**Title:** Traffic safety versus traffic flow on freeways – an empirical analysis

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For freeways, there is a well-known relationship between traffic flow and traffic safety. Roughly independent of the geographical location, traffic is fairly safe (measured in accidents per million miles) for intermediate traffic flows, while it is getting worse for very small or very high traffic flows close to congestion [1], [2]. Furthermore, the very nature of the accident type changes with traffic flow: while the peak at small traffic flow is due to accidents with one or with two vehicles, the peak at large traffic flow is from accidents where almost always two vehicles are involved [2]. An example which is similar to the results in [2] is presented in Figure 1.

Being known for a very long time (already in 1937 the work of Veh [3] demonstrates a weak relationship), there seems to be little effort required to find this effect also in surrogate safety measures (SSM). This will be dealt with in the paper. By analysing single vehicle data from a German freeway, some of the commonly used SSMs will be computed and their distribution analysed. Not surprisingly, these distributions seem to belong to the family of Generalized Extreme Value (GEV) type. Furthermore, by analysing the number of critical situations defined as the 97%-percentile of the corresponding distribution, at least the peak at small traffic flows can be reproduced with the SSM’s analysed so far.