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The transformation of urban transport in the Czech Republic, 1988–1998

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Abstract

Similar to virtually all formerly socialist countries in Central and Eastern Europe, the Czech Republic has been experiencing a transport revolution since the shift from socialism to capitalism a decade ago. From 1988 to 1998, per-capita car ownership rose by 63% in the country as a whole, and by 93% in the capital city of Prague. Vehicle km of motor vehicle use have more than doubled. Conversely, public transport usage has fallen considerably, by 26% in the country as a whole, and by 19% in Prague. This modal shift from public transport to the private car has resulted from increased incomes, access to Western markets, declining real prices of cars and petrol, removal of restrictions on manufacturing and importing cars, and the car's attraction as a symbol of freedom, affluence, and status. The sharp reduction of subsidies for public transport has forced increases in fares and service cutbacks, which have also encouraged the shift toward the private car. Although the private car is very popular, the sudden surge in car ownership and use has caused significant social and environmental problems: roadway congestion, parking shortages, increased traffic accidents, air pollution, and noise. Given their severe financial limitations, Czech cities are struggling to preserve their public transport systems while accommodating the immensely popular private car. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The Czech Republic has undergone a decade of dramatic change since the overthrow of Communism. The so-called “Velvet Revolution” in November 1989 transformed its political system almost immediately, returning democracy for the first time since March 1939. Economic and social changes have also been significant but more gradual. After various stages of privatization, deregulation, and subsidy cutbacks, the Czech economy is now based primarily on the private market. While that has enhanced economic freedom, innovation, and productivity, it has also engendered much greater inequality than during the socialist era, both among social groups and among regions of the country.

Following Communism's demise by about two years, the division of Czechoslovakia on January 1, 1993 also had important political and economic impacts. The Czech portion of Czechoslovakia (Bohemia and Moravia) had always been more prosperous than the Slovak portion in the east, even during the 19th Century in the old Austro-Hungarian Empire. In the first two years after Communism (1990–1992), the unemployment rate among Slovaks was more than twice as high as among Czechs, who also enjoyed

higher incomes. Moreover, Slovaks were slower to embrace the private market than their Czech cousins did. Indeed, former Communists remained in important government positions in Slovakia throughout the decade, hindering the quick adaptation to capitalism desired by most Czechs. The split of Czechoslovakia in 1993 enabled the Czech Republic to pursue an even more free-market-oriented course than previously. And it was no longer burdened by the massive transfer payments it had long made to the Slovaks to compensate for their weaker economy. That set the stage for an economic boom in the Czech Republic that lasted from about 1992 to 1996.

These two crucial events—the fall of Communism and the division of Czechoslovakia—had profound effects on transportation as well. As in other formerly socialist countries of Central and Eastern Europe, there has been a dramatic increase in auto ownership and use, while public transport use has fallen, both within cities and between them. The timing and extent of transport developments, however, has differed considerably from one country to another, and the case of Czechoslovakia and the Czech Republic is particularly interesting.

This article examines a decade of change in the Czech transport system from 1988 to 1998, focussing on urban passenger transport, but also noting trends in interurban and rural transport. It describes changes in both the supply

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Table 1

Trends in auto ownership in formerly socialist countries of central Europe (cars per 1000 population) (*Sources:* Adapted from Pucher, J. (1995), updated with data provided by ministries of transport of Poland, Hungary, Slovakia, the Czech Republic, and Germany. *Note:* Even before the division of Czechoslovakia on January 1, 1993, the Czech and Slovak Republics existed as administrative districts and had exactly the same geographic borders as currently)

Year	Country					
	Poland	Hungary	Czechoslovakia	Czech Republic	Slovakia	Eastern Germany
1970	15	22	64			65
1980	67	95	152			150
1985	98	135	180			199
1988	119	163	196	216	158	225
1990	138	189	211	233		296
1992	169	217	219	250	176	415
1996	195	220		325	191	455

and demand for passenger transport and considers alternative explanations for shifts in travel behavior, including changes in government policies. Of course, the sudden shift from public transport to the auto has also brought problems with it. The article describes those problems and examines alternatives for dealing with them. Finally, it assesses the future prospects of Czech transport.

The situation of the Czech Republic cannot be viewed in isolation, since developments there are part of a much larger overall transformation in Central and Eastern Europe. Thus, the article begins with a brief comparison of the Czech Republic with other countries in the region.

2. Overall developments in Central and Eastern Europe

The formerly socialist countries of Central and Eastern Europe have been experiencing profound social, economic, and political changes in the decade since the demise of Communism. The most dramatic changes were in East Germany, which underwent a thorough transformation upon reunification with West Germany in 1990 (Pucher, 1993, 1998). It entailed almost immediate adoption of the West German currency, legal system, economic system and most other aspects of West German life. The shift from socialism to capitalism was much more gradual in Hungary and Poland. Even in the 1970s and 1980s, Hungarians had increasing freedom to travel to the West, enjoyed a growing selection of consumer goods, and benefited in a variety of ways from their less repressive “Goulash Communism.” In Poland, the Catholic Church and the Solidarity labor union movement played important roles in countering the power of the Communist government, which was forced to make more and more concessions on political freedom, foreign travel, and civil liberties long before the total collapse of Communism (Pucher, 1995). Much more similar to the abrupt change in East Germany, the end of socialism came quickly and dramatically in Czechoslovakia. The so-called “Velvet Revolution” overthrew the extremely repressive Communist regime in November 1989 and almost immediately replaced it with a democratically elected

government favoring the private market and Western social values.

Other countries in Eastern Europe quickly followed suit, each with its own particular history of socialism’s decline and transformation to freer, more democratic, more market-based societies. The downfall of dictators in Rumania and Bulgaria brought quick ends to their regimes but a rather slow transition to the free market and democracy. The breakup of the former Yugoslavia permitted Slovenia and Croatia to emerge as independent countries and return to capitalism, democracy, and their historical ties to the West. Even more dramatic, the breakup of the former Soviet Union yielded the Baltic States, Ukraine, Belarus, Georgia, Russia and many other countries which to differing degrees took the opportunity to transform their economic, social, and political systems.

