Modelling freight demand in New Zealand

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Research has shown that over a period of more than 10 years, road freight in New Zealand has grown at approximately 1.3 times the rate of real gross domestic product (RGDP) growth and that these two growth rates are strongly correlated \((r^2=0.98)\). What this means is that if things continue as they have done for the last 10 years, road freight volumes (measured in tonne-km) will double in 18 years. This growth in road-freight is not the result of shifts from other transport modes. The data on rail freight movements for largely the same period show even higher growth rates. Moreover road freight makes up over 70% of the freight task by tonne-kms and 92% by tonnes moved and therefore dominates any statistics on freight demand. Thus the observed growth in road freight volume reflects the growth in overall freight demand. Freight growth of this magnitude is unsustainable in the long term at a number of levels.

Similar patterns of growth in freight demand have been observed in other countries, notably Australia and the European Union, but some countries such as the USA and the UK have had freight demand growing more slowly than the economy.

Although the model relating freight growth to RGDP growth provides a good fit to the observed data it is of limited use in developing strategies for a more sustainable freight system. Using this model the only mechanism available to reduce freight demand is to have negative RGDP growth but this is not an acceptable strategy in most economies.

To address this problem we have developed a more complex modelling framework that describes the relationships between economic growth and freight growth. In principle this framework can be applied to the economy as a whole, or to a specific region or to a sector and it incorporates mechanisms by which freight growth will be greater than economic growth.

Data have been collected for the existing patterns of freight movements and these are being used to calibrate the modelling framework both at the national economy level and for several major industry sectors. The models predict total freight demand and the allocation of that demand to the different transport modes is done on the basis that users choose the mode with the greatest utility.

To be able to use these models for developing strategies for achieving sustainable levels of freight demand we need to determine the relationships between the key economic drivers and the model parameter values that they influence. Potential economic drivers include oil price, population, exchange rate, productivity, manufacturing intensity etc. This work is currently in progress and we expect to be able to present preliminary results in the full paper.