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ORIGINAL ARTICLE

The deregulation of international trucking in the European Union: form and effect

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Abstract We describe the regulatory regime under which international trucking operated in Western Europe until the mid-1980s, the deregulatory process that followed, and the effect of this deregulation. We find that deregulation had a large positive effect on the growth of international trucking. We also find that shippers shifted toward more outsourcing of their trucking needs, but this occurred to an even greater extent in local and national road transport. We conclude that other factors beside the deregulation of international trucking affected the organization of the industry at the time. Finally, despite concerns voiced by member countries, we find no evidence that deregulation disproportionately favored carriers of countries that were initially more (or less) involved in international trucking, nor that it has favored low-wage countries.

Keywords Trucking · Road transport · European Union · Deregulation · Organization

JEL Classifications L2 · L5 · L9

1 Introduction

The deregulation of the interstate trucking industry in the United States (U.S.) took place with the Motor Carrier Act of 1980, which removed entry barriers and eliminated price-setting bureaus. A number of studies since then have established that deregulation led to lower transport prices, changes in the organization of labor, and

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changes in the concentration and organization of the industry (e.g. Rose 1985, 1987; Joskow and Rose 1989; Winston et al. 1990; Ying and Keeler 1991; Boyer 1993; Peoples and Peteraf 1995, 1999; Belman and White 2005).[1]

At that same time, in the European Union (EU),[2] a complex series of bilateral and multilateral agreements governed both the amount and price of road transport between countries, even though the 1957 Treaty of Rome had stated that a common transport policy had to be achieved by December 1969. The deregulation of international road transport in the EU did not begin until the mid-1980s, and was much more gradual than in the U.S., with most of it completed only by the early 1990s. The official reasons for deregulating international transport in the EU, and some of the concerns surrounding such deregulation, were also different from those associated with deregulation in the U.S. In particular, an important driver of deregulation in the EU was the desire to eliminate government discrimination based on nationality of the freight transport provider. Individual member countries thus worried that their domestic carriers would lose business in a more competitive European environment.

Due in part to the timing and duration of the deregulation, and in part to data issues discussed below, the effects of the deregulation of the trucking industry in the EU have not received much attention in the literature.[3] In this paper we focus specifically on international or cross-border road freight transport in the EU as it has always functioned under its own set of rules, and is the segment of trucking over which the EU has legislative control. We first describe the type of regulation such transport functioned under during the regulation era and the process of deregulation. We then analyze how the deregulation has affected (1) the total amount of international road transport, (2) the extent to which shippers outsource their cross-border transport needs, and (3) the degree to which countries participate in international road transport.

In the U.S. authors have examined the effect of deregulation on pricing. Unfortunately, data limitations prevent us from focusing on the prices charged for international transport in the EU.[4] However, our finding that relaxing regulations had a large positive effect on the total amount of international road transport, beyond what would be expected due to the increased trade among EU countries, and beyond what has occurred for international rail and local transport, suggests that relative to alternative modes of transportation the cost of relying on international road transport has gone down due to deregulation. In other words, this result is consistent with the lower road transport prices that accompanied deregulation in the U.S.

[1] See in particular Chaps. 1, 2, 6 and 8, or McMullen (2005), Corsi (2005), Peoples (2005), and Belman et al. (2005).

[2] Prior to 1992 the European Union (EU) was the European Communities, the most important of which was the European Economic Community (EEC).

[3] Existing studies on European deregulation of trucking include OECD (1988, 1990), Allen (1990), ECMT (1991, 2002), McKinnon (1996), European Commission (1997) and Fernandez et al. (2000). Boylaud (2000) summarizes the results of several empirical studies on road freight transportation deregulation worldwide.

[4] There is evidence that the average price of all road haulage (national and international) decreased for some countries in the EU (McKinnon 1996) during the time of our study. However, data are not available for all countries and we have no reliable way of allocating this price decrease between international and national hauls.

Several authors also have examined the effect of U.S. deregulation on the extent of private versus for-hire road transport. Harper and Johnson (1987) and Boyer (1993) found no significant effect of deregulation on this aspect of industry organization. In the EU, we find that shippers reduced the use of their own trucks for international transport during the deregulation period, but no more so than for local or for national trucking. We conclude that deregulation of international road transport did not have a direct effect on the organization of international trucking but that other factors, including potentially regulatory changes at the national level, drove the change we observe in the data for international trucking.

Finally, we find that deregulation had no effect on the degree to which different countries participate or specialize in road transport. In particular, we find no evidence that carriers of any given country as a group were disproportionately better or worse off after deregulation. This is an important finding in a context where the desire of member countries to maintain the economic status quo can significantly hinder the adoption of potentially beneficial supra-national policies.

The paper is organized as follows. We begin by briefly reviewing the characteristics of the international road transport market in Europe. We then describe how international trucking was regulated in the EU, and the process of deregulation, in Sect. 3. We present hypotheses and describe our data in Sects. 4 and 5 respectively. Section 6 contains the empirical model and results. Concluding remarks are found in Sect. 7.

2 The trucking industry in Europe

The EU is an association of individual countries that do not share a common language, common taxes or common business environments. As a supra-national power, the EU oversees international transport while each country retains jurisdiction over transport that begins and ends within its borders as long as it does not discriminate against foreign carriers. As a result, national and international markets obey different sets of rules. In this paper, we focus explicitly on international—or cross-border—road transport and its deregulation.[5] For large countries such as France, international road freight transport is a fairly small percentage of total freight transported by road (national + international), accounting for about 14% in 1982 and growing to 20% by the late 1990s. For smaller and more centrally located countries, such as Belgium, the percentage is as high as 65% at the beginning of the 1980s and 70% by 1998. Not surprisingly, islands such as the UK and Ireland have a very small percentage of international road freight transport.

In 2001, road transport accounted for 45% of all freight transported between the 15 EU member states, measured in ton-kilometers (t-kms).[6] Another 7.8% was transported by rail, 4% by inland waterways, 2.8% through pipelines and 40.4% by sea. Excluding sea shipping, road freight haulage is by far the dominant transport mode, with 75.5% of total t-kms. In 1980 this fraction was 60% (EU 2003).

[5] Individual national trucking markets within the EU also have historically been regulated and went through their own deregulation processes through the 1980s and 1990s.

[6] A ton-kilometer represents one ton (1000 kg) of freight transported for one kilometer.

Two types of firms are involved in road transport: motor carriers, who operate in the for-hire sector, and shippers themselves, who form the private or own-account segment.[7] In 1998, for-hire trucking accounted for 4% of GDP in the EU, while private haulage added another 1% (EU 2000). In the U.S., trucking accounted for about 6% of GDP in 2001 (Corsi 2005 and BEA). The split between own-account and for-hire is quite different in the U.S. however, with private haulage amounting to about 45% of trucking revenues (or 2.7% of GDP) there. In terms of t-kms, about 30% of national road transport is transported via own-account in the EU. This fraction falls to just 10% for international—or cross-border—haulage.

3 Regulation and deregulation of international road transport in Europe

As stated earlier, the EU has jurisdiction over cross-border road transport in Europe, with each country setting its own rules for national transport, or transport that begins and ends within its borders. When the deregulation of international road transport began in the 1980s, not every European country regulated both the prices at which shipments could take place and the number of licenses that were available to carriers for international transport, but most did one or the other. Own account transport, on the other hand, was not subject to price or licensing regulation. Throughout the period of this study, and to this day, however, own-account carriers are not allowed to carry third-party freight, including for-hire backhauls.

At the beginning of the 1980s, for-hire road haulage between EU member states was authorized in one of four ways:

1. *Under bilateral agreements between member states.* These agreements either allowed free movement of goods or imposed quotas on the number of movements. If a journey involved transit through a third country, then a permit might be needed from that country as well.[8] Under these bilateral agreements, the transport permit granted to a carrier could be limited to a certain period or a certain number of journeys.[9] These permits were the norm for European transport within and outside of the EU until the late 1980s. They are now the main source of authorization for transport to and from Eastern European countries that are not part of the EU. Note

[7] In the U.S., this is usually called private haulage while in Europe it is more standard to refer to it as own account. Since the 1980 deregulation, private carriers in the U.S. have been allowed to carry for-hire backhauls, whereas in the EU they cannot. In addition, in the EU, own-account transport is limited to vehicles driven by employees of the transporting firm or rented without drivers.