Without exception, the political and economic changes in Central and Eastern Europe have been producing an equally striking transportation revolution. As shown in Table 1, levels of auto ownership have grown substantially since 1988. The largest and quickest increase was in the former East Germany (+102%), primarily due to the higher incomes there, and also the massive transfer of funds from West Germany to support monetary union and economic development. Poland had the next fastest growth (+64%), followed by the Czech Republic (+50%), Hungary (+35%), and Slovakia (+21%). These rates are averages for the entire period 1988–1996, however; they do not reflect the different timing within that period. In fact, auto ownership in Czechoslovakia grew modestly until 1992—by 12%, compared to 33% in Hungary, 42% in Poland, and a whopping 84% in the former East Germany. After 1992 auto ownership accelerated in Czechoslovakia (especially in the Czech Republic), rising by 30% in the four years from 1992 to 1996, while growth in auto ownership slowed down sharply during the latter period in Hungary (1%), Poland (15%), and Eastern Germany (10%).

Corresponding to growth in auto ownership, public transport use has been falling throughout Central and Eastern Europe. Again, the former East Germany led the way, with a loss of 56% of its public transport passengers in the

Table 2

Comparison of car ownership levels in formerly socialist countries of central and eastern Europe, 1996. (Sources: International Road Federation, *World Road Statistics*, Washington, DC, 1997; World Bank, *World Development Report*, Washington, DC, 1998)

Country	Cars per 1000 people	GNP per capita (in US dollars)
East Germany	455	15,498
Slovenia	331	9680
Czech Republic	325	5200
Estonia	251	3390
Hungary	220	4430
Bulgaria	203	1140
Poland	195	3590
Latvia	194	2063
Lithuania	194	2230
Slovakia	191	3700
Croatia	159	4610
Macedonia	131	1090
Rumania	106	1420
Belarus	94	2150
Georgia	81	840
Russia	78	2740

four years from 1988 to 1992. Hungary and Poland also suffered losses (14 and 33%, respectively). In sharp contrast, Czech ridership hardly fell at all, declining by only one percent between 1988 and 1992. But just as auto ownership in the Czech Republic rose rapidly after 1992, public transport use fell sharply between 1992 and 1996 (by 28%).

Increased auto use and declining public transport use

Table 3

Growth in auto ownership in Prague and the Czech Republic, 1975–1998. (Source: Institute of Transportation Engineering of the City of Prague; *Data o Doprave v Praze*, Annual Reports, 1988–1998)

Year	Auto ownership per 1000 population	
	City of Prague	Czech Republic ^a
1975	151	129
1980	235	170
1985	256	198
1988	265	216
1990	276	233
1991	283	241
1992	292	250
1993	324	266
1994	418	287
1995	443	302
1996	489	325
1997	502	344
1998	511	352

^a Car ownership figures for the Czech Republic prior to 1990 were estimated on the basis of actual car ownership rates for the former Czechoslovakia in each year and the ratio of car ownership rates between the Czech and Slovak portions of the country in 1990. Thus, the figures for years prior to 1990 are rough approximations. From 1990 onward, the reported values represent actual, not estimated, rates for the Czech Republic. Although Czechoslovakia did not split up until January 1, 1993, separate statistics were kept as early as 1990.

have obviously affected modal split distributions. Over the entire period from 1988 to 1996, public transport's share of motorized urban trips fell from 79 to 50% in Poland, from 80 to 52% in Hungary, from 78 to 55% in the Czech Republic, and from 52 to 22% in Eastern Germany. Again, the modal shift in the Czech Republic was small until 1992 (78 to 75%) but has accelerated since then, with public transport accounting for only 55% of all motorized trips in 1996 (Pucher 1997). The reasons for the different timing in the Czech Republic are examined later in this article.

Table 2 shows the latest available statistics on auto ownership for a broader group of formerly socialist countries. The former East Germany is clearly at the top of the list, with 455 cars per 1000 inhabitants in 1995. Slovenia and the Czech Republic are in the next tier, with 331 and 325 cars per 1000 population, respectively, roughly a fourth less than Eastern Germany. Estonia and Hungary form the next group (mid- to lower 200s). Bulgaria, Poland, Latvia, Lithuania, and Slovakia are in the next tier, hovering around 190–200 cars. At the bottom are Belarus, Georgia, and Russia, all parts of the former Soviet Union, with fewer than 100 cars per 1000 inhabitants.

Even during the socialist era, there were large differences in auto ownership and use among these countries. Since the end of Communism, auto ownership has increased greatly in all the countries, but large differences among countries persist. Clearly, those countries with the highest incomes, closest ties to the West, and most market-oriented economies have the highest levels of auto ownership. With the exceptions of Estonia and Bulgaria, the farther a country is located from Western Europe, the lower is its stock of cars per capita. Thus, the wave of motorization and declining public transport use has generally been moving from west to east.

Throughout the world, there is a strong correlation between income and auto ownership, and Table 2 clearly shows a positive relationship. There are some anomalies, however. For example, Bulgaria reports a much higher level of car ownership than one would predict on the basis of its low income. By comparison, Russia and Belarus have lower levels of car ownership than might be expected from their incomes. To some extent, the problem almost certainly is inaccurate data, both for car ownership and for per-capita income. The sources used for Table 2 are the best available (International Road Federation, 1997; World Bank, 1997).

