potential voters by giving them a gift: a new railway to their sleepy town. The principle of the state guarantee of the minimal gain from invested capital appeared to be an essential motive for building local railways. Comparing the local lines built in Bohemia<sup>6</sup> – where the gain was guaranteed – with local lines built in Moravia<sup>7</sup> – where the gain was not guaranteed – we can

<sup>6</sup> Bohemia was an autonomous part of the Czech lands surrounding its capital Prague.

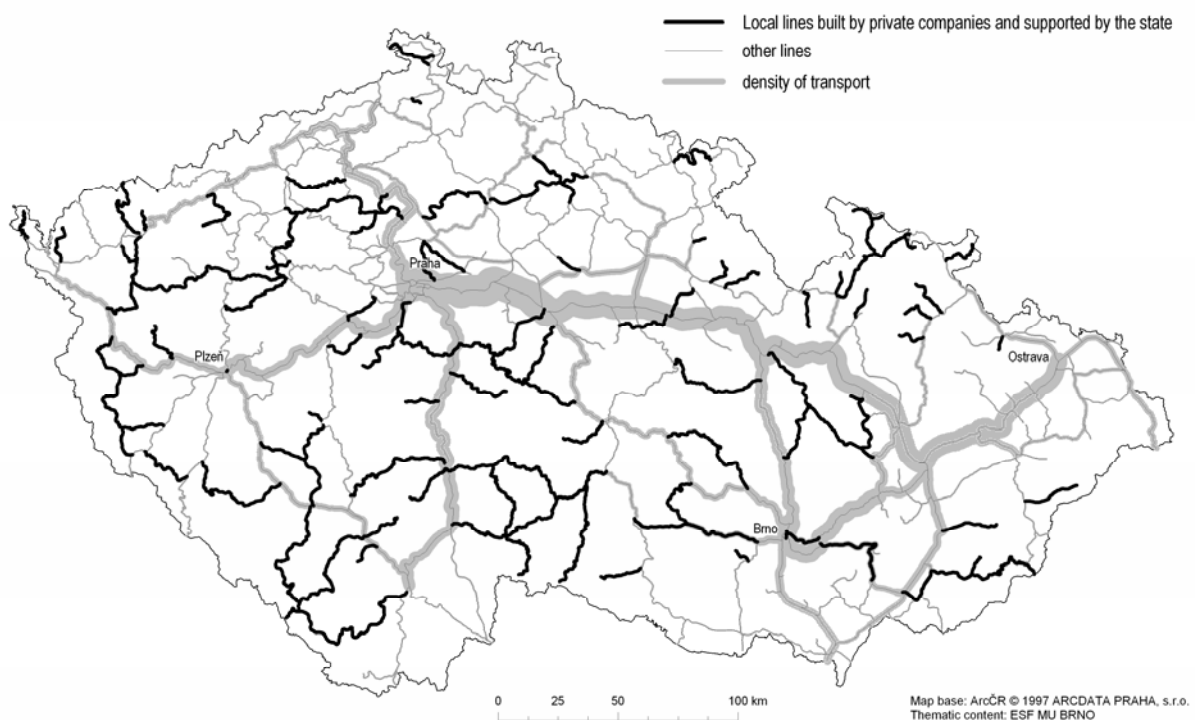
<sup>7</sup> Moravia was an autonomous part of the Czech lands surrounding its capital Brno.

see a significant difference: the total / average length of local lines in Bohemia was about 1,900 km / 33 km in contrast with 261 km / 14 km in Moravia.

Altogether, the local railways were built according to particular interests of local lobbies and politicians, but on the account of the state; at the same time the state had little chance to influence routing of the local lines. This development resulted in building local lines which were deficient even at the time of opening, which were able to pay back neither interest nor the credit from the state, and served not public demand, but private interest of local lobbies. Not surprisingly the local railways are quite inefficient nowadays, as well as they were in the history (many empirical studies concluded this fact generally – e.g. *Gathon – Pastieau 1995* or *Campos – Cantos 2000, p. 233*).

3,039 km of these lines were built between 1871 and 1914 with the average length of 30.4 km. As for competition, there was a very strong competition for the state support there as well as the competition in the market – but no competition for the market. Density of transport is low on the Czech local lines (see Figure 2.5), operating costs are comparatively high, as well as operation's inefficiency is quite high – that is why there will be little interest of TOCs to compete for the local lines' market if the operations were not heavy subsidised by the state.

