Mikio Takebayashi and Masamistu Onishi’s paper starts from a very topical and stimulating point – namely, the (lack of) robustness of airline networks to investigate whether high-speed rail (HSR) services could help in more resilient networks in case of sudden adverse events. The authors present a model for addressing such situations. Beyond the apparent sophistication of mathematical formulations and the fact that the authors have certainly done their best, several of their assumptions are questionable.

First of all, HSR services are obviously needed at country and airport level. However, high-speed rail services are globally still relatively underdeveloped compared to the dense grid of airline routes. This is notably due 1) to infrastructure costs compared to insufficient demand and/or to insufficient resources available (de Rus and Nombela, 2007); 2) the fact that HSR attractiveness is restricted to rather short distances because of airline competition (Dobruszkes et al., 2014); 3) physical obstacles, especially seas and mountains. What is more, even in existing HSR networks, there are only a few connections at airports, which could be due to bad planning, a limited market or to high-speed line design that involves large detours to serve airports. In that case, the detours would penalise the dominant, inter-city market (Dobruszkes and Givoni, 2013). It is then very unlikely that costly extra-infrastructure works would be made just to improve air network reliability in case of unexpected events.

Provided HSR services actually exist, the authors assume the absence of any capacity constraints. This is justified by the fact that in Japan, travellers can stand in certain high-speed trains (recall than in most other countries, booking a seat is mandatory). But let consider Tokyo airports. Tokyo Haneda Airport handles about 85 million passengers annually, and Tokyo Narita Airport processes 41 million, which means Haneda handles an average of nearly 233,000 people a day, and Narita Airport processes more than 112,000 passengers every day. If half of them (116,500 and 56,000, respectively) were to be moved to further cities or alternate airports, it would imply a huge concrete flow. Optimistically estimating available capacity on existing HSR services at 500 extra passengers in each train, this still means 233 plus 112 trains, respectively, would be needed every day. If operated over 18 hours, this would mean 19 trains per hour, which is around the technical limit of most HSR systems, but is not available in most existing HSR corridors. Of course, no train operator has so many trains available in its depots, and, in any case, virtually no high-speed line would be able to accommodate such capacity if it were added to existing services.

Another point is air passengers’ freedom of travel or lack of it. Subject to citizenship, people need an ID, passport or visa to cross borders⁠¹. This could significantly prevent unexpected re-routings via surface transportation. For instance, during the 2010 Eyjafjallajökull eruption, connecting passengers were blocked inside the controlled area of Moscow Airport without any chance of going to a hotel in town to wait until the traffic recovered. Similarly, people travelling to London with a visa valid in the UK only cannot be rerouted via Paris, France, or Brussels, Belgium, with the hope of an alternate HSR connection if they do not hold a Schengen visa or the automatic right to enter the Schengen area subject to their citizenship. As a result, the rationale for HSR as a means of rescue transportation could only be partial and restricted to domestic city-pairs only.

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¹ See https://www.henleyglobal.com/henley-passport-index
Last but not least, the modelling exercise assumes passengers would choose the best available routes through disutility comparison. Even though this approach is common in transportation research, passengers are not constantly conscious of their behaviour, because they are complex human beings who are affected by social forces (Van Acker et al., 2010). What is called rationality is very diverse according to various social, demographic and occupational attributes. Rational choice in transportation is also denied to some extent by routines and habits (Marechal, 2018). As a result, the neo-classical assumptions that dominate transportation modelling (Kębłowski and Bassens, 2018) are probably not fulfilled in many cases. In more general terms, it is worth noting that the complexity of human behaviour is simplified, including through hypotheses inspired by natural laws at the time natural sciences themselves have significantly moved towards a better integration of the complexity of processes, including non-equilibrium, multiple potential futures, bifurcations and path dependencies (Wallerstein, 1996). What is more, one could expect that disrupted contexts are even less appropriate for considering “rational” behaviours, notably because of a lack of time to compare options, the lack of broad information, stress and little time to decide. In concrete terms, let us consider an airport with highly disrupted services and many distraught passengers. Suddenly, an announcement is made that 500 seats will be available in 20 minutes on a train heading towards a given city. Affected, shocked passengers will simply not have the time to compare all options and to decide coolly and “rationally”.

All in all, these issues could involve a significant gap between the modelling exercise and what would happen in the real world should one or several airports close unexpectedly. As scholars, we have nothing a priori against modelling, and we have all used various modelling techniques when we have found them relevant. Of course, several authors have performed such simplified modelling exercises, because taking into account the whole social reality is much more demanding, if not impossible. But this raises two fundamental questions. First, what is the rationale for setting up a model we know in advance could only approximate the real world, without any evidence that its prediction would be correct, since there is no reality available for calibration2? Second, if the model is simplified and cannot guarantee the whole complexity of behaviours and institutional constraints (as fairly acknowledged by Mikio Takebayashi and Masamistu Onishi), it makes sense that the authors prevent themselves from deriving policy conclusions. At the time of austerity in many countries, could we really figure out that governments would decide to invest in costly infrastructures based on a model that is not fully representative of all the parameters? Simply said, not only transportation networks have to be robust, but also evidence produced by experts to advise policymakers.

References


2 This contrasts with modal choice or routing models, that can be calibrated based on concrete observations.
