A dismasted sailboat is more vulnerable to capsize as compared to a vessel with an intact mask due to the large inherent roll inertia (i.e. resistance to rolling motion) of the mast and rigging. It is estimated that the mast and rigging contribute 60% of the total roll inertia when compared to the other two major weight contributors to a boat: hull and ballast. While the mast's and rigging's combined weight is much less than the other two, it's gyradius (k, also known as radius of gyration) as measured from the vessel's CG is much greater. The moment of inertia (I_r) is defined by the calculation:

$$\boldsymbol{I_r = mass * \; k^2}$$

Note that the distance of the center of mass of the mast and rigging from vessel's CG as defined by k is squared which greatly increases the resistance to roll.

A longer natural period of roll (T_n) for a boat is desirable to avoid resonant magnification between the wave trains and the hull. As found in the following equation, a larger I_r will contribute to a larger natural period of roll for the boat:

$$\boldsymbol{T_n = 2 * \pi * \sqrt{\frac{I_r}{GM * \; \Delta}}}$$

where:

T_n = the vessel's natural period of roll

I_r = vessel's moment of inertia

GM = vessel's metacentric height

Δ = vessel's mass displacement