Recent studies on the twisted transition-metal dichalcogenide bilayers have demonstrated a desired platform to simulate Hubbard model physics with tunability through the twisted angle. We focus on the heterobilayer where the SU(2) symmetry is retained in the valley (spin) space, and investigate the Mott insulating phase at half filling which is subject to an out-of-plane magnetic field. Tuning the magnetic field for different twisted angles we identify three conventionally ordered phase including a 120^{o} Neel phase, a stripe phase and an up-up-down phase. For intermediate fields an emergent chiral spin liquid phase is identified with partial spin polarization because of the competition between the effective spin interactions and the Zeeman interactions that are induced by the magnetic field. We further characterize the topological nature of the chiral spin liquid as the $SU(2)_1$ Laughlin type through disorder-averaged spin flux insertion simulations and topological entanglement spectrum. In addition, we map out the quantum phase diagram for different twisted angles and identify the phase transitions.