[8] Usually bilateral agreements included the authorization to transit through a third country. Sometimes however third countries did not recognize transit authorizations in which case a specific permission to transit had to be obtained from such third countries or separate bilateral agreements could be established with the third country.

[9] Specifically, there were two types of authorization: authorization by trip and authorization by time. The trip authorizations allowed a predetermined number of trips to be completed in a specified time-period. The time authorizations were valid for a year and covered an indeterminate amount of trips within that time. Typically these agreements were negotiated by the countries' governments every year. Each government then distributed these authorizations among its carriers as it saw fit. Note that bilateral agreements applied to both the for-hire and own-account sectors until 1980, and thereafter only to the for-hire sector (Bernadet 1997, Scharf and Smolders 1999).

that the EU had only nominal control over bilateral agreements between member states.[10]

2. *Under Community permits.* These permits, instituted in 1969, allowed a limited number of vehicles to operate freely within the Community.[11] Each country was allocated a quota and decided how to distribute it among its carriers. The permits were for unlimited international journeys during one year. However, until the late 1980s they accounted for only about 5% of international road transport (Whitelegg 1988; Bernadet 1997, Degli Abbati 1987). The first table in the Appendix shows how the number of community quota authorizations changed between 1982 and 1992. By 1993 the for-hire segment was fully deregulated in that limitations on the number of permits were lifted.
3. *Under European Conference of Ministers of Transport (ECMT) quota arrangements*. These quotas are similar to Community quotas but apply to ECMT countries.[12] These permits are available only for the for-hire transport sector, and are quite limited in number. In 1994 the total number of such authorizations was 4100, less than the amount that was available in 1973 to the (then) nine member of the EU. They are currently—and were throughout the period of this study—mostly used for transit from European Community countries to non-EU countries rather than within the EU.
4. *For types of transport exempt from quotas.* This applied to goods that traveled in part by rail, to some specific commodities,[13] and to transport with Switzerland, Andorra, Monaco and Lichtenstein, all of which had completely liberalized access of freight carriers to their territory prior to the start of our data period. This also applied to trucks with a payload weight smaller than or equal to 3.5 tons and to for-hire transport within 25 km on either side of a border as the crow flies.[14]

In addition to these quotas or 'entry' regulations, bilateral agreements between member states typically specified price brackets (both a minimum and a maximum price) at which transactions could occur. These price brackets officially became 'suggested' prices in 1984, and then in January 1990, prices were allowed to be set by

[10] See Council Decision 80/48/EEC of 20 December 1979 on the adjustment of the capacity of for-hire carriage of goods by road between member states (OJ L 18, 24/1/1980).

[11] Council Regulation 1018/68 published in the OJ L 175 of 23/7/1968. The initial quota was for a total of 1200 authorizations and covered only for-hire carriers. For extensions, see Degli Abbati (1987, pp. 105–106).

[12] The ECMT (recently renamed International Transport Forum) is a forum for the Ministers of Transport of various European countries, not limited to EU members, established in 1953. Until the end of the 1980s it included EU members, EFTA members (Switzerland, Finland, Norway, Sweden and Austria) plus Yugoslavia and Turkey. Eastern and Central European countries joined after the end of the communist block. In 2005, the ECMT had 43 member states, including the 15 pre-2004 EU members. The ECMT authorizations are valid in all the member countries of the ECMT and include transit permits. Since these authorizations are only available for for-hire transport, outside of the EU own-account transport still can only be performed under bilateral agreements.

[13] From Council Regulation 881/92, published in the OJ L 095 of 09/04/92, exempt commodities include mail as a public service, vehicles that have suffered damage or breakdown, and medicinal products, appliances, equipment and other articles required for medical care in emergency relief.

[14] See First council directive of 23 July 1962 published in the OJ L 70, 6/8/1962 and successive amendments.

shippers and carriers. However, even when the price brackets were officially binding, they were not enforced (Bayliss and Coleman 1994, Degli Abbati 1987, p. 98). For that reason, our analyses focus on the relaxation of quotas or entry requirements rather than changes in price regulation. We expect these changes in entry regulation to affect the prices paid by shippers for two main reasons. First, carriers with authorizations faced much less competition under regulation, and thus could charge higher prices. Second, the limit on the number of authorizations encouraged carriers and shippers alike to possibly choose less efficient routes to avoid crossing borders. This in turn would have increased the cost of transporting goods by truck.

Carriers involved in international road transport in the EU faced other regulatory constraints that were relaxed during the 1980s and 1990s. First, there were lengthy controls at borders up until 1990 when they were eliminated. Second, carriers faced strict restrictions on cross-trade transport and a complete prohibition on cabotage. Cross-trade transport is defined as international road transport performed by a motor vehicle registered in a third country. Such transport was authorized only under Community quotas. As the availability of such quotas increased, the restrictions on cross-trade transport became less stringent. Cabotage, on the other hand, is defined as transport within a member state performed by a carrier registered in a different country. The prohibition against cabotage was lifted gradually, as discussed below.

The rules concerning "who could carry what where" existed in the EU despite the fact that discrimination based on the nationality of the carrier was supposedly illegal. The 1957 Treaty of Rome that established the European Economic Community stated that a common transport policy was needed by December 1969. As this had not yet been achieved by the early 1980s, the Court of Justice in 1985 ruled that member states had to enact new legislation to allow a free international market for road freight transport. Starting in 1987, the number of community permits was increased by 40% each year. All limitations on the number of permits were finally eliminated in 1993 with the introduction of Community licenses, which are 5-year renewable licenses allowing a carrier to transport anywhere within the EU. Also, in July 1990, the EU introduced a limited number of permits for for-hire carriers to perform cabotage operations.[15] This number was increased by 10% in 1991–1992 and another 10% in 1992–1993. The final solution to the cabotage issue for for-hire carriers was adopted with EU regulation 3118/93 which stated that starting on January 1, 1994 the number of cabotage authorizations were to be increased until July 1, 1998 when the need for such authorizations would be eliminated.[16] As for own-account carriers, they were allowed to perform cabotage operations starting in 1994.[17]

[15] Specifically, under Council Regulation 4059/89 (OJ L 390/3, 30/12/1989), the EU created 15,000 authorizations (equivalent to 2,500 yearly permits) between July 1990 and July 1991. Cabotage authorizations could only be assigned to motor carriers that had a community authorization for international transport. They were valid for two months (but could be divided into two authorizations of one month each). They could be used by any vehicle owned by the carrier.

[16] Because new members entered the EU, Commission Regulation 3315/94 (OJ L 350, 31/12/1994) further increased cabotage authorizations by 54% for 1995 and another 30% per year until July 1, 1998 when the need for cabotage authorizations was eliminated.

[17] Commission Regulation 792/94 (OJ L 92, 09/04/1994).

During the same period, there were few changes in the regulation of other modes of international transport in the EU. Rail freight transport remained fairly heavily regulated throughout the period of this study at the EU level, although legislation enacted in the 1990s set the ground rules for a slow liberalization in this industry to begin in March 2003 and be completed by 2007 (see Vassallo and Fagan 2005; Scherp 2005). Seaports were neglected by EU policy during the 1970s and 1980s. In the early 1990s investments in ports increased significantly. The amount of freight transported through inland waterways did not change substantially during the 80s and 90s although the adoption of containerization allowed this mode of transport to become more efficient and considerably reduce the number of vessels used.