Figure 2.5. Local railways built by private companies and supported by the state.



## 2.6. Coalmine railways.

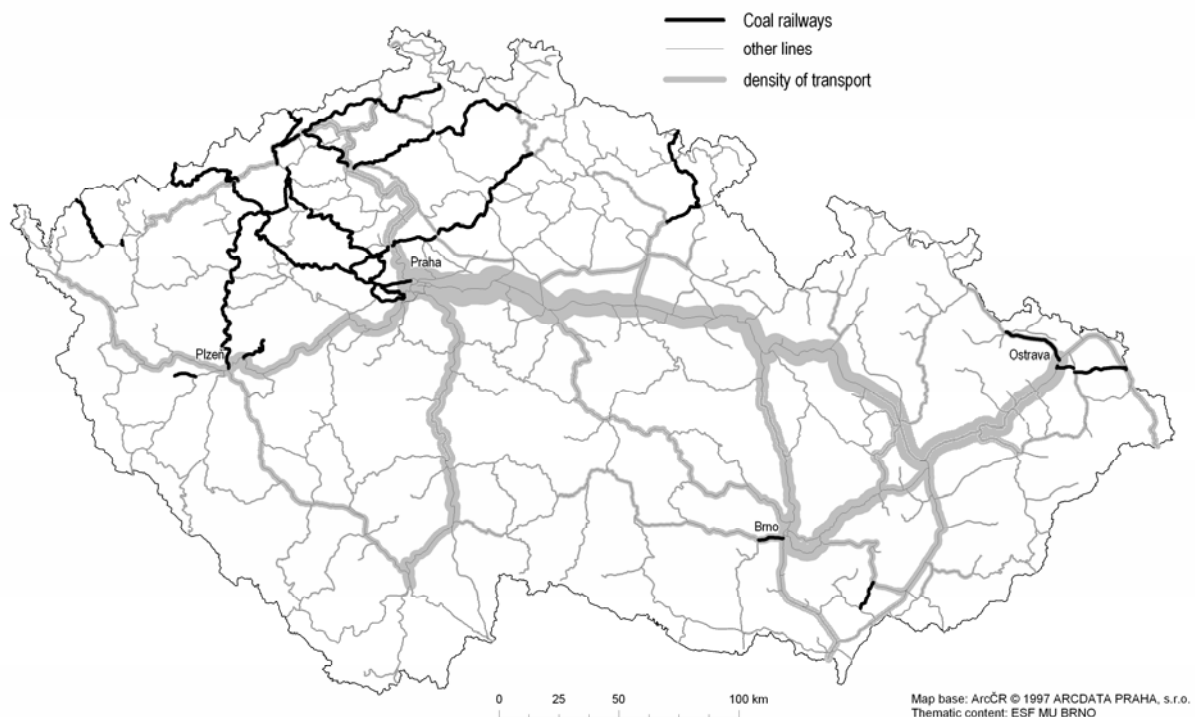
At the very beginning of the railway age many lines were built to connect coal mines with major cities and steel mills. Coal used to be the most important commodity transported on railways: coal was burnt in engines to move trains, coal became the only fuel in steel mills – and steel became the most important material for construction of rail tracks, as well as rolling stock (*Hlavačka 1990*) – most of industrial production was directly based on coal. It is clear then that building and running of lines to transport coal was a good business – coalmine railways were the most profitable ones in the 1800s (*Hlavačka 1990*). That is why there was

a very hard competition in the market: many railway companies tried to build a line connecting collieries with towns. The first lines were quite short (Brno – Rosice 20 km, Prague – Kladno 30 km, Pilsen – Stupno 20 km, etc.), later coalmine lines were built to farther destinations (Pilsen – Most 141 km, Řetenice – Liberec 145 km, etc.) and abroad, namely to Saxony. The competition between railway companies was neither even nor fair: the companies formed local monopolies buying collieries, excluded competitors (i.e. other mines) from the market by setting up high tariffs, or by lobbying for additional by-state-guaranteed privileges, etc.