3. Transport trends in Czechoslovakia and the Czech Republic

This section examines in greater detail the specific situation of transport in the Czech Republic. As shown in Table 1, auto ownership had been increasing considerably even during the socialist 1970s and 1980s. From 1970 to 1988, per capita car ownership tripled in Czechoslovakia (including Slovakia)—from 64 to 196 cars per 1000 persons. Car

Table 4

Growth in auto traffic in Prague, 1961–1997. (Source: Institute of Transportation Engineering of the City of Prague; *Data o Doprave v Praze*, Annual Reports, 1988–1997)

Year	Vehicle km of auto use (in millions)	Percent of 1990 auto use
1961	2273	31
1971	5061	69
1981	5562	76
1990	7293	100
1994	11,619	159
1995	12,961	178
1996	13,896	191
1997	14,878	204
1998	17,430	239

ownership continued to grow after the fall of socialism, but the increase was surprisingly slow until 1992. Between 1988 and 1992, the rate of car ownership rose by only 12% in Czechoslovakia as a whole, and by only 16% in the Czech portion of Czechoslovakia. Between 1992 and 1998, auto ownership and use skyrocketed, with a 41% increase in per-capita auto ownership in the Czech Republic (excluding Slovakia).

The sudden jump in car ownership around 1992 has several possible explanations. In 1992 the Czech Government liberalized its regulations for importing cars from Western Europe, thus increasing supply and reducing the price for Czech car buyers. In addition, 1992 was the last year the standard Czech car, Skoda Favorit, was manufactured. It was much cheaper than its successor, the Skoda Felicia. Many Czechs rushed to buy the cheaper Favorit as the best chance to replace their old and far inferior Skoda 105, Skoda 120, Trabant, or Wartburg. Moreover, increasing real incomes after 1991 encouraged car purchases in all subsequent years. Finally, the spurt of new private firm formations in the early 1990s generated more car sales

Table 5

Decline in public transport use in the Czech Republic, 1989–1997 (millions of passenger trips per year). (Sources: Ministry of Transport of the Czech Republic; and Czech Statistical Office, *Statistical Yearbook of the Czech Republic*, Annual, 1992–1997)

Year	Urban public transport		Intercity and rural public transport	
	Czech Republic	Prague	Railroad	Bus
1989	2969	1316	290	1377
1990	2945	1319	289	1359
1991	3208	1555	295	1282
1992	3075	1521	290	1422
1993	2876	1385	242	1196
1994	2745	1364	229	1086
1995	2435	1074	227	1005
1996	2207	1078	219	891
1997	2191	1076	203	669
1998	2167	1064	182	652

because new firms often purchased cars for their managerial and professional staff.

Growth in auto ownership and use has been far more dramatic in Prague than in the rest of the country. As shown in Table 3, car ownership has always been higher in Prague than in the rest of the country. Near the end of the socialist era (1988), Prague had 35% more cars per capita than Czechoslovakia as a whole, and 23% more cars per capita than the Czech portion of the country (the same territory as the current Czech Republic). Ten years later, in 1998, Prague had 45% more cars per capita than the Czech Republic as a whole (511 vs. 352).

The much higher level of auto ownership in Prague has persisted throughout the period due to higher incomes, better political connections, and the concentration of firm headquarters. Higher incomes obviously make a car more affordable. In addition, many government bureaucrats in Prague have access to publicly owned cars. That was an especially prized perk during Communism, but it persists even today. Much more important in recent years is the proliferation of new private firms, which almost immediately purchase a fleet of cars for use by their employees, both for business and private purposes. The especially rapid growth in car ownership in Prague during the economic boom between 1993 and 1996 (+51%) was largely due to such car purchases by private firms (Institute of Transportation Engineering of the City of Prague, 1997). Since the headquarters of most Czech firms are located in Prague, that may explain why growth in auto ownership since 1992 has been so much faster in Prague than in the country as a whole. But household incomes in Prague have also increased faster than elsewhere in the Czech Republic, thus stimulating more car purchases by individuals.

With its superb public transport system, Prague certainly offers the country's best alternatives to the car. Moreover, many destinations are within walking distance. Thus, one might expect lower auto ownership in Prague because a car is less necessary in a city so well served by public transport. Although many Prague residents still use public transport for the journey to work, they need cars to reach their summer houses in the countryside and garden plots in the suburbs. Interviews conducted by the author suggested that Prague residents may feel a greater need for car access to the countryside than their Czech counterparts in smaller cities. That explanation seems questionable, however, since many Czechs in smaller cities also have summer houses and garden plots that are only accessible by car. Moreover, the overall mobility and accessibility level possible in Prague without a car is much higher than in any other Czech city. Reliable statistics on this point are not available, but most of the much higher car ownership in Prague is probably due to higher incomes and the concentration of firm headquarters and government offices.

The limited data available suggest that vehicle km of auto use have been increasing even faster than auto ownership. As shown in Table 4, vehicle km of auto use in Prague more

Table 6
Decline in urban public transport use in the 10 largest Czech cities, 1990–1996 (millions of passenger trips per year). (Source: Czech Statistical Office, *Statistical Yearbook of the Czech Republic, Annual, 1992–1997*)

City	1990	1992	1993	1997
Prague	1319	1521	1385	1076
Brno	339	355	345	333
Ostrava	271	289	270	209
Plzen	128	110	110	106
Olomouc	80	73	68	52
Liberec	51	50	53	52
Hradec Kralove	45	39	41	28
Ceske Budejovice	52	49	49	48
Usti nad Labem	63	68	67	62
Pardubice	37	36	34	40

than doubled between 1990 and 1997 (+104%), while auto ownership grew by 82% during the same period. Not only is the number of cars increasing, but each car is also being used more and more. In particular, cars are now being used daily by many Czechs for the journey to work and shopping, while in the 1970s and 1980s, cars were used primarily on the weekends for recreation (e.g. to access country houses).

Table 5 provides evidence of the rather dramatic decline of virtually every form of public transport in the Czech Republic. As noted previously, the decline in urban public transport began only after 1992, both in Prague and in the country as a whole. The situation was similar for long-distance railroad services and for intercity and rural bus services. Indeed, all forms of public transport actually gained passengers between 1989 and 1992. Since 1992, however, Czech railroads have lost 37% of their passengers. Far more dramatic, interurban and rural bus services lost over half their passengers (down 54%).