4 Conceptual framework and hypotheses

4.1 Liberalization and the amount of international road transport

Prior to liberalization, the regulatory regime imposed costs on the transport of goods across borders by road, both because of the need to secure permits and because of time-consuming border controls. One would expect this to lead carriers to make detours, perhaps refuse certain hauls, and so on. Moreover, it is estimated that about 40% of the trucks crossing borders were traveling empty in the EU during the late 1980s (McKinnon 1996).[18] To the extent that liberalization allowed carriers to combine loads more efficiently, or to use more direct or otherwise better routing, and to reduce the amount of empty backhauls for international haulage, it should reduce the cost of international road transport. Assuming that these reduced costs are passed on to consumers in the form of lower prices, liberalization then should lead to an increase in international road transport. Of course, less expensive international road transport, due to deregulation, may also increase the incentives of companies to source or sell more internationally, thereby leading to increased trade. Our goal, then, is to assess if deregulation has had a direct effect on road transport net of this effect on trade.[19]

4.2 Liberalization and the use of for-hire versus own-account carriage

The choice between for-hire and own-account haulage for a shipper involves a number of trade-offs. Shippers whose loads need to be highly coordinated with production or whose customer service requirements are high may rely more on own-account haulage (Hubbard 2001; Baker and Hubbard 2003; Nickerson and Silverman 2003). For-hire

[18] This is a large amount compared to the U.S. For example, Moore (1991) reports that even prior to deregulation, 28% of own account carriers in the U.S. had empty backhauls.

[19] We do not believe the potential endogeneity of international trade affects how we should interpret our results for two main reasons. First, the impact of lower international transport costs on the amount of international trade is likely to be small compared to the overall effect of EU enlargement and the push towards a single European market. Second, in our empirical analyses, we examine the effects of deregulation after controlling for changes in international trade. If lower international road freight transport costs mostly spurred increases in international trade, our results will be biased against our finding a direct deregulation effect.

carriers, however, are likely to have lower costs. First, they tend to be less sensitive to demand volatility because they serve the transportation needs of a portfolio of firms. Second, in Europe, private carriers are not allowed to take on third-party freight, which restricts their capacity to use their trucks efficiently.

Prior to the period covered by our data, own-account and for-hire carriers were subject to the same permit requirements in Europe. In the early 1980s, however, a Council directive exempted own-account international transport from any quota or authorization requirement. The subsequent liberalization thus had an impact only on the for-hire segment, reducing its cost relative to the already liberalized own account. We therefore expect liberalization to increase the proportion of international road transport performed by for-hire carriers.

Another aspect of deregulation that may affect the relative reliance on for-hire and private haulage relates to cabotage. Changes in regulation for cabotage were implemented initially for for-hire haulage only, and then for own-account. If such regulations were constraining one would expect the deregulation to have a positive effect on the proportion of for-hire during the period of preferential treatment (1991–1994).

While the arguments above lead us to expect changes in the organization of the industry in response to regulatory changes, many studies of deregulation in the U.S. have failed to find a significant effect on the make-or-buy decision in the wake of the Motor Carrier Act of 1980 that deregulated that market. Boyer (1993) for example finds that the ratio of for-hire to private trucking did not change significantly between 1972 and 1987.[20]

4.3 The effect of liberalization on member state transport intensity

National governments in the EU are often concerned that changes in regulation will go to the advantage of other countries.[21] In the case of international road freight transport deregulation, there were two major worries. First, large countries whose transport industry had been strictly regulated, such as France and Germany, worried that deregulation would favor carriers of countries that had been more open during the regulated period, such as the Netherlands and Belgium. This might occur if the carriers in such countries were more efficient, perhaps due to their greater exposure to competitive pressures, giving them an advantage in the post-deregulation period. On the other hand, carriers based in countries that were more open may lose share if their advantage was mostly associated with their governments' ability to negotiate bilateral agreements with other member countries. Second, high labor cost countries expressed concern that they may lose share to low labor cost countries such as Spain, Portugal and Italy after deregulation.[22] We examine the validity of both of these issues with EU policies towards international road transport.

[20] See also Harper and Johnson (1987).

[21] Such fears are not limited to the EU: e.g., see ECMT (2002).

[22] On this issue, see also the debate about NAFTA and Mexican drivers in the United States.

5 The data

The transport data we rely on is from Eurostat, the European statistical office that harmonizes data series collected by individual member countries. The information on t-kms transported by road is available for each EU country each year from 1982 to 2002.[23] In 1982 there were ten member countries; that number grew to 15 by 1995. Since most of the deregulation process ended in 1993, the empirical analyses below focus on the 12 countries that joined the EU prior to 1990, namely Belgium, Denmark, Germany, Greece, France, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain and the UK. Due to data issues, however, Belgium and Luxembourg are treated as a single jurisdiction: BLEU, or the Belgium–Luxembourg Economic Union.[24]

We use data on the amount of international haulage performed by for-hire and own-account operators of the reporting countries (in millions of t-kms), excluding t-kms transported under the cabotage regime and cross-trade transport.[25] Typically the information is for trucks with a payload weight of more than 3.5 tons.[26] We completed and corrected the data using information from the ECMT database.[27] Finally, we added the data on inbound (from a foreign country to the declaring country) and outbound (from the declaring country to a foreign country) carriage to obtain total international t-kms transported per country.

Since international trade is a major factor affecting international transport, we control for increased trade among EU members using data from the IMF Direction of Trade database. For each country we measure total EU trade, namely imports from, plus exports to, all countries that are part of the EU at the time. This variable thus captures increased trade due to EU enlargement and German reunification as well as increases in trade among existing members of the EU. Because the freight transport data are measured in real terms (t-kms), we convert the trade data to 1990 U.S. dollars.[28] We also measure GDP and the price of diesel fuel, exclusive of VAT, which we also express in 1990 U.S. dollars.[29]

[23] Prior to 1999 the data were based in part on customs data. In 1999, data collection at borders was dismantled, so the data since then have been collected through surveys.

[24] For simplicity, we use the word country to denote jurisdictions in the remainder of the paper.

[25] Results are unaffected if we use the total amount of t-kms transported, including cabotage and cross-trade transport, as our dependent variable. We do not report these results, nor analyze these forms of transport separately, because the data on these were not collected reliably prior to 1999 (see the methodological notes in EU (2004)).

[26] Exact information on the parameters used by each country is not available for all countries.

[27] Specifically, when data appeared extremely different in adjacent years, we compared them with the ECMT data and used the latter if they seemed more plausible.

[28] The data are in current U.S. dollars in the source. We convert them to national currency, then deflate the results for each country using a country-specific price index, and reconvert them to U.S. dollars using the 1990 exchange rate.

[29] The GDP data are from the OECD, in national currency. The fuel price data are from the International Energy Agency (IEA), also in national currency. We deflate both using a country specific CPI (from International Financial Statistics) and then convert them to 1990 U.S. dollars.

For the nine countries that were part of the EU prior to 1982, there are 21 potential observations available. However, some of the yearly data on road transport are missing for some countries: Greece, Ireland and Italy respectively have 4, 5, and 8 missing observations. Spain and Portugal joined the EU in 1986, so there are 17 potential observations for these, adding up to a total of 206 observations for our main variable of interest.

In the appendix we show the number of EU permits for road transport assigned to carriers, by carriers' country of origin, for each year. Since there are no EU permits issued after 1993, when entry into international road transport was fully deregulated, we cannot know what number of authorizations corresponds to full deregulation. For this reason, we measure deregulation with a variable that we set equal to zero prior to deregulation and 100% from 1993 onward. Between those two periods, we calculate the extent of deregulation using the number of authorizations allocated to each country each year in proportion to what we expect total deregulation to require. We assume that the market is 90% deregulated by 1992, the last year of partial deregulation. This assumption seems reasonable given that the pace of liberalization was set with the view of avoiding a large change in the year of full liberalization (see Bernadet 1997, p. 143). We calculate the number of authorizations that corresponds to full deregulation as $N_c^* = (100/90)N_c$, where N_c stands for the number of authorizations available for that country in 1992. The extent of deregulation in year t for country c then is measured as $(x_{ct}/N_c^*) \cdot 100$, where x_{ct} is the number of licenses available to country c in year t. This measure allows us to capture the fact that the extent of deregulation was not exactly the same across countries each year.