Because the coalmine lines were so profitable, the competition in the market resulted in building several duplicate lines, connecting e.g. North-Bohemian mines with Prague four times and with Liberec twice. In the time when the whole economy depended on coal, all the coalmine lines were profitable, i.e. efficient – but there is little to transport nowadays: former coalmine lines cross the country by-passing towns and connecting collieries and steel mills which were shut down years ago. Of course, there are several important and profitable coal mines as well as steel mills and chemical works in present – these huge plants are well served by several main lines I gathered into the 1<sup>st</sup> and/or the 2<sup>nd</sup> groups: Prague – Olomouc, Břeclav – Ostrava, Ústí n/L – Chomutov, etc.

Figure 2.6 shows the lines of coalmine railways which were built just to transport coal (i) from collieries which were shut down, or (ii) to places where there is no demand for coal presently (i.e. big cities without heavy industry based on coal – chemical works, steel mills, etc.). 1,083 km of these lines were built between 1855 and 1911 with the average length of 47.1 km. Operating these lines is inefficient today, there is no relevant demand for transport services – the coalmine railways belong to the lines with the lowest density of transport. There will be little interest of TOCs to compete for the market to operate these lines – and there will be little interest of the state or local authorities to support operations on these lines.

Figure 2.6. Coalmine railways.

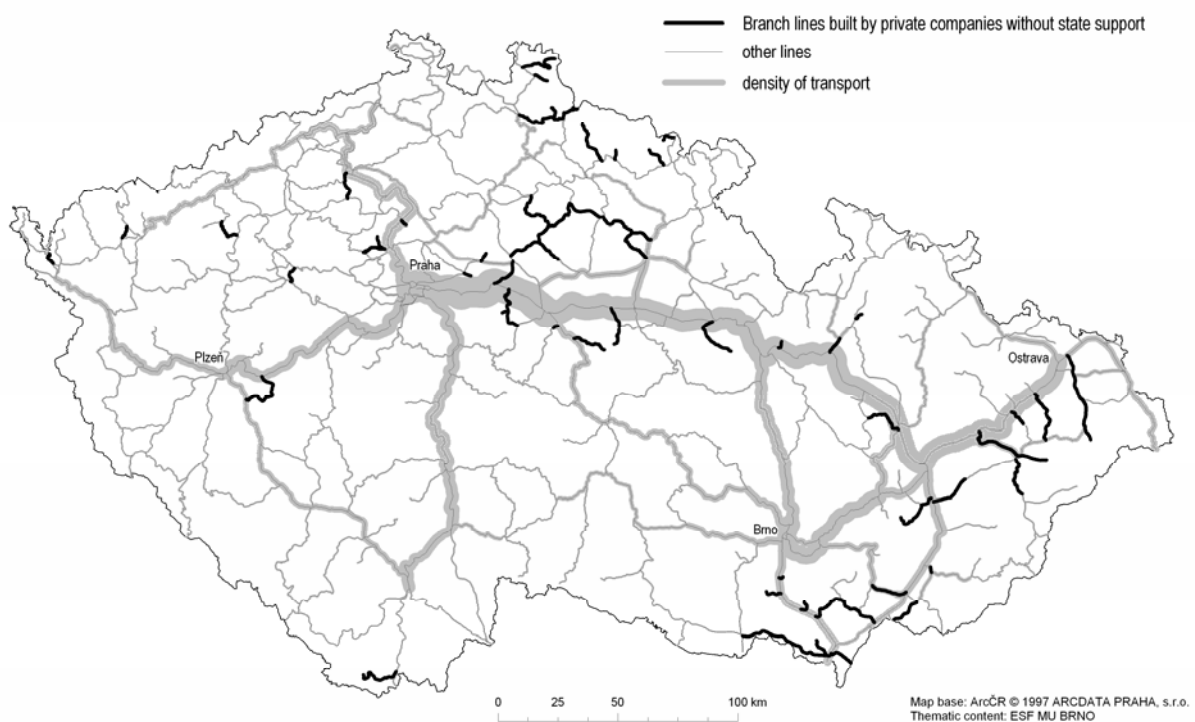


### **2.7. Branch lines built by private companies without state support.**

Railway companies built branch lines from 1870s, believing it would increase their income from network effect and give them a competitive advantage. It was believed that branch lines would attract further passengers and increase haulage on main (trunk) lines. Even if these lines were built by private companies without a direct state subsidy, the state supported them indirectly – by technical allowances in the same way I described in section 2.5, which in fact resulted in higher operational costs and lower effectiveness. As for the routing of these lines the major motive was the same as I described for the local lines: serving local factories, sugar mills, farms, etc. Putting together, the branch lines were built according to particular interests of a local-industry lobby, more or less affecting the density of transport on trunk lines. As for competition, there was a very strong competition in the market as railway companies tried to increase their network to the prejudice of the other competitors.