All five of the largest Czech cities conform to the downward trend since 1992 (see Table 6). The biggest drop is in Prague, perhaps because car ownership grew so much faster there than elsewhere after 1992. Among the smaller cities in Table 6, only Hradec Kralove experienced a serious decline.

Urban public transport services were cut from 1990 to

1993 but have held steady since then (see Table 7). Somewhat strangely, the largest cutbacks were from 1990 to 1992 when passenger levels were growing. More crowded vehicles and less frequent service may have been partly responsible for the large passenger losses that followed in subsequent years. Nevertheless, the overall reduction in service has been quite small compared to the sharp drop in riders. For the Czech Republic as a whole, seat km of service fell by 12% between 1990 and 1997, far less than the 26% drop in passengers. Similarly, the 8% drop in service in Prague was less than half the 18% loss in riders. Since 1992 public transport vehicles have been carrying fewer and fewer passengers, making it increasingly difficult to finance the services through passenger revenues. Indeed, for all urban public transport systems in aggregate, passenger fares covered only a third of operating expenses in 1998 (Dosek, 1999).

4. Transport policy shifts from socialism to capitalism

Transport and land-use policies in Communist Czechoslovakia were very different from current policies. Under socialism, car ownership and use were greatly restricted. The central government limited the number of cars produced for private consumption and virtually prohibited the import of Western European cars. As a result, demand far exceeded supply, and there were long waits to purchase a car, expedited only through political connections or bribes. Of course, the quality of socialist cars was abysmally poor, which further detracted from the joys of car ownership.

In addition, the central government directly set the price of both cars and petrol (gasoline). Similar to all other socialist countries, most Czechs simply could not afford to own cars, let alone use them for daily travel. Even as car ownership rose during the 1970s and 1980s, most cars were used for trips to the countryside on weekends and holidays or to garden plots on the outskirts of the city. As late as 1988, only 10% of Czechs used a car for the journey to work (Institute of Transportation Engineering of the City of Prague, 1992). Thanks to large subsidies from the central government, public transport services were ubiquitous and very inexpensive, thus further discouraging car use.

With the “Velvet Revolution” of 1989, many of these policies changed. The first change was a sharp reduction in central government subsidy to public transport, just as in Poland and Hungary. Whereas the central government had financed all capital investment and operating subsidy prior to the revolution, most of that burden has been shifted to municipal governments. Czech cities now pay the entire operating subsidy for public transport (except for some short-distance railroad services). The situation for capital subsidies is more complicated and has changed over time. In recognition of a desperate need to renew aging rolling stock and improve deteriorated rights of way, the central government established a special infrastructure fund in

Table 7
Cutbacks in public transport service levels in the Czech Republic and Prague, 1990–1997. (Source: Czech Statistical Office, *Statistical Yearbook of the Czech Republic, Annual, 1992–1997*)

Year	Seat km of service (millions)	
	Czech Republic	Prague
1990	35,213	18,250
1991	33,094	17,206
1992	31,521	16,499
1993	30,871	16,333
1994	30,926	16,443
1995	31,130	16,540
1996	31,499	16,859
1997	30,910	16,768

Table 8

Price trends for transportation in the Czech Republic, 1989–1998 (currency amounts in nominal Czech crowns). (Source: Czech Statistical Office, *Statistical Yearbook of the Czech Republic*, Annual, 1992–1997)

Year	Overall consumer price index (1989 = 100)	Average price of public transport ticket	Price of one liter of petrol (gasoline)	Purchase price of standard car (Favorit/Felicia) ^a
1989	100.0	1.00	8.00	84,600
1990	109.9	1.00	14.65	92,543
1991	172.2	2.47	16.00	127,223
1992	191.3	2.76	17.31	144,658
1993	231.1	3.43	18.79	191,192
1994	254.3	3.80	19.10	197,522
1995	277.4	4.48	19.05	223,187
1996	302.1	5.07	20.99	220,685
1997	327.5	5.62	22.19	228,790
1998	n.a.	6.80	22.86	n.a.

^a The Skoda Felicia has only been produced since 1995, when it replaced the Skoda Favorit as the standard Czech car. The Felicia costs considerably more than the Favorit, but it is also a better car; thus, part of the price increase is due to quality improvement and not simply price inflation.

1995, with an anticipated annual subsidy of one billion CZK (about US\$280 million) through 1997 (Dosek, 1999). The central government subsidy was supposed to cover 30% of vehicle and infrastructure costs for electric trams and trolley buses, and 10% of bus purchase and rehabilitation costs. Unfortunately, the local governments were not able to raise the necessary matching funds, and the central government could not afford to offer the promised contribution. Thus, the central government subsidy fell to 600 million CZK for 1996 and 1997 (Dosek, 1999). For the years 1998 through 2000, the central government is offering a continuation of the 30% capital subsidy for trams and trolley buses but has doubled its subsidy rate to 20% for buses and related infrastructure (garages, repair facilities, terminals). It remains to be seen whether or not the central government can actually afford to provide these subsidies, and whether local governments can raise the necessary matching funds.

For many years, the central government provided especially generous subsidies for the expansion of the Prague Metro system, but aid has been drastically cut back in recent years: from one billion CZK (about US\$280 million) in 1996 to 570 million CZK (US\$171 million) in 1997 and nothing at all in 1998. That trend was recently reversed when the Czech Parliament approved a Central Government subsidy of 1.5 billion CZK for further Metro extension in 2000. Overall, however, the City of Prague bears most Metro capital costs (reconstruction, vehicle replacement, and line extensions) and all Metro operating costs (Dosek, 1999). The central government pays only about 5% of the total (operating and capital) subsidy to public transport in Prague. Municipal tax revenues finance the remaining 95%. Public transport subsidies have consumed 33–41% of the entire budget of the city in recent years (Dopravni Podnik, 1992–1998, annual). It is highly questionable whether Prague can sustain that high subsidy burden over the long run.