We also used an alternative measure, a simple step function set equal to 0 for all years prior to 1985 (complete regulation), to 0.5 between 1985 and 1993 (partial deregulation), and 1 after 1993 (complete deregulation). This measure yielded results that were consistent with those shown below.[30] For that reason, and given that this measure is less precise, we only present results obtained with our more continuous measure below.

Border deregulation is measured as a single dummy variable set equal to zero prior to 1990 and one thereafter. We report summary statistics for all our variables in Table 1.

In Table 2 we show the same statistics for the six countries for which we have full time-series data on international road transport, namely the BLEU, Denmark, Germany, France, the Netherlands, and the United Kingdom.[31] Together these countries accounted for about 95% of total international t-kms in the EU in the early 1980s. This proportion decreased over time as more countries joined the EU, standing at about 75% of total international road t-kms by the late 1990s. On average, these 6 countries display larger amounts of road and rail transport, and larger trade and GDP levels as well.

[30] We also experimented with more levels of "deregulation" and obtained similar results.

[31] We have full time series for these in part because they were members of the EU throughout the data period, and because they have the most reliable data collection systems.

Table 1 Summary statistics (country-level data, years 1982–2002), 11 countries

Variable	Obs	Mean	Std. Dev.	Min	Max
International Road: total ton-kms (millions)	206	16,280.58	12,035.04	409	51,160
International Rail: total ton-kms (millions)*	162	5,217.02	6,006.9	19	23,425
Local ton-kms (millions)**	201	9,109.92	8,828.54	548	38,628
Percent for hire international	206	92.82	6.87	66.31	100
Percent for hire local	201	50.21	15.71	15.36	78.46
Trade (billion 1990 U.S. $)	206	171.1	132.18	10.52	571.76
GDP (billion 1990 U.S. $)	206	609.65	573.65	35.64	1979.32
Diesel price (1990 U.S. $/liter)	206	0.598	0.136	0.259	0.929

* For international rail transport, we are missing observations as follows: Denmark, 9; Spain, 4; France, 6; Greece, 5; Ireland, all; Italy, 11; Portugal, 2; the Belgium–Luxembourg Union, 1; and the UK, 12

** In addition to the 4, 5 and 8 missing observations for Greece, Ireland and Italy respectively for road transport, for local road transport we are missing another observation for Spain, one for Portugal, and 3 for the Netherlands

Table 2 Summary statistics (country-level data, years 1982–2002), 6 countries

Variable	Obs	Mean	Std. Dev.	Min	Max
International Road: total ton-kms (millions)	126	19,943.72	11,072.74	3,205	47,164
International Rail: total ton-kms (millions)**	98	6,909.43	6,675.22	174	23,425
Local ton-kms (millions)*	123	11,773.82	9,926.54	1,352	38,628
Percent for hire international	126	90.45	7.35	66.31	99.31
Percent for hire local*	123	53.99	12.5	30.52	78.46
Trade (billion 1990 U.S. $)	126	224.62	127.24	30.42	571.76
GDP (billion 1990 U.S. $)	126	767.93	601.65	112.38	1979.32
Diesel price (1990 U.S. $/liter)	126	0.601	0.129	0.294	0.907

* The 3 missing data points are for local transport for the Netherlands

** The reduced sample is due to missing observations for this variable even for this set of countries—per Table 1, there are 12 missing data points for the UK, 6 for France, and one for BLEU

6 Specification and results

6.1 Effects of deregulation on quantity of international road transport

Figure 1 shows international road transport for our six-country sample. Clearly the growth in international road transport has been strong throughout the liberalization period, for both small and large countries in this set. The growth in other modes of transport was much more modest during the same period, despite being influenced by the same expansion in trade (see EU 1999 and 2000). We explore how deregulation may have contributed to this expansion by modeling international trucking as follows:

$$\log T_{ct} = \alpha_c + \beta(\log \%AuthDereg_{ct}) + \zeta(BorderDereg_t) + \mu(\log Trade_{ct}) + \nu(\log DieselPrice_{ct}) + \varepsilon_{ct} \quad (1)$$

which states that the amount of international trucking in each country depends on both types of deregulation, but also on the amount of within EU international trade that each country engages in and on differences in diesel prices across countries. We include a country-specific term to control for any relevant time-invariant country characteristic.

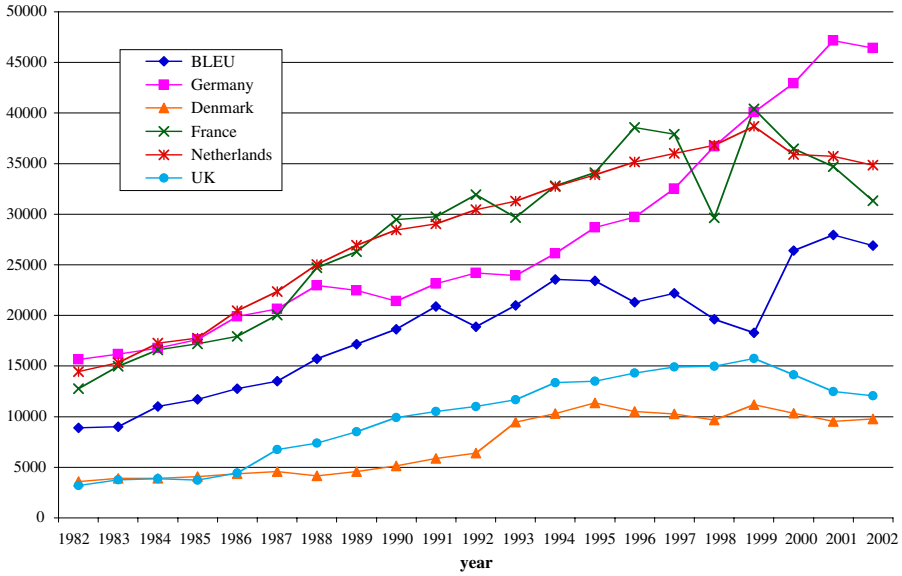

Fig. 1 Total international road ton-kms transported 1982–2002

First-differencing yields the following regression equation:

$$\Delta \log T_{ct} = \beta(\Delta \log \%AuthDereg_{ct}) + \zeta(\Delta BorderDereg_t) + \mu(\Delta \log Trade_{ct}) + \nu(\Delta \log DieselPrice_{ct}) + \Delta\varepsilon_{ct} \quad (2)$$

where the dependent variable, $\Delta \log T_{ct}$, can be interpreted as the growth in international transport by road performed by carriers of country c between years t and $t-1$.[32] All the other differenced variables are defined similarly and also can be interpreted as growth rates, except of course for the differenced *BorderDereg* variable. This last variable is set equal to one for all countries from 1990 onward, so the difference in this variable is equal to one in 1990, and zero in all other years, for all countries.

In this regression, we expect all variables except for the price of diesel to have a positive effect on the growth of international road transport.[33] Increases in the average

[32] We estimate first-difference regressions to control for country-specific effects. We also estimated fixed effects regressions, which yielded similar results, but displayed a tendency for autoregressive terms that approached unity, suggesting that differencing would be a more appropriate approach. See Chap. 10.6 in Wooldridge (2002) on the appropriate use of first differencing in policy studies. The advantage of the specification in logs is that the effects can be interpreted as proportional to the initial amount of international trucking in each country. We also estimated the above equations with linear specifications (not reported) and obtained qualitatively similar results.

[33] We also estimated the above equation with a deregulation variable for cabotage. However, the amount of cabotage is quite low in our data, and it remained so even after permits became available (Allen 2000, Commission of the European Communities 2000). Not surprisingly then, the effect of cabotage deregulation typically was not significant. Given concerns with the correlation between this and other deregulation variables in our limited panel data set, and the fact that this form of deregulation and transport did not play a major role, we chose to exclude it from our analyses.

yearly price of diesel (by country), on the other hand, increase operating costs. If this effect is high for road transport relative to other modes, then increases in fuel prices might dampen the growth of international road transport.

