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# Agricultural response to a changing climate: the role of economics and policy in the United States of America

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A changing climate will create new challenges for farmers and policy-makers. Farmers will face changes in productivity, pest outbreaks and extreme weather events. Farmers are resilient; throughout history they have adjusted to regional differences in climates, soils and agronomic conditions, as well as to changes in demand for crops, new technological developments, and changing policy environments, and they are likely to adapt to new conditions as well. However, adjusting to new climates will not be costless, and may have distributional and policy implications.

Farmers can adapt by diversifying crop and livestock types and varieties, adopting new technologies, using alternative tillage practices, implementing irrigation practices and changing the timing of farm operations, among other choices. In the United States of America, they can also purchase crop insurance to reduce the risks of climate-related income loss, invest in crop shares and futures to reduce the risks of climate-related income loss and diversify sources of household income

Global climate models predict increases over time in average temperature worldwide, with significant impacts on local patterns of temperature and precipitation. The extent to which such changes present a risk to food supplies, farmer livelihoods and rural communities depends in part on the direction, magnitude and rate of such changes, but equally importantly on the ability of the agriculture sector to adapt to changing patterns of yield and productivity, production cost and resource availability. Potential constraints to adaptation may include regional land and water availability, as well as constraints related to farm finances and viability.

A recent report by the US Department of Agriculture's Economic Research Service suggests that, while impacts are highly sensitive to uncertain climate projections, farmers have considerable flexibility to adapt to changes in local weather, resource conditions and

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price signals by adjusting crops, rotations and production practices. Such adaptation, using existing crop production technologies, can partially mitigate the impacts of climate change on national agricultural markets. Adaptive redistribution of production, however, may have significant implications for both regional land use and environmental quality.

Options for government and policy responses include research and development on new crop varieties, improved early warning systems that provide daily weather predictions and seasonal forecasts, water management innovations, financial and technical assistance for adopting conservation practices, extension support, and supporting risk management tools such as crop insurance.

Effective crop insurance policies provide financial stability for growers; financially stable growers are more likely to invest in new growing practices to adapt to climate change. Premium rates can act as a price signal to farmers about risk and the value of mitigation or adaptation. The United States crop insurance programmes adjust premium rates based on historical losses and so can reflect gradual changes in risk. However, adjusting programme parameters to reflect non-linear and sudden changes, such as establishment of new practices for new areas or crops, remains a challenge.