Virtually all Czech cities have been struggling with the sharp reduction in central government subsidy funds and the

growing burden of financing public transport themselves. Prague's system, however, benefited from generous funding from the municipal government, whose revenues increased due to economic growth and very low unemployment. Moreover, the public transport system in Prague (Dopravni Podnik hl. m. Prahy, a.s.) was one of the best systems in Central and Eastern Europe during the socialist era. Currently Prague accounts for half of all public transport passengers in the Czech Republic, although it houses only one-ninth of the Czech population. Other Czech cities have been less fortunate than Prague in most respects. They have had much less funding for public transport improvements; their systems have deteriorated over the past decade, while Prague's network of public transport services has been considerably upgraded. Nevertheless, passenger levels in Prague have fallen as fast as in most other Czech cities (by 29% between 1992 and 1997, both in Prague and in the Czech Republic as a whole). The much lower incomes and lower car ownership levels outside of Prague present public transport with less competition. Thus, the lower quality and extent of public transport in other Czech cities has not caused as large a loss of riders as one might have otherwise expected.

5. Economic impacts affecting travel behavior

Trends in income, employment, and prices have greatly influenced travel behavior since the collapse of communism in 1989. Table 8 shows some basic data on overall inflation and three key transport prices: public transport fares, petrol prices, and new car prices. Most striking is that public transport fares have risen faster than inflation (462% compared to 228%) and more than twice as fast as petrol prices (177%) and new car prices (170%).

Tables 9 and 10 compare developments in car ownership and public transport use with relevant price, income and other economic indices. With the sole exception of 1990,

Table 9

Economic trends affecting auto ownership and use in the Czech Republic. (Source: Czech Statistical Office, *Statistical Yearbook of the Czech Republic*, Annual, 1992–1997; and additional data provided directly to the author by the Czech Statistical Office)

Year	Autos per 1000 population	Months of average salary needed to purchase car ^a	Ratio of petrol price per litre to average public transport fare ^b	Unemployment rate	Index of real salaries (1989 = 100)
1989	204	26.7	8.0	0.2	1.00
1990	233	28.2	14.7	0.8	0.94
1991	241	33.6	6.5	4.1	0.69
1992	250	31.1	6.3	2.6	0.77
1993	266	32.9	5.5	3.5	0.79
1994	287	28.7	5.0	3.2	0.86
1995	302	27.3	4.3	2.9	0.93
1996	325	22.8	4.1	3.5	1.01
1997	344	20.4	3.9	5.2	1.03
1998	352	n.a.	3.4	7.5	1.01

^a Average purchase price of a standard Czech automobile (Skoda Favorit or Felicia) divided by average monthly salary in that year.

^b Average price of petrol (gasoline), including taxes, divided by average one-way public transport fare in Czech cities.

petrol (gasoline) has become less and less expensive relative to public transport fares. In 1989 a liter of petrol cost eight times more than a single ride on public transport, but by 1997 it cost slightly less than four times more. Thus, the relative price of petrol is only half what it was before communism's demise. Moreover, the real price of petrol (adjusting for inflation) actually fell by 15%. Measured in constant 1989 crowns, it declined from 8.00 to 6.78 CZK. In both respects, car use became more affordable than before. In addition, new cars have become more affordable. In 1989, it took 27 months of salary for the average Czech to buy a standard new car (Skoda Favorit or Felicia). By 1997, that had fallen to only 20 months, a decline of 26%.

Conversely, public transport fares rose much faster than inflation; the real price of public transport rose 72% in inflation-adjusted crowns. Similarly, the price of public transport relative to petrol doubled from 1989 to 1997. These price changes obviously favored the observed shift from public

transport to the car. The only exception is the brief period just after the Velvet Revolution (1989–1991) when public transport fares actually fell, relative to both inflation and petrol prices. That is precisely the period when public transport use rose (by 8%), while it was already plummeting in Eastern Germany, Hungary, and Poland. As fares rose continuously after 1992, public transport patronage fell steadily as well.

As shown in Table 9, real salaries fell sharply from 1989 to 1991. Given the negative income elasticity of public transport, that income decline may also help explain the rise in public transport usage during that period (see Tables 9 and 10). After 1991, real salaries rose considerably until 1997, when a recession interrupted the Czech economic recovery. That trend in real income growth corresponds with the decline in public transport use, which would again be consistent with its negative income elasticity.

The relationship of income to growth in car ownership is

Table 10

Economic trends affecting public transport use in the Czech Republic. (Source: Czech Statistical Office, *Statistical Yearbook of the Czech Republic*, Annual, 1992–1997; and additional data provided directly to the author by the Czech Statistical Office)

Year	Public transport trips ^a (millions)	Real public transport fare index ^b	Ratio of public transport fare to petrol price (per liter)	Unemployment rate	Foreign tourists (millions)
1989	2969	1.00	0.13	0.2	8.6
1990	2945	0.91	0.07	0.8	20.7
1991	3208	1.43	0.15	4.1	39.6
1992	3075	1.44	0.16	2.6	42.2
1993	2876	1.48	0.18	3.5	71.7
1994	2745	1.49	0.20	3.2	90.5
1995	2435	1.61	0.24	2.9	98.1
1996	2207	1.68	0.24	3.5	109.4
1997	2191	1.72	0.27	5.2	107.9
1998	2167	1.78	0.30	7.5	n.a.

^a Includes only public transport trips within urban areas, not long-distance trips between cities.