Table 3 shows results from estimating Eq. (2) using data for the 11 countries that joined the EU prior to 1995 (column 1), and then for our more balanced subsample of 6 countries (column 2). The results imply that the liberalization of the authorization system had a large positive effect on the growth in international trucking even after controlling for increased trade within the EU, some of which may itself be due to the deregulation of international trucking. Specifically, we find that every five percent increase in the proportion of deregulation on average leads to a one percent increase in international trucking. Border deregulation, however, has no significant effect on the growth of international road transport.[34] Growth in trade has a positive and significant effect on the growth of international road transport, as expected. Finally, the effect of the price of diesel is never statistically different from zero.

One potential concern with the results above is that our estimation strategy ascribes to deregulation all the growth in international road transport that has occurred during the deregulation period beyond that due to changes in trade and fuel prices. While we believe that trade is the main driver of international road transport in the EU, in reality other factors also might affect international trucking over time. If these factors are also positively correlated with the deregulation variable, and yet are excluded from our regressions, our estimates of the effects of deregulation will be biased upward. For example, government investments in road maintenance and construction might increase international road transport and be correlated with deregulation simply because both increase gradually over time. The omission of such investments in our regressions would then yield overestimates of the effect of deregulation.

One way to address this problem would be to control for all potentially relevant factors directly in our regressions. However, the difficulty in identifying all relevant factors and the complete lack of harmonized cross-country data on many of them lead us to adopt an alternative approach. Specifically, we consider how the growth in international road transport differs from the growth in other types of transport that were not directly affected by international road freight regulation or deregulation, and were not themselves subject to any regulatory change during the period of out data.

We rely on two very different "control groups," namely national local transport, defined as road transport within a range of 50 kms from origin, and international rail transport.[35] We expect that unobserved supply factors are likely to affect both local and international road transport in similar way. For example, investments in road infrastructure would affect both. Similarly, we expect unobserved demand factors, such as perhaps changes in the type of products shipped across borders, or changes in the distance at which goods are shipped, to affect international rail as well as

[34] Though these are not shown for space reasons, we also found statistically significant positive effects of authorizations deregulation when we specified Eqs. (1) and (2) in levels rather than logs. Border deregulation had no effect under this specification either.

[35] We use local road transport rather than all national road transport because most countries regulated and then deregulated domestic transport on distances longer than 50 kms during the period covered by our data, while the rules governing local transport were not changed. Similarly, the deregulation of international rail did not begin until after our data period.

Table 3 Total international road transport (in log)

	First-difference estimation		Difference-in-difference		
			International–Local		Trucking–Rail
	11 Countries[a]	6 Countries	11 Countries[a]	6 Countries	10 Countries[b]
Δ log Authorization deregulation	0.19** (0.06)	0.20** (0.04)	0.11 (0.07)	0.20** (0.06)	0.20** (0.07)
Δ Border deregulation (1990 dummy)	−0.03 (0.05)	0.01 (0.03)	0.02 (0.04)	−0.00 (0.04)	0.00 (0.07)
Δ log GDP			0.41 (0.64)	−0.21 (0.60)	
Δ log Trade	0.44** (0.15)	0.27* (0.11)	0.18 (0.23)	0.31 (0.19)	−0.00 (0.18)
Δ log Diesel price	0.07 (0.12)	−0.03 (0.09)			−0.22+ (0.13)
Observations	193	120	184	116	135
$Corr^2$ (actual, predicted)	0.05	0.06	0.02	0.06	0.05

Robust standard errors in parentheses; + significant at 10%; * significant at 5%; **significant at 1%. We report the correlation between predicted and actual values of the dependent variable as a more interpretable goodness of fit measure in our context, when the model does not include a constant term

[a] The 11 country regressions include Greece, although total t-kms for Greece is set equal to for-hire t-kms because Greece never reports own-account information

[b] Ireland is excluded as we were unable to find information on international rail ton-kms for this country

international road transport. This conjecture is supported by the fact that whereas total freight transport by rail (the sum of national and international) has decreased in the EU over the time period we study, *international* rail freight transport (measured in ton-kms) has either increased or remained stable in most countries. In particular, it has increased for BLEU, France, Germany, the Netherlands, Italy and Spain. Again, we expect this is due to the increased integration of EU economies over the period of our data.

Suppose in particular that Eq. (1) should be written as:

$$\log T_{ct} = \alpha_c + \beta(\log \%AuthDereg_{ct}) + \zeta(BorderDereg_t) + \mu(\log Trade_{ct}) + \nu(\log DieselPrice_{ct}) + \delta(\log RoadI_{ct}) + \varepsilon_{ct}$$

where $RoadI_{ct}$ measures the stock of road infrastructure in country c at time t. Using L to denote local road transport, we can write:

$$\log L_{ct} = \alpha_{cl} + \beta_l(\log \%AuthDereg_{ct}) + \zeta_l(BorderDereg_t) + \nu_l(\log DieselPrice_{ct}) + \delta_l(\log RoadI_{ct}) + \gamma_l(\log GDP_{ct}) + e_{ct}$$

where we have assumed that national GDP is relevant to local trucking and trade is not. First-differencing each of these equations eliminates the country-specific effects. Further, assuming that deregulation of international trucking does not affect local road transport directly, that is $\beta_l = 0$ and $\zeta_l = 0$, and that road infrastructure and diesel prices affect local road transport as much as international road transport by carriers of the same country (i.e. $\nu_l = \nu$ and $\delta_l = \delta$), we get:

$$\Delta \log T_{ct} - \Delta \log L_{ct} = \beta(\Delta \log \%AuthDereg_{ct}) + \zeta(\Delta BorderDereg_t) + \mu(\Delta \log Trade_{ct}) - \gamma_l(\Delta \log GDP_{ct}) + [\Delta\varepsilon_{ct} - \Delta e_{ct}]$$

where the coefficients on the deregulation variables, trade and GDP have no, or an l, subscript as they represent the original effects in the international road, or local transport, equations respectively. However diesel prices and road infrastucture are excluded from this equation because they are expected to have similar effects for both local and international transport carried out by the same national carriers. Consistent with this assumption, we found that diesel prices had no significant effect in the difference-in-difference regressions with local road transport, and that the inclusion of this variable did not affect other coefficients either. Diesel prices, however, reappear in the difference-in-difference equation with international rail given the expectation that it affects road transport differently than rail.

We present our difference-in-difference results relative to (the log of) local trucking, and then to (the log of) international rail, in columns 3–5 of Table 3. In other words, we compare international trucking first to another trucking segment in columns 3 and 4, so that variables that similarly affect different trucking segments are implicitly controlled for, and then to another form of international transport in column 5 to eliminate biases that could arise from factors that affect all international transport similarly. Unfortunately, there is only limited information on the amount of international freight

transported by modes other than road. Ireland, for example, lacks this information completely, and we have only limited information for the UK. For this reason, for the comparison with international rail, we show results based on what remains of our overall sample only.

Results from our difference-in-difference regressions strongly support our earlier finding that the deregulation of authorizations has had a positive effect on international trucking. The estimates of the coefficient on the deregulation of authorizations are very consistent across all the specifications, enough so that we can conclude that our original coefficients were not biased by the omission of factors that affected other trucking segment nor other international transport modes. The one exception is for our overall sample when we compare to local trucking; in this one case, the coefficient, while still positive, is somewhat lower than in the other cases.

