Ferromagnetic perovskite cobaltites La$_{1-x}$M$_x$CoO$_3$ ($M$ = Ca, Sr, Ba) have unusual magnetic and transport properties due to the unique feature of the Co ion to change its spin-state. Their large sensitivity to the external pressure is caused by the strong dependence of the crystal-field splitting energy $\Delta_{cf}$ on variation in the Co-O bond length $d_{Co-O}$. They demonstrate a complex dependence of pressure coefficient $dT_C/dP$ both on doping level and on size of dopant ion. An essentially positive $dT_C/dP$ coefficient found for Ba compound is in strong contrast to that one found for Ca and Sr cobaltites, where the $dT_C/dP$ changes sign from negative to positive with increasing doping. We demonstrate that the sign reversal of $dT_C/dP$ can be caused by the hole-doping and also, independently, by the lattice expansion only, realized by increasing size of dopant ion at constant hole-doping level. It is shown also that the complex pressure effect on ferromagnetic transition $T_C$ in cobaltites can be successfully described in terms of the competing $e_g$-electron bandwidth $W$ and crystal-field splitting energy $\Delta_{cf}$, taking into account the pressure dependent steric factors.

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