^b The average urban public transport fare is expressed here in real, inflation-adjusted Czech crowns, using constant 1989 currency units for all years. Thus, the index shows how much fares have increased in excess of the rate of inflation, with values greater than one indicating fare increases greater than inflation, and values less than one indicating fare increases less than inflation.

more puzzling (see Table 9). Without question, income growth from 1991 onward helped stimulate more car ownership and use. Yet car ownership also rose from 1989 to 1991, when real incomes plummeted. The triple devaluation of the Czech crown and the lifting of government price controls in 1991 drastically reduced the purchasing power of most Czechs. Prices rose by 57% on average in less than a year. Perhaps the opening up to the West for the first time explains the anomaly. Suddenly free access to the Western European car market might have provided such a strong impetus to car purchases that it offset the decline in purchasing power just after the Velvet Revolution. Moreover, the private car has been an important symbol of freedom, affluence, and prestige in all formerly socialist countries. After decades of pent-up demand, many Czechs strove to acquire a car as soon as possible, in spite of their financial limitations. With real income growth between 1992 and 1997, the prestige factor has continued to play an important role in stimulating car purchases, even in cities like Prague with a good public transport alternative.

The unemployment rate does not appear to help much in explaining trends in either auto ownership or public transport use (see Tables 9 and 10). Generally, work commutation is the single largest source of trips for public transport, and passenger levels usually fall significantly during recessions. In the Czech Republic, however, unemployment rates have remained quite low until 1997 and 1998. In Prague, with half of all Czech public transport riders, the unemployment rate was consistently less than 2% until 1997. The large loss of riders started already in 1992 and continued through 1996, precisely the period of the Czech economic boom.

Finally, one might expect that the huge influx of foreign tourists might have affected public transport use, especially in Prague, where most of them came. From 1990 to 1996, for example, the number of foreign tourists rose from 21 to 109 million, more than a five-fold growth. Whatever contributions those tourists made to public transport passenger levels, they obviously were not enough to offset the large underlying decline.

6. Problems of increased car use

The rapid increase in private car use in the Czech Republic since 1988 has caused the usual problems of noise, air pollution, congestion, and traffic injuries (Institute of Transportation Engineering, 1998; Organization for Economic Cooperation and Development, 1999). For example, between 1988 and 1997, the total number of traffic fatalities in the Czech Republic rose by 32%—from 1171 to 1549. In Prague, the number of traffic accidents more than doubled (from 18,024 to 39,473) and the number of serious injuries rose by 46% (from 369 to 539). Nevertheless, the number of road fatalities actually fell slightly (from 94 to 90). The explanation almost certainly is that traffic speeds are so

much slower in Prague that whatever accidents occur are less likely to be fatal. Yet the very presence of so many cars in such a small area virtually guarantees many collisions of one sort or another. For the country as a whole, and even for Prague, traffic accidents have certainly become a more important problem since 1988 due to the large growth in car ownership and use.

Air pollution from cars has been growing in every Czech city. Again, the situation is worst in Prague because of the rapid growth in car ownership and use (more than doubling since 1990) and the high density of traffic and urban development. Many cars in the Czech Republic still do not have catalytic converters and use leaded petrol (gasoline), although the proportion of cars with advanced emissions control systems has been rising steadily as old cars are replaced. The older, most polluting cars (Skodas 105 and 120 and Russian Ladas) are owned by people with low incomes who cannot afford a new car. All new cars sold in the Czech Republic now have catalytic converters, however, and the government plans to phase out unleaded petrol in a few years. Fortunately, the overall air quality in most Czech cities is improving because there have been significant reductions in industrial sources of pollution. Power plants, for example, have removed sulphur from their emissions. Moreover, the output of heavy industry—crucial to the Czech economy for decades—has fallen substantially since 1990, largely offset by a boom in the relatively clean service sector. In the past, heavy industry was a major source of pollution, and as it has declined, so have its noxious emissions. In recent years, auto air pollution is the only kind of air pollution that has been increasing.

Traffic noise is also a serious problem in Prague. According to Prague's Institute for Transportation Engineering (1997), roughly half of the city's inhabitants suffer from noise levels in excess of the officially accepted norm. The Institute's sampling of noise levels found that 50 km of the street network exceeded noise levels of 75 dB, and that almost 400 km of streets had noise levels of 65 dB or higher. Of course, trucks and buses contribute to the overall noise levels, not just private cars. Traffic noise is a problem in most other Czech cities as well, but statistics are not available to document the extent of the problem outside of Prague.

Probably the most visible problem of increased car use is the growing congestion on the roadways, together with the growing number of parked cars that take up more and more space in Czech cities. Since very little new roadway capacity has been added since 1990, the doubling of motor vehicle use has led to serious congestion. During morning and evening rush hours in Prague, traffic on key arteries comes to a standstill. That has not only slowed down cars but also buses and trams using the same streets. Waiting cars often block trams, especially in the city center. Although 51% of the tram network is on separate rights of way, such protected corridors are mostly in the outer districts and not on congested inner-city streets. Of course, cars also block

buses, which carry about a third of all public transport passengers in Prague (and over half in the Czech Republic as a whole). There are seven priority bus lanes in Prague (with a total length of only 2.7 km). They are rather short and lie outside the city center, since most bus lines (unlike metro and tram lines) do not penetrate the core. The average speed of bus travel in Prague has especially suffered from congestion because buses lose extra time pulling in and out of traffic at bus stops.

Parking is the other visible problem that plagues almost anyone trying to use a car. The narrow streets and densely built-up centers of most Czech cities sharply limit the number of on-street parking places. Moreover, there are very few high-capacity parking decks, underground parking garages or other facilities that would remove cars from the streets. Until about 1995, most Czech cities were rather lenient in permitting motorists to park their cars almost anywhere they wanted to: on sidewalks, on streets, in vacant lots, in alleys, in roadway medians, on the edges of parks, and in portions of plazas. Indeed, many of Prague's magnificent historical squares have been turned into parking lots, with the litter of parked cars blocking the passage of pedestrians and diminishing the aesthetic charm and unique ambience of Baroque Prague. For example, one of Prague's most beautiful squares (Malostranske Namesti) has been appropriated as a parking lot for the members of the National Parliament. Given the powerful interests of legislators, firm owners, and other car owners to park conveniently, it is unlikely that such parking blight will be eliminated soon. As discussed below, the City of Prague has been working hard since 1995 to systematize parking policies and to enforce existing parking regulations and fees. Yet parking remains an important and growing problem.

