Risk, Return, and Ross Recovery

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The risk return relation is a staple of modern finance. When risk is measured by volatility, it is well known that option prices convey risk. In a parametric Markovian setting, risk-neutral transition probabilities can also be determined from option prices. Recently, Ross has shown that real-world transition probabilities of a Markovian state variable can be recovered from its risk-neutral transition probabilities along with a restriction on preferences. In this paper, we show how to recover real-world transition probabilities in a diffusion context in a preference-free manner. Our approach is instead based on restricting the form and dynamics of the numeraire portfolio. (Joint work with Jiming Yu.)