The coefficients on the authorizations variable again imply that international trucking has grown by about 1% for each 5% increase in the proportion of authorizations deregulation. Here also we find no effect from border control deregulation. The coefficients on GDP and trade are insignificantly different from zero in columns 3 and 4, suggesting either that these variables affect local and international trucking in similar ways, or more likely in our view, that the trends in trade and GDP are too similar to estimate effects separately with any precision. The coefficient on trade is virtually zero in column 5. Since GDP is excluded from this equation, we believe that this result, combined with results in columns 1 and 2, really indicates that the growth in international trucking and in international rail transport are both strongly driven by changes in the amount of international trade within the EU. Consistent with our hypothesis about the relative importance of diesel prices for trucking, the negative effect of diesel price in column 5 implies that indeed a higher price for this input dampens the growth in international road transport relative to that in international rail transport.[36]

In addition to controlling for potentially omitted variables using a difference-in-difference approach, one might want to allow for a time trend, or perhaps even for country-specific time trends, in our equations. After first differencing, such a specification yields an estimating equation that contains a constant term or a new set of country fixed effects respectively. This constant term or country fixed effects would also remain in the difference-in-difference regressions if the trends were assumed to differ between international and local road transport, or between international road and international rail transport. We therefore re-estimated our models in Table 3 first with a constant term in each regression, and then also with country fixed effects. The constant and the country fixed effects were never significant in the regressions with our overall sample. They proved significant in those cases where our sample was limited to just six countries, but we found that this was at the expense of the coefficient on trade (and on GDP in column 4). The presence of the constant term or of country fixed effects did not improve the overall fit of our regressions. We conclude that the time

[36] Eurostat changed its data collection methodology for road freight statistics in 1999. Concerned that this might affect our results, we repeated all our analyses using only data to 1998. The results were substantially the same. As further robustness checks, we verified that international road transport as a proportion of total national and international road transport, and international road transport in proportion to total international transport using all modes, exhibited the same response to deregulation. In all cases, the results remained consistent.

trend(s) was (were) too highly correlated with the international trade and the GDP data to be able to identify these effects separately. In that context, we chose to report results that rely on an explicit explanatory factor (trade) rather than simple trend effects. However, importantly, we note that the effect of the authorization deregulation variable, while somewhat weaker, remained positive and significant in all cases, and that border deregulation continued to have no significant effect in all these regressions.

Finally, the growth in ton-kms that we observe in the data might be driven in part by the accession of countries that were on the periphery of the EU, which would lead to longer hauls on average, and thus more ton-kms, in later periods in our data. As noted earlier, the results in column 5 of Table 3 alleviate this concern as distances for international freight transport via rail should similarly go up with accession of new further away countries to the EU. Nonetheless, we also analyzed the effects of deregulation on tons rather than ton-kms transported internationally, and on average length of haul. We found no effect of deregulation on the latter, but a strong and positive effect on the amount of tons transported internationally. In sum, our results suggest an economically important positive effect of deregulation on the amount of international road transport that is not simply driven by longer distances for the same freight.

6.2 Effects on percent of total transport operated by for-hire carriers

Figure 2 displays the evolution of the share of for-hire international freight trucking for the six European countries for which we have complete time series data. This share increased in all six countries during this period, and especially in the Belgium–Luxembourg union. We explore whether the deregulation of international trucking contributed to this change by estimating the following equation:

$$\%forhire_{ct} = \alpha_c + \beta\ authorizations_{ct} + \gamma\ cabotagedummy_t + \varepsilon_{ct} \qquad (3)$$

where *%forhire* stands for the percent of total ton-kilometers transported by for-hire carriers in country c at time t. As before, the variable *authorizations* captures the deregulation of the system of licenses for international road transport. The variable *cabotagedummy*, set equal to 1 from 1991 to 1994, captures the preferential treatment of the for-hire segment with respect to cabotage between 1991 and 1994.[37] The 'full sample' results are limited to 10 countries because Greece does not report the amount of international own-account road freight transport performed. As there is no theoretical reason for international trade or the price of diesel to influence the decision to outsource trucking services, we exclude these variables from these analyses.

Results, in Table 4, imply that increasing the number of licenses had a positive and statistically significant effect on the share of total transport operated by for-hire firms. Moving from complete regulation to complete deregulation increased the percentage of for-hire transport by 4.4 or 7.5 percentage points on average depending on the set of countries we consider.

[37] We also tried introducing a trend (and therefore a constant in the first-difference equations) but it was never significantly different from zero and it did not change the other coefficients greatly, therefore we omitted it in the final version.

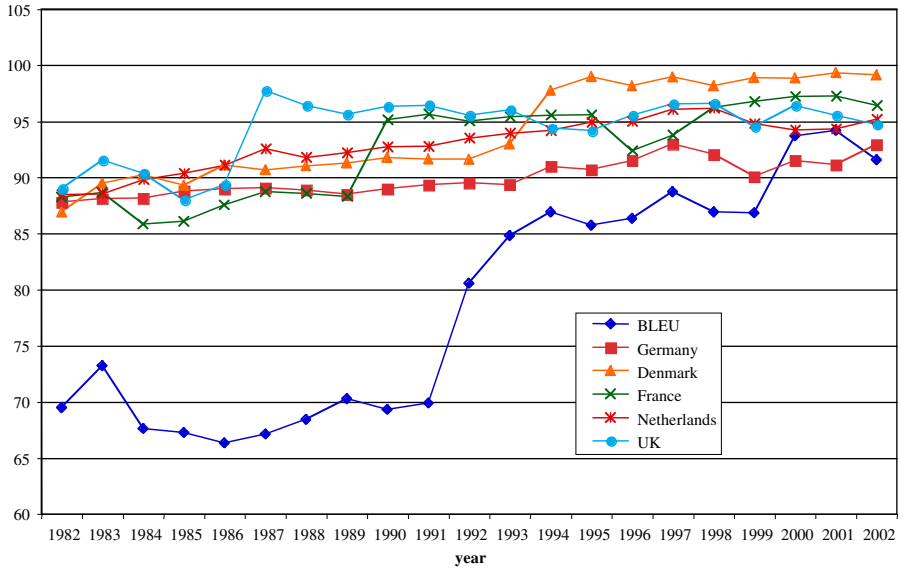

Fig. 2 Percent for hire (tkm for hire/total tkm), international trucking

Table 4 Dependent variable: % for-hire, first difference estimation

	First difference results		Dif-in-dif results	
	10 Countries	6 Countries	10 Countries	6 Countries
Δ Authorization deregulation	4.42+ (2.74)	7.53* (3.66)	−2.93 (4.39)	2.26 (2.84)
Δ Cabotage dummy (1991–1994)	−1.62** (0.56)	−1.21* (0.59)	−1.27 (1.10)	−0.04 (1.02)
Δ German dummy			−9.23** (1.10)	−8.00** (1.02)
Observations	166	116	168	120
R-squared	0.06	0.09	0.04	0.04

Robust standard errors in parentheses; + significant at 10%; * significant at 5%; ** significant at 1%

Contrary to expectations, the preferential treatment of for-hire in the cabotage liberalization process seems to have had a negative effect on shippers' decision to integrate vertically. We believe that this occurs because of other concurrent changes in the market. Still, for our purposes, it suggests a lack of advantage associated with the short preferential treatment of the for-hire segment for cabotage, which is consistent with our earlier finding (see footnote 33) that cabotage was never a major issue or opportunity. Some recent studies, e.g. Hubbard (2000) and Baker and Hubbard (2003), have analyzed the effects of technology adoption (especially on-board-computers) on the make-or-buy decision in U.S. trucking. Conversations with representatives from the European trucking industry, however, suggest that this was very unlikely to affect the make-or-buy decision in Europe because there was very limited adoption of computers beyond what was mandated everywhere by law (i.e. trip recorders) during the period of our data. As for other technological factors that might affect our results,

one might consider how the adoption of just-in-time technology may have affected the make-or-buy decision in trucking. Unfortunately, data issues prevent us from pursuing this question directly. However, the adoption of just-in-time is expected to increase the use of private, not for-hire hauling, and as such it would not explain the growth in for-hire shown in Fig. 2 and Table 4. Still, we explore whether the results above are driven by unobserved changes in the environment faced by shippers, including technological change but also potential macroeconomic changes, by comparing again how the decision to subcontract international trucking needs varied relative to local trucking during the same period. The identification strategy in this case relies on the assumption that technological or environmental changes that affected international trucking also affected local trucking. We include a German dummy variable in these regressions to capture a change in the way that national trucking statistics were collected in Germany. Specifically, starting in 1994 they were collected by survey instead of self reports, which caused total national trucking to go up by about 20%, but local own-account trucking to drop by about 30%, that year.

