The vibro-impact response of a single-degree of freedom model with the coefficient of restitution is analyzed using pointwise mapping and a standard averaging combined with non-smooth transformations. Experimental data are taken from a cantilever beam with attached mass and unilateral constraint submitted to different gap configurations and levels of excitation. Numerical simulations are used to reproduce empirical observations to a certain extent and validate theoretical predictions. Investigations on the coefficient of restitution show its dependence on the forcing frequency and pre-contact velocity. The effect of gap variations due to sliding of the constraint during frequency sweep is analyzed experimentally.