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TRANSPORT TRENDS AND ECONOMICS

Studies on transport economics and track costs undertaken by other organizations

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CONCLUSIONS OF THE ECMT ROUND TABLE 127 : TIME AND TRANSPORT

The Round Table was held on 3 and 4 December 2003 at OECD Headquarters in Paris.

The valuation standards of time requirements for transport and time savings as a consequence of transport policies are often decisive for the acceptance or rejection of transport policies and transport infrastructure investment projects. Time savings usually account for about four-fifths of the non-monetary benefits of transport policy measures. The Round Table revisited the extended literature on the valuation of passenger time, discussed the under-researched area of the value of time in freight transport and explored the value of time in freight transport derived from changes in interregional and international trade, induced by a more efficient transport sector.

Time and Passenger Transport

While the theoretical foundations of the measurement of the value of time are straightforward, sizeable differences in its measurement and in evaluation conventions exist. Demand for transport is considered to be a derived demand, transport being an input into other consumption or production activity. As a consequence, the value of time on the individual level is equal to the foregone income which would result from an extra unit of labour time. If the users of the transport system could freely adjust their labour time, this would be equal to the value of an

extra time unit of leisure. The difficulties of evaluating passenger travel time result from the fact that most persons face restrictions on adjusting labour and leisure time to their preferences. Moreover, it is unclear to what extent the uses of transport facilities have a character of genuine consumption and to what extent trips have multiple purposes. In empirical studies and in evaluation conventions, the answers to these questions depend on the mode of transport and on the causes of the time requirements.

The value of time is obtained through direct methods of evaluating effects, through stated-preference surveys or revealed-preference methods. Given the many restrictions individuals face in choosing travel times and trip routes (possibly combining multiple trip purposes) and given the incomplete information on transport related choice options, individual choices will depend on a relatively large number of socio economic characteristics. Therefore, empirical assessments can only give a more or less precise picture of individual valuations of time. Moreover, the analysts' information on the distribution characteristics of the relative consumer population is in many cases imperfect. Therefore, an average approach to measure the opportunity cost of time is often used. The hourly value of travel time is related to average hourly salaries. In more differentiated analyses, different values of transport time have been attached to the time of travelling, congestion delays and waiting times as well as to using different modes of transport.

In many instances, stated-preference studies have shown that many of the individuals affected by transport policies misperceive their effects. As future users tended to overestimate improvements in general and time savings in particular, and future non-users to underrate them, stated-preference exercises seem to suffer from strategic misrepresentation of preferences in interviews or imperfectly designed laboratory experiments.

Revealed-preference studies try to distil the passengers' values of time from econometric and calibration studies, accounting for a varying number of determinants of travel behaviour. Recent studies, based on the random utility model, have succeeded in improving the account taken of time value in transport demand models. In comparison to other approaches, they have indicated a higher value of transport time and consequently a higher demand for speed.

Relatively high preferences for speed or high elasticities of travel demand with respect to reduced time costs have been the basis of concerns, particularly of urban planners, in the following respects:

The high preference for speed indicates high costs of delays due to congestion and these can be used to support relatively elevated user charges for transport facilities. Urban planners and policymakers therefore expect a strong resistance from users, as many of them are severely constrained in their possibilities to change travel times or make other mode choices in response to high peak charges. Moreover, high revenues from infrastructure charging may indicate a high demand for infrastructure investments which may conflict with other city development or environmental protection objectives.

A second concern is that a strong demand for speed could fuel urban sprawl. This concern is based on what is called "Zahavi's hypothesis", i.e. the assertion that, independent of the conditions of passenger travel, individuals' daily travel time budgets remain constant. An increase in travel speeds would then imply an increase in daily distances travelled, a less dense pattern of urbanisation and an increase in the problems of urban sprawl. While the costs of transport, and particularly time requirements for commuting, have impacts on urban form and city sizes, the statistical problems in the studies on Zahavi's hypothesis and the lack of attention

to what determines firms' and households' location choices do not allow immediate conclusions to be drawn on urban policies.

The concerns about estimates of the value of passenger time seem to be derived from the expectation that the assessment of high time values could be used to argue for excessive investment in transport infrastructure. High values of time indeed show that congestion costs are high. If schemes for transport infrastructure user charges do take account of congestion costs, the high time values imply high charges which will lead to reductions in travel demand, depending on the opportunities for passengers to adjust their travel behaviour. Beyond the immediate behavioural changes, the user charges may help to lift some of the constraints faced by passengers in responding to prices (more flexible working times, increased supply of alternative modes of transport, etc.). In any case, the assessment of high values of passenger travel times does not deny the existence of pressing transport policy problems, such as environmental costs and the many other social costs which are addressed by spatial and urban policies. A rational transport policy will be based on a proper account of these problems as well as on as precise estimates of the values of passenger times as possible.

The Value of Freight Time in Transport

Reviews of cost-benefit-analyses of transport policy measures have shown that freight transport requirements are seldom included. Government practice in Sweden is an exception in that unit prices related to goods are used in the CBA methodology of the National Roads Authority (VV) and the National Rail Authority (BV). They are also part of the national forecasting model, which contains a module for goods transport by different modes, including imports, exports and transit traffic. EUNET, a research project funded by the European Commission as part of the Fourth Framework Programme, included the development of "freight user values of time", without leading to much implementation in the Member countries so far.