The results, in columns 3 and 4 of Table 4, suggest that international deregulation had no measurable effect on the vertical structure of international trucking. Though the amount of for-hire international transport clearly went up during deregulation, per Fig. 2 and the results in columns 1 and 2 of Table 4, from the last two columns we see that this has occurred at a pace that is not statistically different from that of local transport. We believe that this lack of a significant deregulation effect arises because shippers that have international operations usually operate at the national level as well. Since national road freight transport is much larger than international transport in most countries, the incentives to integrate vertically are driven by concerns related more to national than international transport.[38] In fact, data in Fig. 3 below indicate that shippers have greatly increased the amount of outsourcing for national freight as well between 1982 and 2002. We conclude that factors beyond international road transport deregulation have led to the increase in reliance on for-hire road freight transport in Fig. 2.

6.3 Effects on member state transport intensity

In this section, we consider the extent to which deregulation has affected how much different member states may "disproportionately" participate in international transport. Figure 4 shows the evolution of the relative transport intensity of each of these countries over time, namely:

$$intensity_{ct} = \frac{T_{ct}/\sum_c T_{ct}}{GDP_{ct}/\sum_c GDP_{ct}} \tag{4}$$

[38] International trucking is larger than national trucking (excluding local) only in small, open and centrally located countries, notably the Belgium–Luxembourg Economic Union, the Netherlands and Denmark after 1993. On average, however, national trucking over distances greater than 50 km, measured in t-kms, is more than five times larger than local trucking and more than four times larger than international trucking in our data.

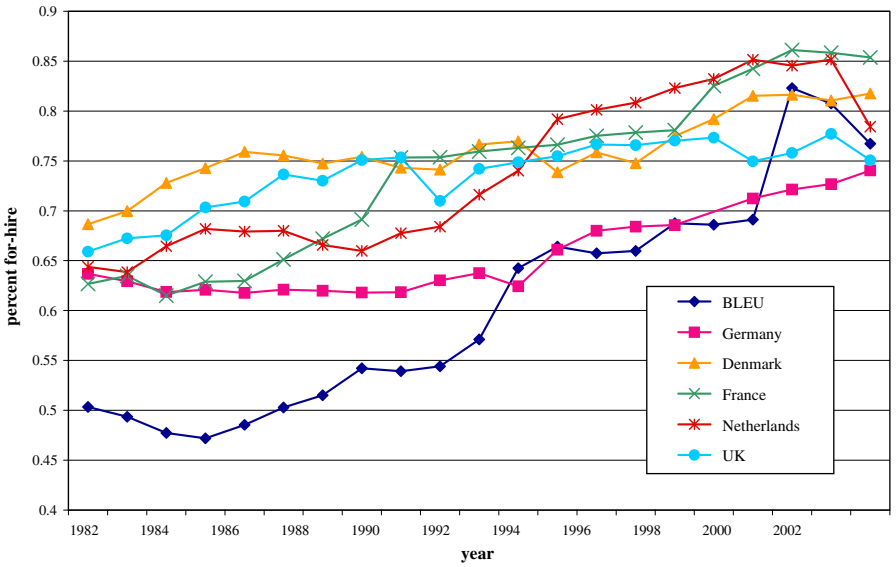

Fig. 3 Percent for hire (tkm for hire/total tkm), national trucking over 50 km (ton-kms)

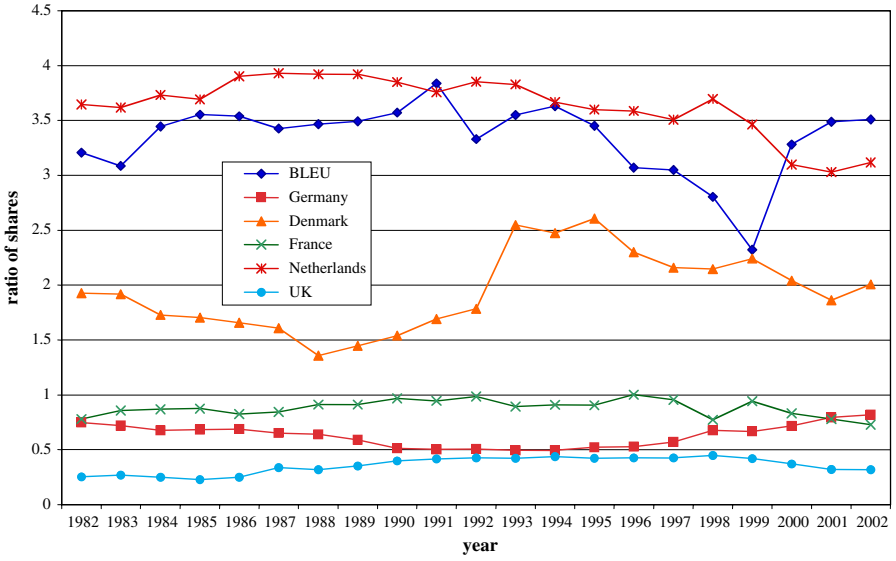

Fig. 4 (Country share of 6 country international transport by road)/(Country share of 6 country gdp)

where T_{ct} represents the amount of international road transport in t-kms of the carriers of country c in year t, and GDP_{ct} is Gross Domestic Product for country c in period t. This measure captures the degree to which a particular country 'specializes' in international road transport, that is the extent to which its share of international road transport diverges from its share of European GDP.

The graph does not suggest a clear effect of deregulation on the tendency for different countries to specialize more in, or get a larger share of, international road transport in Europe. Neither those with larger shares nor smaller shares before deregulation seem to gain disproportionately from the change. The three countries with ratios below one in Fig. 4—the countries that do less international road transport than their GDP "warrants"—stay at this level throughout the period of our data, and the three countries with ratios above one, all of which are small countries through which much traffic must go, also are consistently above one over the full period, albeit with a degree of fluctuation in "intensity." Regression results (not shown), where we allow deregulation to affect high and low intensity countries differently, confirmed that deregulation had basically no effect on the "degree of specialization" in international road transport for the six countries for which we have more complete time-series.

We also examined this issue using an alternative measure of specialization: the share of total international road transport accounted for by each of the six countries for which we have full time series data, in proportion to the total amount of international road freight transport of those same six countries. Again this measure showed no net effect of deregulation.

We address the possibility that carriers of low-wage countries would benefit disproportionately from the deregulated environment in Fig. 5, which shows the share of total international road freight transport (i.e. country *c*'s international road transport divided by the sum of such transport across all 11 member countries) performed by carriers of low-wage countries, i.e. Italy, Portugal and Spain. This figure shows that carriers of these countries have not increased their share of total international transport dramatically. The largest increase is for carriers based in Spain, but only for the later years of the sample when the wage differential with other European countries was in fact decreasing.

