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Poster 20

ON TECHNOLOGICAL CHANGE IN CROP YIELDS

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As a result of numerous changes in technology, agriculture has experienced dramatic and widespread yield increases over the past 75 years: yields of many staple crops have doubled or tripled. To date, the effects of technological change have been measured exclusively at mean—implying technological change has shifted the location of the yield distribution without altering mass within the distribution. However, evidence in the crop science literature indicates technological developments alter the mass associated with subpopulations of the yield distribution: technological change could have different effects in below-average or above-average yield realizations, independent of shifts in the mean.

We model technological change in crop yields using a mixture model. Our novel contribution is using the flexibility of the mixture model to accommodate the possibility of different rates of technological change in different subpopulations of the yield distribution. Then we can test some interesting questions such as: (1) is the rate of technological change equivalent across subpopulations and (2) are the probabilities of subpopulations constant over time? We reject equivalent rates of technological change across subpopulations in the majority of cases: 84.0% for corn, 82.3% for soybean and 64.0% for wheat. Further, we find a small portion of counties reject constant subpopulations over time: 12.0% for corn, 5.4% for soybean and 3.0% for wheat. The proposed model provides an alternative—and we suggest more probable—model of the effect of technological change on crop yields. Understanding these changes is important because crop yields are agriculture's principle unit of productivity measurement.