Research Working Papers

Technology and Energy Substitution: A Path toward Climate Change Mitigation

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Substitution between different production inputs is an important mechanism for climate change mitigation.

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Mitigating climate change is critically linked to reducing an economy's reliance on fossil energy. This paper examines U.S. energy dependence, measured by its factor share, using a neoclassical framework systematically. We present the degree of substitution between different factors of production as a simple, explicit mechanism for climate change mitigation and for interpreting energy-saving technical change. With timevarying capital equipment-energy substitutability, changes in observed factor quantities alone can account for most of the variations in the income share of energy over 1963-2019. Advancing capital equipment access and quality and integrating the dynamic substitutability between energy and equipment into the design of climate policies can help economies achieve environmental goals.

JEL classifications: E13, E23, E25, J24, Q41, Q42, Q54, Q55

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Related Research

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