7. Impacts of national policies on travel behavior

As noted previously, public policies in the Czech Republic have generally promoted increased ownership and use of the private car. Cutbacks in central government subsidies, for example, have sharply reduced the overall financing available for urban public transport. Similarly, subsidies to the Czech National Railways (Ceske Drahy) and Czech National Bus Services (CSAD) fell sharply during the 1990s. In addition, the nationwide bus company (CSAD)—which had provided rural, small-town, and inter-urban bus services—was broken up into many regional divisions. Reduced service coordination, cutbacks in service, and steep fare increases have devastated the once-thriving non-urban bus market, causing it to lose more than half its former passengers. Many small towns and rural areas are now left with virtually no public transport at all, practically immobilizing families too poor to purchase a car. Subsidy cutbacks have hurt urban public transport and railroad services as well, which have lost about a third of their riders since 1992. All modes of public transport have been forced

to raise fares and reduce services, thus reinforcing the impacts of income growth and access to the Western car market and accelerating the modal shift from public transport to the private car.

The private market system itself probably encourages more car use, since it generally favors private consumption over public investment. Some of the growth in the stock of cars is due to large purchases by private firms that have emerged since 1990. But the trend toward increasing materialism and conspicuous consumption among private households—strongly encouraged by the shift to capitalism—has also promoted car purchases.

Just as government budget problems have forced cutbacks in public transport subsidies, they have also prevented massive new investments in the Czech roadway system. The former Conservative government under Vaclav Klaus (in power during most of the 1990s) favored the private car and better highways over investments in public transport, but only modest additions were made to roadway capacity. A few major highways have been extended or improved, as had been planned for decades. Likewise, some key arterials in and around cities have been upgraded, with a few new links constructed. Whatever roadway expansion has occurred, it has not been nearly sufficient to cope with the enormous growth in motor vehicle use. Lack of funding has prevented more extensive roadway expansion.

The Social Democrats took control of the national government in June, 1998. They have expressed far more support for public transport and more opposition to unbridled car use. They do not have an absolute majority in parliament, however, and depend on the tolerance of the opposition Conservative Party of former Prime Minister Klaus. Moreover, the current economic recession and worsening budget problems make it difficult for them to provide larger subsidies to public transport. Thus, both the Conservatives and the Social Democrats have been limited in their ability to implement their transport preferences.

8. Local government policies on urban transport

Especially now that the central government has limited its involvement in urban transport, local government policies have become increasingly important. Those local policies obviously vary from one city to another. As the richest and most important city, Prague's economic growth has generated large revenues for the local government, and those additional revenues have permitted quite large subsidies for operations, maintenance, and new investments in public transport. For example, the Prague metro has already been extended twice during the 1990s (by 5 km in 1994 and by 6 km in 1998) bringing the length of the three metro lines to 50 km. By the year 2002, a further extension of 4 km is planned. In addition to expanding the metro system, Prague has been modernizing its metro stations and replacing escalators for greater rider convenience. The oldest metro

vehicles are being taken out of service and replaced with new or reconstructed cars that are more efficient, more dependable, and more comfortable. Prague's extensive tram and bus systems have also been improved over the past decade. Older trams and buses are gradually being replaced with modern vehicles that correspond to Western European standards for comfort and efficiency. A new light rail line opened in 1995, and more are planned. Existing tram lines have been improved through modernization of tracks, including reconstruction of tracks and track beds over key routes. Moreover, trams are increasingly given signal priority at intersections (currently at 48 and rising), with signals turning green for oncoming trams and red for cars. In the suburbs, 51 completely new bus routes have been started since 1993 to serve the increasingly dispersed population. The City of Prague also created a special region-wide transportation agency (called ROPID) to coordinate routes, fares, timetables, and funding for all modes of public transport throughout the metropolitan area.

Most other Czech cities have made some improvements—such as vehicle modernization—but only a few have actually expanded their systems as in Prague. The town of Liberec (North Bohemia) reconstructed its tram tracks and modernized the tramway operating system. It also built a major new public transport terminal in the heart of the city. Brno (South Moravia) built a new trolleybus depot. And the North Moravian city of Olomouc built a new light rail line through its center. In general, however, Czech public transport systems have struggled with the large loss of passengers and the lack of funding to improve services and offer attractive fares.

Local governments have primary influence over parking policies, traffic regulations, auto restraints, zoning, and many other policies that importantly affect urban transport and the choice between the private car and public transport, walking, and cycling. Many Czech cities have had extensive auto-free zones for decades, and these have been preserved and, in some cities, even expanded. Prague, for example, introduced traffic calming in stages from 1971 to 1985, and became the first European city to traffic calm its entire city center (Institute of Transportation Engineering, 1998; Klofac, 1989). It comprises extensive pedestrian zones, 24 streets closed to private cars, and most other streets restricted to local traffic only.

Parking policies have changed considerably over the past two decades. During the 1970s and 1980s, for example, Prague sharply restricted parking in the center, giving priority to local residents and businesses, but still requiring them to pay fees for the necessary annual permits. For the first five years after the Velvet Revolution, previous restrictions were largely ignored. One Prague official described the situation as “parking chaos,” with little enforcement of parking regulations. With parked cars blocking traffic, causing accidents, and blighting scenic areas, city officials finally introduced stricter parking rules for the city in 1995 and started to enforce them with stiff fines and towing of illegally parked

cars. The price of short-term metered parking in the central zone rose to 40 CZK (about US\$1.25) per hour. Most other public parking spaces in the center are now reserved for local residents and businesses, but they must pay substantial fees for the annual permits required. Even with the permits, there is no guarantee of actually finding an open parking space. In Prague as well as most other Czech cities, parking in districts outside the city center is free and virtually unregulated.

