The Michigan attorney general could become an unlikely barrier to Republican Gov. Rick Snyder's hope for a speedy path through bankruptcy court for the city of Detroit based on cutting pensions.

Attorney General Bill Schuette announced over the weekend that he plans to represent city retirees in the bankruptcy case because he said their pensions are protected by the state constitution—setting up a battle between state law and the federal bankruptcy code.

"We're going to aggressively defend the Michigan constitution," Mr. Schuette, also a Republican, said in an interview Sunday. "If anything, this puts the issue out there and facilitates the issue." He said the governor, who was briefed on the decision, didn't oppose his entry into the case. The governor's spokeswoman said "we appreciate and support efforts to get clarity" from the federal courts on the pension issue.

Mr. Snyder and emergency manager Kevyn Orr, who the governor appointed, have argued that reducing the estimated $3.5 billion in unfunded pension liabilities is necessary to help restructure Detroit's long-term debt estimated at more than $18 billion.

Detroit filed for bankruptcy protection on July 18, becoming the largest municipality to do so in U.S. history. Prospects for a federal bailout dimmed further Sunday as Treasury Secretary Jacob Lew suggested Detroit will need to solve its financial problems largely on its own.

"Detroit's got serious financial problems. They've been a long time in the making," Mr. Lew said on CNN, adding, "I think the issues that Detroit has in terms of problems with its creditors, it's going to have to work out with its creditors."

After some preliminary motions, the federal bankruptcy court in Detroit is expected to turn quickly to whether the cash-poor city of roughly 700,000 is eligible for bankruptcy protection. Unions and pension funds are expected to argue that Mr. Snyder improperly ignored the state constitutional protection for pensions when he authorized the bankruptcy filing, a position that could be bolstered indirectly by Mr. Schuette's entry in the case.

In an interview Friday, Mr. Orr said he based his analysis of pension obligations in part on his experience in the 2009 bankruptcy of Chrysler Group LLC. He said Chrysler was able to argue successfully that the need to cut dealerships trumped protections for dealers under state laws. The bankruptcy code "says that federal laws should be supreme," Mr. Orr said. "We managed to overcome some pretty strong arguments."

After taking over the city in March as receiver, Mr. Orr has insisted that unfunded pension obligations should be treated as unsecured debt, putting pensioners in the same category as some municipal bondholders. Under his plan unveiled last month, these creditors would receive less than 10 cents on the dollar to repay their debt.

Mr. Schuette said retired workers shouldn't be caught in the middle of the city's bid for financial restructuring. He added that he has concerns that the pension funds may have been poorly managed, a view shared by Mr. Orr, who ordered an investigation into their finances that is ongoing. "Frankly, they are getting stiffed in the process," Mr. Schuette said Sunday of city retirees. "They are not the ones who may have mismanaged the funds."

Michigan is among seven states that have some form of public pension protection outlined in state constitutions, according to a report last year from the Center for Retirement Research at Boston College.

Mr. Schuette, 59 years old, was elected in 2010 after previously serving in the U.S. House from 1985 until 1991.

Conflicts between Messrs. Snyder and Schuette are relatively rare but not unheard of. "We agree 95% of the time," Mr. Schuette said Sunday. His office still intends to represent the governor's interests in the bankruptcy case, he said.

Last year, Mr. Schuette opposed Mr. Snyder's bid to have the state create a health-care exchange under President Barack Obama's Affordable Care Act. The attorney general also pushed in 2012 for using part of the state's budget surplus to hire more police officials, a measure that wasn't a part of the governor's plans.