

TIPMAC – TRANSPORT INFRASTRUCTURE AND POLICY: A MACROECONOMIC ANALYSIS FOR THE EU

CLIENT: European Commission - Directorate General Transport and Energy- 5th Framework Programme for Research and Development

YEAR: 2001-2003

DESCRIPTION OF ACTIVITIES:

The TIPMAC project analyses ‘The role of transport in macro-economic development and employment’ as part of a projects cluster on socio-economic impacts of transport investments and policies and network effects in the EU of the Fourth Research Programme.

TIPMAC combined transport modelling with macro-economic modelling to study the indirect macroeconomic impacts of transport infrastructure investment and transport pricing policies in the EU. The study focused on the TEN-T infrastructure projects and transport pricing policies, using the White Papers “*Fair Pricing for Infrastructure Use*” and “*European Transport Policies for 2010: time to decide*” as a starting point.

Two parallel analyses employing contrasting methodologies were undertaken. They employ models that are at the leading edge of EU analysis, employing state-of-the-art techniques and knowledge of industrial and consumer behaviour.

Common scenarios were defined to provide common model input assumptions for the cluster projects (TIPMAC and IASON). All scenarios are revenue neutral and include alternative options for TEN-T projects funding which are offset by reductions in personal income tax.

The modelling tools

The TIPMAC project involved two parallel analyses.

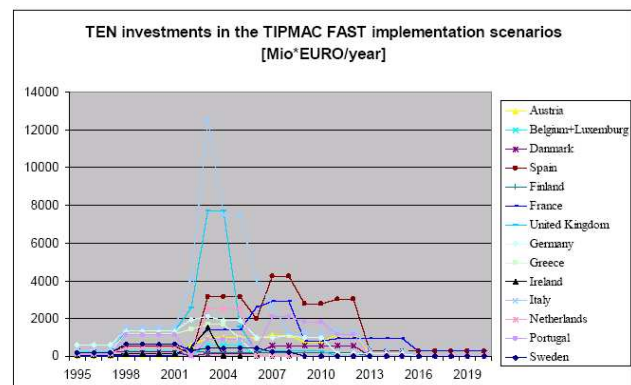
- In one analysis, the SCENES transport network model has been linked to the E3ME macroeconomic model. This joint use is a significant innovation in transport policy analysis, as a major limitation of macroeconomic analyses is that the modelling of the transport sector is very simple. TIPMAC has experimented a way to overcome this problem by combining a full macroeconomic model with a detailed analysis of the transport sector, allowing for changes in both passenger and freight demand and a network analysis of the impact of new infrastructure.
- In the second analysis, the ASTRA model is applied. The model was developed under the 4th research framework programme of the European

Commission for strategic assessment of long-term impacts of European transport policy with respect to economic, environmental and social implications. The technical challenge of ASTRA was to demonstrate that the applied system dynamics methodology is appropriate for such long-term policy assessments.

The scenarios

Three policy scenarios were designed as variants in the implementation of the measures the White Paper considers essential to redirect the Common Transport Policy towards meeting the need for sustainable development. These were defined by juxtaposing transport taxation and infrastructure charges as alternative instruments to capture external costs generated by transport vehicles, as well as the main sources to fund a slow or a fast implementation of the Trans-European Transport Network projects in the next decades.

- In the first scenario, Social Marginal Cost Pricing is adopted as a key criterion to harmonise infrastructure pricing in the EU together with a *slow implementation* of the TEN-T core projects.
- In scenarios two and three, investments flows are anticipated (*fast implementation*). In the second scenario variant, the bulk of additional funds to fund the fast implementation of TEN-T core projects is made available by means of increasing taxation on fuel, while in the third variant infrastructure charges are levied at social marginal costs.



The impacts of the three scenarios are compared with those of a reference or Business as Usual (BAU) scenario. Social marginal costs depend on different types of vehicles, traffic conditions, existing levels of transport modes taxation and of subsidies. Furthermore social marginal costs vary significantly through time as the total traffic and its distribution among the different modes changes. The operational approach followed in the estimation of such costs was then to proceed with a top down methodology, starting from *existing* estimates of average marginal costs for some European countries and mode and extrapolate values where no estimates were available.

The results

The analyses detailed the indirect impacts of transport infrastructure spending on the TEN-T network and a range of alternative pricing regimes, in addition to the direct impacts. They detailed the implications for different industrial sectors. Employment by industry and country and changes in overall economic performance as measured by GDP and employment were modelled. Also, the distribution of effects – across EU member states and by industry - were

calculated. The impacts on CO₂ emissions were calculated.

The analyses demonstrated the factors that determine the macroeconomic response to transport investment and pricing policies.

Further outputs are an enhanced modelling capability for macroeconomic assessment of transport policy. The ASTRA model was improved and updated, in the area of productivity impacts of transport, with increased sectoral detail. The SCENES and E3ME system now form a unique model system, which for the first time combines disaggregated macroeconomic modelling with a detailed transport network and demand analysis.

The Consortium

The TIPMAC consortium was led by Cambridge Econometrics (UK) and composed by IWW Universitaet Karlsruhe (Germany), TRT Trasporti e Territorio, ME&P Marcial Echenique and Partners (UK), TNO INRO (NL) and NOBE, Niezalezny Osrodek badan Ekonomicznych (PL).

Changes to BAU in TEN+Fuel scenario for EU15 macroeconomic aggregates (left) and road vehicles CO₂ equivalent emissions reduction from SMCP Scenario in the year 2020 (right)