903 km of these lines were built between 1871 and 1911 with the average length of 15.3 km. Nowadays, the branch railways are quite inefficient, the density of transport is low there, (see Figure 2.7), operating costs are high – that is why there will be little interest of TOCs to compete for the branch lines' market if the operations were not heavy subsidised by the state.

Figure 2.7. Branch lines built by private companies without state support.



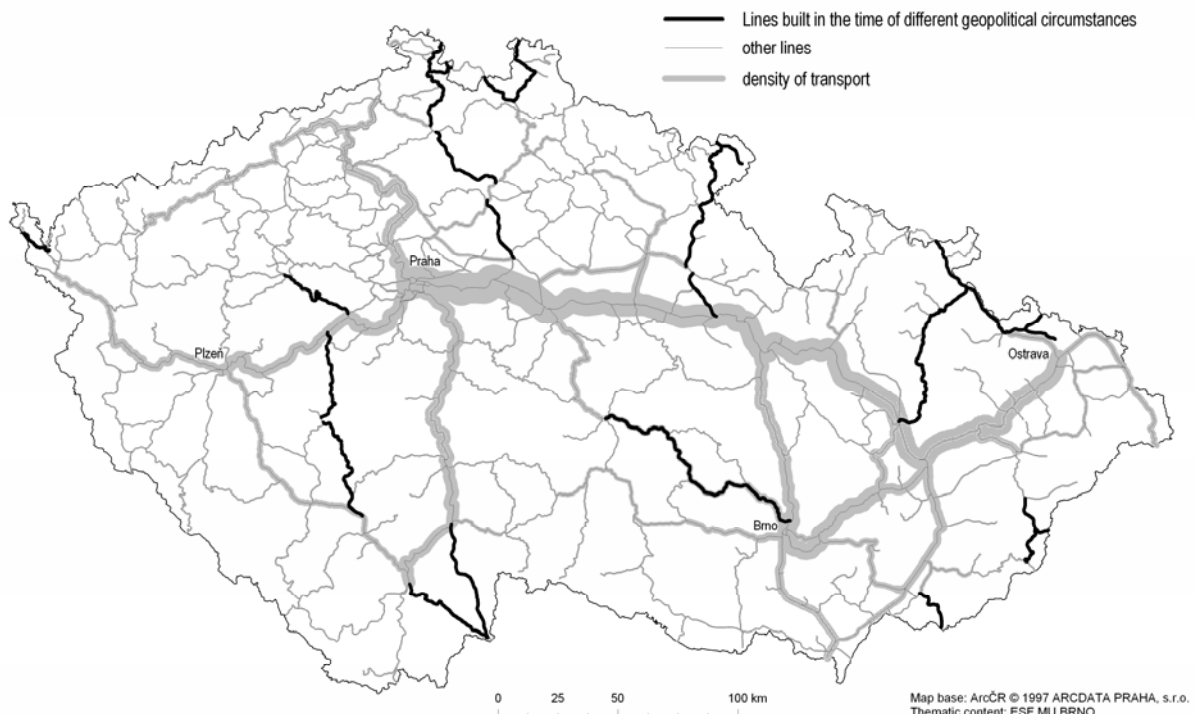
### **2.8. Lines built at the time of different geopolitical circumstances.**

The Czech territory went through difficult political development during the 1800s and 1900s – it used to belong to five entities: the Austro-Hungarian Empire, Czechoslovakia, the protectorate, Czechoslovak Socialist Republic, Czech Republic. This development was followed by (i) changes of frontiers, as well as (ii) changes of natural economic and social relations, and resulted in re-orientation of the routes of the main North-South connection (i.e. Vienna – Prussia / Galicia) to the East-West (Moscow – Slovakia – Prague); finally, the routes covered widespread destinations after the collapse of the Iron Curtain in 1989.