One reason why there is not more attention in evaluation studies to reductions in transport times for goods may be the fact that the valuation of their costs is often supposed to be reflected in market valuations. The importance of adding benefits of reduced goods transport times to public evaluation procedures depends on the extent to which shorter transport times, more reliable arrival times and less damage to goods, due to delays, provide non-market benefits. In addition, it depends on the repercussions a more efficient transport system has on the entirety of the supply chain.

The broadest components of generalised costs in freight transport are: the cost of transport in a narrow sense (e.g. the cost of using a vehicle); the cost of delayed consumption or use of intermediate goods while they are in transit; and other costs concerning uncertainty about effective transport arrival times and/or the degradation, loss or damage of the goods in transit from production to consumption.

Corresponding to these cost categories, unit values are estimated for expected freight transport times, or time savings, unit values of improved reliability and unit values of reduced damage. There are two basic approaches to deriving the unit values for freight transport: the "market price approach" and econometric estimates of freight time values, based on stated preferences obtained from interviews with decisionmakers, confronting them with hypothetical choices, or from data on factual decisions concerning route or mode choice, interpreting them as revealing the decisionmakers' preferences. Where freight transport time valuations are part of cost-benefit analysis practice, the market price of capital approach is used. The data used to

calculate the net time values are the rate of interest, the value of goods carried per tonne plus the number of tonnes carried per vehicle unit and the number of hours per year. In other words, the time valuation is restricted to the financial cost of working capital by reducing transport times. This practise of valuing freight transport time abstracts from the consequences for parts of supply chains other than core transport activities.

The fact that demands for transport services are often stochastic implies that the willingness to pay for shorter time requirements for goods transport is often much higher than what is estimated by the capital method. The fact that stochastic variability of demand has not induced precautionary inventory responses reflects high costs which are potentially avoided by shorter transport times.

Attempts to estimate the value of greater reliability in transport services has led to a doubling of the conventional estimates based on the capital method. The examples of quantifying the reduction in the risk of damage as a result of shorter transport times have equally led to significant increases in the estimates. They do, however, still suffer from conceptual problems when defining the damages and risk assessment methods.

The Round Table discussions suggested that it is necessary to broaden the spectrum of costs and benefits of transport time savings even further by looking at the value added of responses to changes in transport times in the transport sector, changes in inventories held and even in the production processes. A scheme to enumerate and quantify these effects was proposed.

The overall changes throughout the supply chain may even require going beyond the usual partial equilibrium view of cost-benefit-analysis, based on the presumption that the relative prices of goods remain largely unchanged. Far-reaching transport policy measures or large transport infrastructure investment projects are likely to be associated with changes in relative prices which can induce changes in the geographical pattern of trade relations and a relocation of production activities. The exclusion of such "secondary effects" from the evaluation of transport policy projects implies a tendency to underestimate the net benefits of transport policies.

The Importance of Cost and Time of Transport for International Trade

The increased importance of the secondary effects of transport time variations is reflected in the high attention transport costs have recently received in the literature on international trade. In contrast to standard models of trade theory and most of the trade policy debates focussing exclusively on policy imposed obstacles to trade, transport policy-related impediments and other policy-independent frictions have recently become a prominent object of study. Hand in hand with this reorientation goes a greater awareness of the importance of transport policies in helping to realise the potential gains from international economic relations.

Even without significant tariff barriers to trade and reduced non-tariff barriers, the international exchange of goods is far from frictionless. The average difference between factory prices of exporters and prices of consumer goods imported into the US amounts to a tariff equivalent of 170 per cent. This entails a 55 per cent tariff equivalent for wholesale and retail margins, 44 per cent for border- related trade barriers and a 21 per cent tariff equivalent for transport costs. The transport cost figure includes a 9 per cent tariff equivalent for the time value in transit.

The immediate effect of trade costs is a reduction in trade volumes and the ensuing reduction in gains from specialisation. Whether this is important for a country's economy depends on which resources a country already has available and only has access to by trading with partner countries. Secondly, trade frictions constrain the opportunities for individual countries to exploit increasing returns to scale, or limit them in doing so by restricting the number of consumers to the size of the own population. Thirdly, trade costs determine which countries are trading partners, and which pattern of comparative advantages emerges from these trade relations. Fourthly, trade costs and time requirements for transport seem to be particularly important for trade in intermediate goods. This aspect includes the vertical disintegration of large companies by outsourcing parts of the production process to foreign countries in relation to the cost advantages offered there. Finally, time requirements for transport between regions or nations may impede the realisation of agglomeration economies and the attraction of multiple, interrelated industries to one location, and decrease that region's or country's economic potential.

A detailed study of the trade costs showed that the resource costs of transport have become less important than the time costs of international trade, a conclusion which is confirmed by the strong shift to freight air transport, even though air transport costs are about 25 per cent of the product value higher than ground transport.

A major reason for the high importance of transport time is the shortening of product cycles. The productivity increases of research and development, as a result of technical progress there, lead to faster arrivals of product innovations and product designs which can only develop their market potential with short delays between production and availability to the retail sector. These developments do not only concern relatively small high-tech sectors but also labour-intensive sectors, such as, e.g., the clothing industry. Against the backdrop of these developments, proximity to major market areas seems to be an increasingly important determinant for the location of industries, relative to the real wage costs at different locations.

The increased importance of transport times for international and interregional trade indicates the challenge for transport policy to react to, anticipate and support these developments.

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