An Estimate the Implicit Price of Sulfur in Coal Prior to Phase I of the 1990 Clean Air Act Amendments

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Abstract
The market-based approaches initiated by Title IV of the 1990 Clean Air Act Amendments (CAAA) differed from past sulfur dioxide (SO₂) regulation. The law instituted a cap-and-trade program for SO₂ emissions, deregulated SO₂ abatement technique choice, and created a marginal cost of SO₂ emissions. Phase I of the law came into effect in 1995 for 263 mandatory boilers whose SO₂ emissions had previously been unregulated by the federal government. Most Phase I plants complied by purchasing coal of lower sulfur content. Permits initially traded at a price of approximately $150 per ton, fell to $70 in 1996, and stabilized at $170 until 2004.

In this paper, we investigate how the implicit price of sulfur in coal evolved over time for Phase I plants in response to changes in the incentives of the regulatory regime. If the implicit price of sulfur is approximately the price of a permit, it suggests that the permit market was efficient in that firms were arbitraging
between purchasing low sulfur coal and permits. A hedonic price model of long-term contract (greater than 1 year) coal deliveries, with a correction for the panel nature of the data, is estimated in order to determine the inherent price of sulfur. Data on contract coal purchases from 1979 to 1994 are separated into discrete time periods based on information available to plants at the time the contract was signed or re-negotiated. We find that purchases made under contracts signed or re-negotiated before passage of the 1990 CAAA show a price of SO$_2$ not significantly different from zero. After passage but prior to implementation, contract purchases show an implied price of SO$_2$ of approximately $154 that is significantly different from zero. These results provide an example of how power plants respond to market-based regulation and suggest that the permit market was operating efficiently in the early years of its existence.