These changes resulted in construction of several lines which lost their importance in the following periods. Quite a long line (of the length of 150 km) was built to connect West-Bohemian towns (Rakovník and Beroun) with Vienna directly, i.e. by passing Pilsen, in 1876. The line is interesting because it was the only one built by the state on its own account after 1855 and before nationalisation in the 20<sup>th</sup> century. Other lines were built in Northern Bohemia (Sudetenland) to connect towns inhabited by German-speaking people with their neighbouring towns in Prussia and Saxony. Quite an important line (of course temporary only) was built by the state during the period of the protectorate in the 1940s. Nazi Germany annexed 35% of the Czech territory and many lines were disconnected, including the most important one from Prague to Brno and Ostrava. That is why the state decided to build a new line from Prague to Brno. Even though the total length (256 km) of the new connection is absolutely the same as the old one (built by the state in 1845), operating costs nearly tripled due to the crossing of the Moravian Highlands in the length of 120 km. Nowadays, the line is deficient, duplicating the backbone line, having a low density of transport. Similar lines were built to connect Slovakia after WW1 – and resulted in similar troubles.

914 km of these lines were built between 1859 and 1953 with the average length of 45.7 km. Times are changing. Some of these lines used to be subject to strong competition in the market and used to be quite profitable, some of them were built by order from the state and were never profitable. But all of them will be hardly efficient in the future – competition for the market would have to be heavily supported by the state. Figure 2.8 shows the network of railways of the 8<sup>th</sup> group – these railways correspond to the lines with a low density of transport.

Figure 2.8. Lines built at the time of different geopolitical circumstances.



## Conclusion

The aim of the study was to examine whether present state of railways (regarding a potential competition for the market) is affected by their history - empirical evidence validates this assumption. To conclude: comparing the density of transport on the Czech railway network



we can see the differences among the lines according to their origin. The railways of group A – measuring together 2,010 km – correlate to the lines with the highest density of transport (Figure 3.1), contrary to the railways of groups B and C – measuring 7,166 km – which correlate to the lines with a low density of transport (Figure 3.2). This finding corresponds to the initial hypothesis: if a given line was built as inefficient or if conditions of profitability waned, the line is inefficient at the present as well. I have found out that the deficiency of particular lines was affected by circumstances of competition in the market at the time of origin. Present-time strategies of revitalisation of railway transport are based on competition for the market – the study has shown a paradox in the Czech network: TOCs will compete before all for the lines which were not built as a result of competition in the market, i.e. the lines of group A. The lines whose origin resulted from a very strong competition on the market (as well as the lines which are odd nowadays – i.e. group 8) will be less interesting for TOCs to compete for the market.

This study does not claim to be able to solve the problem of railway networks by means of historical method. There are obvious limitations to historical method; discussion of them is beyond the scope of this study. However, the questions raised by this study warrant further investigation. The railway problem is a complex one – analysing networks, we should take into account their path dependence. Further research is required in order to quantify the effects discussed above. The conclusions presented here may have quite important implications for development of railways' reform strategies.

Figure 3.1. Lines of group A.