9. Shifts in land-use trends since 1990

Corresponding to the shifts in transport policies, urban development trends have shifted considerably since the overthrow of Communism. For example, low-density suburban sprawl was virtually non-existent prior to 1990. Almost all new housing was government-built and government-owned, and it was concentrated in very high-density and appallingly ugly apartment complexes on the periphery of cities, because that was the only land available for such vast projects. Of Prague's 1,212,000 inhabitants in 1990, 830,000 lived in the monolithic housing projects built by the Communists (Sykora, 1995). Even in these peripheral settlements, there was little need for a car because they were well served by frequent public transport services to the center (Pucher, 1990).

The situation has changed considerably since 1990. Similar to the long-term trends toward decentralization in North America and Western Europe, most of the new construction in Prague has been in the suburbs (Sykora, 1995; Sykora and Simonickova, 1994; Sykorova and Sykora, 1999). In order to avoid the congestion and high land prices in central Prague, many firms are now locating on the periphery along key highways. Large shopping centers are also emerging far from the center. Most new housing is being built at the urban fringe, but unlike the high-density apartment complexes of the Communist era, most housing units are now low-density single family homes. Public transport services are sparse in these new suburban developments. Especially with the surge in auto ownership and use, suburbs are becoming quite auto-oriented in their design and travel patterns.

Suburban sprawl is especially pronounced and problematic outside the 496 sq. km of the city's administrative district, which includes many inner suburbs. Prague itself has retained strict land-use regulations and building codes on its territory, but much new suburban and exurban development is in communities beyond Prague's control. Land-use regulations there are far more lax than in Prague, and suburban towns are tempted to permit virtually any kind of development in order to attract jobs, tax revenues, and economic development away from Prague. By comparison, there is less auto-oriented suburban sprawl in other Czech cities, with their lower growth rates, lower incomes, and

lower car ownership rates. Nevertheless, the trend toward dispersal is perceptible throughout the Czech Republic.

In summary, the very strict land-use controls and high-density housing policies under Communism strongly encouraged public transport use, while the recent trend toward low-density commercial and residential development at the urban periphery obviously reinforces the trend toward more auto ownership and use. After decades of being forced to use public transport and to live in monolithic, unattractive, and boring apartment complexes, the shift to the car and the flight to low-density suburbs may not be surprising. In addition, rising per-capita incomes and the growing cadre of middle- and upper-class professionals and entrepreneurs are obvious customers both for new cars and for single family homes in the suburbs. Firms are locating their offices in the suburbs for the same reasons they do in North America and Western Europe: convenience, lower cost, less regulation, greater land availability, less congestion, cleaner air, and access to the long-distance highway network. Now that firm location decisions are based mainly on profit incentives, the move is definitely to the suburbs, except for those specialized firms and headquarters functions that still need access to the core.

10. Prospects for the future

After the turbulent decade of the 1990s, it is likely that the new millennium will bring with it more gradual change. The economic recession that started in 1997 has already slowed things down considerably. Higher unemployment and falling real incomes will at least temporarily put a damper on rising auto ownership. Moreover, much of the rapid increase in motorization was simply to catch up to Western European levels. With a much smaller gap now between car ownership rates in the Czech Republic and the European Union, there is less catching up to do. Car ownership and use will surely continue to grow, just as they are continuing to grow throughout Europe, but the growth will be far less explosive than during the 1990s.

Similarly, it seems likely that public transport use will continue to decline, but more slowly than in recent years. It certainly will not return to the artificially high levels of the Communist Era. Public transport systems throughout the Czech Republic, and especially *Dopravni Podnik* in Prague, are making valiant efforts to expand and improve their services. They are fighting a difficult battle against the extremely popular private car, however. Even if they eventually manage to attain a Western European standard of service quality, the best they can hope for is to stabilize usage at current levels. With public transport's modal split share falling throughout Western Europe—in spite of superb public transport systems—it is certain that public transport will be serving a lower and lower percentage of urban trips in the Czech Republic as well.

These trends mean that the Czech Republic will have to deal with the sorts of urban transport problems plaguing Western European cities for many years, the same problems that have emerged so suddenly in Czech cities during the turbulent 1990s: congestion, air pollution, noise, accidents, parking, and transport finance. Czech policymakers and researchers are already looking to Western Europe for guidance, and they have already begun adopting the same policy measures used in European Union. Technological improvements in car design, for example, should help mitigate the air pollution, noise, energy use, and safety problems. This is already evident in the new cars Czechs are now purchasing, partly because they were manufactured in Western Europe anyway. Even the most common Czech car, the Skoda, was vastly improved after the Skoda Company was bought by Germany's Volkswagen Corporation.

The congestion and parking problems will probably remain as intractable in the Czech Republic as in the rest of the world. Elaborate pricing schemes (such as in Singapore) are virtually inconceivable, since there is still a strong backlash to the repressive controls under Communism. Expansion and refinement of the current, crude system of differential parking fees would probably help resolve the parking problem, and if well designed, might mitigate congestion in central cities as well. As Western Europe and the United States have learned, massive additions to roadway capacity will not solve the congestion problem, since they generally induce more traffic and more suburban sprawl. Nevertheless, it is clear that the current roadway system in the Czech Republic desperately needs some key new links to fill gaps. Moreover, at least some additional capacity must be provided to meet the huge new demand for car and truck use that has emerged during the 1990s and which will surely continue to grow in the coming years, even if at a slower rate.

With its membership in OECD and NATO, the Czech Republic has already moved considerably toward its ultimate goal, membership in the European Union. Assuming eventual acceptance by the EU, which is highly likely, the Czech Republic will have to conform to all EU regulations, laws, and standards for transport. Moreover, the Czech Republic seems to look toward Western Europe as its model anyway. Over the coming years, the transport system of the Czech Republic will become increasingly similar to that in the European Union. That is not such a terrible fate, even if it does mean a considerably smaller role for public transport than currently. All EU countries depend primarily on the automobile for passenger transport, but most EU countries offer excellent public transport systems and attractive environments for walking and bicycling, especially compared to the rest of the world. It is certain that public transport will maintain an important role in Czech cities, but the days of public transport dominance, as under Communism, are long past.

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