

Leakage from sub-national climate policy: The case of California's cap-and-trade program

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The increase in emissions in unregulated regions (leakage) due to national or international climate policies has been extensively investigated in the literature. Sub-national policies can potentially suffer from higher leakage rates as economies are more tightly integrated within national borders than between. This article estimates the economy-wide leakage implications of a sub-national policy, using California's cap-and-trade program as a representative example. In 2006, California became the first U.S. state to implement an economy-wide program to curb emissions with the passage of the Global Warming Solutions Act. The law requires the state to reduce its emissions to 1990 levels by 2020 through a cap-and-trade market for greenhouse gas (GHG) emissions and a suit of complementary measures.

California, which imports a lot of electricity, could potentially suffer from high leakage rates in the electricity sector: as electricity prices increase as the result of emissions pricing, consumers will import cheaper electricity from neighboring states and emissions in those states will increase. The problem is compounded by the relatively more carbon-intensive electricity mix in neighboring states. A large part of California's electricity generation comes from natural gas, whereas states that export electricity to California rely much more heavily on coal-fired generation. When electricity is imported from one of these states, it results in even more emissions than if electricity had been generated in California. This study uses an economy-wide general equilibrium model covering the whole world economy and including detail at the US state level. We find that when importing electricity from neighboring states, or "resource shuffling," is allowed, out-of-state emissions increase by 45% of the reduction in California. When resource shuffling is banned, as is intended in the California law, this amount drops to 9%: there is considerable leakage through non-electricity goods to most regions, but it is almost completely compensated by reduction in the electricity-related emissions in states that export electricity to California. Thus, the California law is likely to result in relatively little overall leakage of emissions. We also study the potential effects of linking California's carbon market with the EU carbon market and find that that such a linkage is likely to result in a small increase in leakage from both markets.