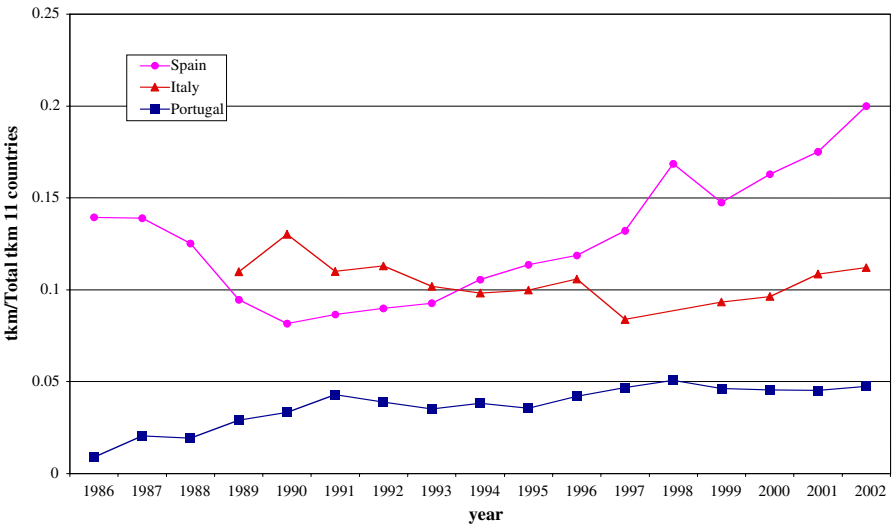

Fig. 5 International road freight transport share of low low-wage countries (of 11 country total)

Table 5 HHI index for international transport in Western Europe

Year	HHI(11)	HHI(6)	Year	HHI(11)	HHI(6)
1982	1929	2096	**1993**	1305	1921
1983	1900	2085	**1994**	1307	1903
1984	1930	2089	**1995**	1221	1901
1985	1946	2096	**1996**	1225	1956
1986	1624	2098	**1997**	1236	1950
1987	1558	2042	**1998**	1393	1971
1988	1596	2085	**1999**	1173	2014
1989	1353	2058	**2000**	1147	1979
1990	1354	2041	**2001**	1174	2042
1991	1326	2003	**2002**	1189	2043
1992	1336	2021			

To explore the concern about distribution of international trucking activity in a different way, Table 5 uses the Hirschman-Herfindahl index (HHI) of concentration. This index is calculated each year as $\sum_c (s_{ct})^2$ where s_{ct} represents the share of EU international road transport performed by carriers based in country c in year t. We present this measure for both our set of 11 and then 6 member countries.

The index confirms that for the EU as a whole, the concentration of the international road freight industry has been steadily decreasing over the period covered by our data. This, of course, is not surprising given EU enlargement. When we focus on only those six countries that were members throughout, we find a decrease in concentration from the mid 1980s to the mid 1990s, after which concentration increases. This suggests that the carriers of countries that started off with low shares of international road transport gained share during the deregulation period. But from the mid 1990s, when full deregulation had occurred, the larger share countries bounced back. In the end, the net effect of deregulation on the transport share and intensity of each country, and thus on the concentration of the economic activity across countries, has been negligible.

7 Conclusion

In this paper we have described how the international road freight transport sector in the European Union was regulated and then deregulated throughout the 1980s and 1990s, and analyzed the effect of the deregulation on the growth and organization of the international segment of the trucking industry.

Deregulation in the EU occurred mostly through the gradual dismantlement of the system of authorizations allocated for international road transport and through the elimination of border controls. Our results suggest that eliminating quotas on the number of authorizations had a positive effect on the amount of international road transport in the EU after controlling for increased trade as well as potentially unobserved factors that would have affected local trucking or rail transport. We believe that this increase in international road freight came about because carriers were able to route and use their trucks more efficiently once the quota system was relaxed. This allowed them to arrange backhauls more easily. The cost savings were at least in part passed on to shippers who then chose to rely on trucking to a greater extent for

their international transport needs. In other words, we find evidence suggesting that deregulation was efficiency enhancing in Europe as it was in the United States.

We also found that although shippers increased their reliance on for-hire, compared to own-account, for their international road transportation needs during the deregulation period, they did the same to an even greater extent for their national transport needs. We conclude that other factors, rather than international deregulation, have led shippers to rely on the buy option to a larger extent for all their transportation needs in the EU.

Finally, we examined how the deregulation of the international trucking sector changed the distribution of this activity across EU member countries and concluded that the effect of deregulation on this aspect of the industry was negligible. This is an important finding in the context of the EU, where the veto power of countries, coupled with their desire to maintain the status quo for their economies, accounts for strong inertia in the decision-making process. Such tendency toward inertia can only grow with the accession of 10 new members in May 2004. Our result that the distribution of economic activity in the crucial and quite mobile industry that is international road transport did not change importantly should be reassuring to those involved in the development of supranational policy at the EU level and elsewhere as well.

These last results moreover suggest that carriers of the new member countries are not likely to take a share of EU-wide international road freight transport that is disproportionate to their level of economic activity. However, there is evidence that increasing trade ties and the need to comply with EU regulations in these countries will increase the use of road freight haulage, and thus of the infrastructure that supports road freight transport, as shippers move away from other modes, especially rail.

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Appendix

Table A1 Distribution of community quotas over the period 1982–1992

	1982[a]	1985[b]	1986[c]	1987[d]	1988[e]	1989[e]	1990[f]	1991[g]	1992[g]
Belgium	434	570	707	1036	1488	2084	2918	4133	5787
Denmark	305	469	625	929	1444	2022	2831	4010	5614
Germany	727	914	1112	1735	2374	3324	4654	6986	9781
Greece	88	131	170	293	658	922	1291	1829	2561
Spain	–	–	673	1014	1543	2161	3026	4286	6001
France	656	801	957	1488	2018	2826	3957	5604	7846
Ireland	88	147	204	341	671	940	1316	1865	2611
Italy	567	721	883	1424	2022	2831	3964	5614	7860
Luxembourg	111	179	245	404	693	971	1360	1926	2697
Netherlands	626	785	955	1553	2104	2946	4125	5842	8179
Portugal	–	–	233	416	873	1223	1713	2427	3398

Table A1 continued

	1982[a]	1985[b]	1986[c]	1987[d]	1988[e]	1989[e]	1990[f]	1991[g]	1992[g]
UK	436	551	673	902	1265	1771	2480	3512	4917
Total authorized	4038	5268	7437	11535	17153	24021	33635	48034	266513

[a] Council Reg. 663/82 in OJ L 78 of 24/3/82. A 15% increase for Greece and Ireland and a 5% increase for all other member states
[b] Council Reg. 3621/84 in OJ L 333 of 21/12/84 p. 61
[c] Council Reg. 3677/85 in OJ L 354 of 30/12/85
[d] Council Reg. 1879/87 in OJ L 179 of 3/7/87
[e] Council Reg. 1841/88 in OJ L 163 of 30/6/88
[f] Council Reg. 1053/90 in OJ L 108 of 28/4/90
[g] Council Reg. 3914/90 and 3915/90 in OJ L 375 of 12/1990. Council Reg. 3915/90 increases the quotas allocated to all countries slightly and to Germany significantly in view of the German unification

Table A2 Proportion of international freight transport deregulated, 1982–1992, assuming 90% is deregulated in 1992 and 100% is deregulated starting in 1993. Each cell is [#authorizations (t)/#authorizations (1992)] * 90

	1982–84	1985	1986	1987	1988	1989	1990	1991	1992
Belgium	6.75	8.86	11	16.11	23.14	32.41	45.38	64.28	90
Denmark	4.89	7.52	10.02	14.89	23.15	32.42	45.38	64.29	90
Germany	6.69	8.41	10.23	15.96	21.84	30.59	42.82	64.28	90
Greece	3.09	4.6	5.97	10.3	23.12	32.4	45.37	64.28	90
Spain	–	–	10.09	15.21	23.14	32.41	45.38	64.28	90
France	7.52	9.19	10.98	17.07	23.15	32.42	45.39	64.28	90
Ireland	3.03	5.07	7.03	11.75	23.13	32.4	45.36	64.29	90
Italy	6.49	8.26	10.11	16.31	23.15	32.42	45.39	64.28	90
Luxembourg	3.7	5.97	8.18	13.48	23.13	32.4	45.38	64.27	90
Netherlands	6.89	8.64	10.51	17.09	23.15	32.42	45.39	64.28	90
Portugal	–	–	6.17	11.02	23.12	32.39	45.37	64.28	90
UK	7.98	10.09	12.32	16.51	23.15	32.42	45.39	64.28	90

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