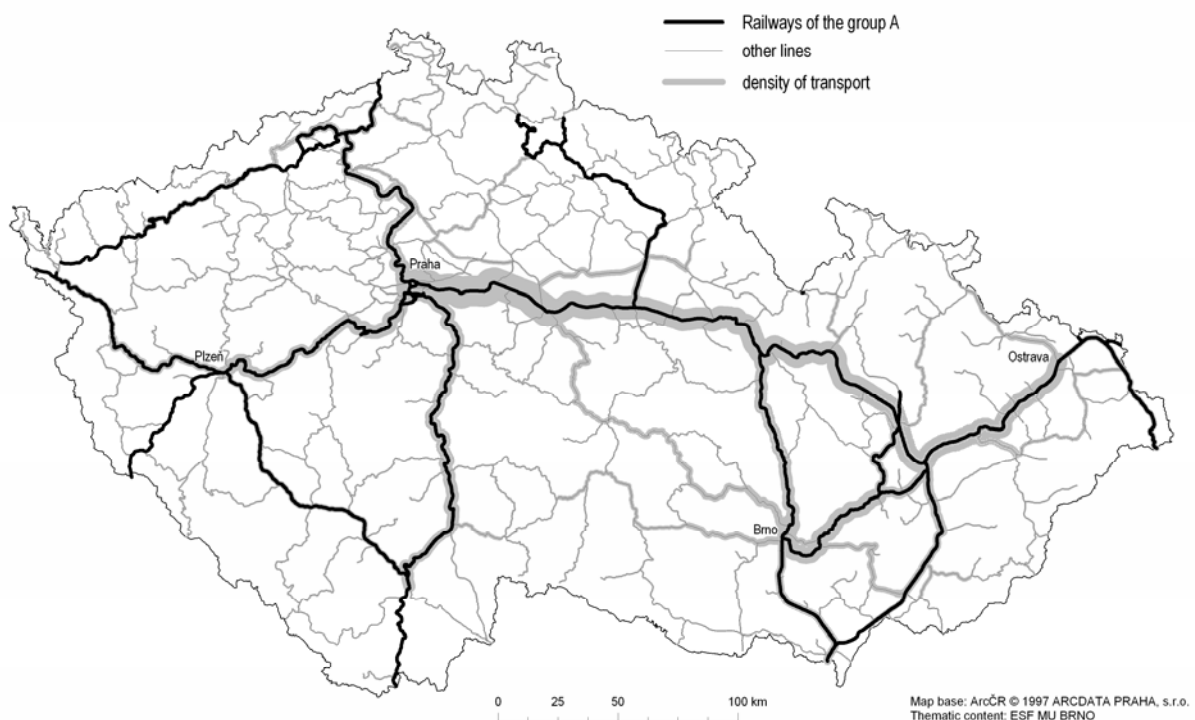
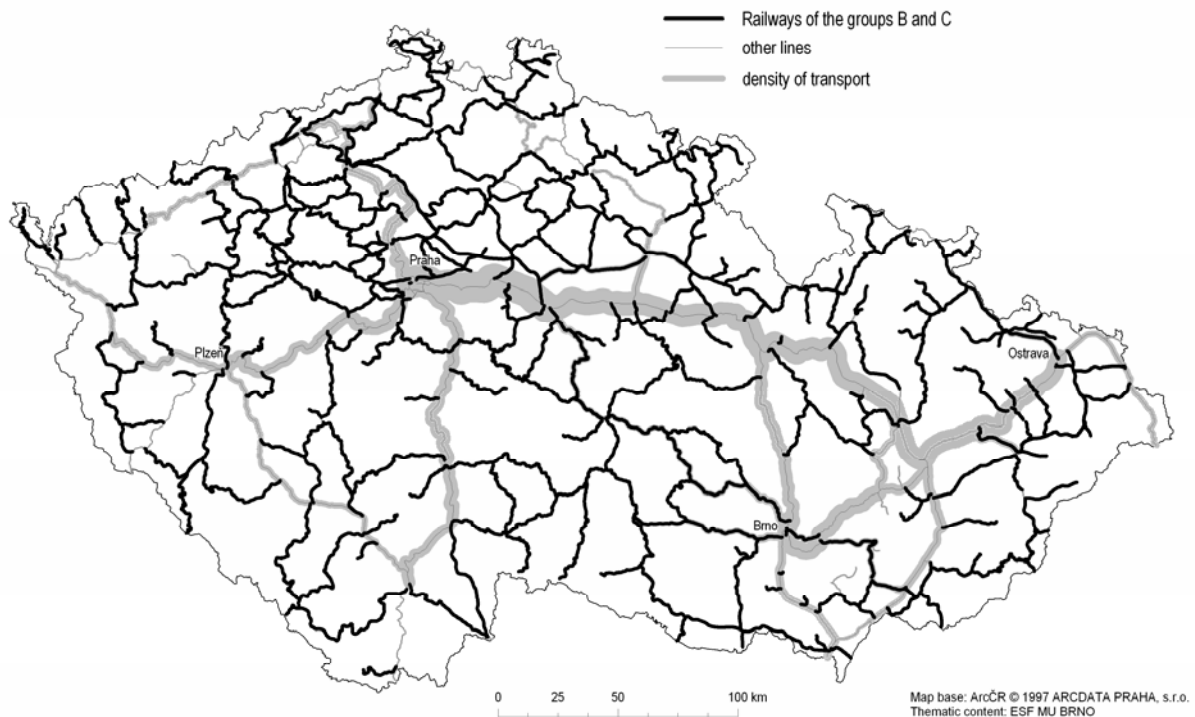




Figure 3.2. Lines of groups B and C.



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