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Bursting Bubbles in a Macroeconomic Model

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We consider environments with aggregate risk and advance the findings of Hirano and Toda (2025 JPE). In particular, this paper examines stochastic bubbles that are expected to collapse. We identify the economic conditions and mechanisms that give rise to stochastic bubbles. In order to uncover the economic intuition and the mechanism by which stochastic bubbles arise, the paper first presents a Toy model in which land bubbles inevitably arise while their future collapse is expected. A land price bubble and its collapse occur as the unique equilibrium outcome. Next, we construct a full-fledged macro-finance model of intangible capital. We show that stochastic stock price bubbles attached to intangible capital emerge in the process of a major technological innovation and its spillover effects spread throughout the macroeconomy. The spillover process is characterized by unbalanced growth, where different factors of production and different sectors grow at different rates, and the stock price bubble is characterized by a bubble in stock prices of the booming production factors and sectors. It will also be shown that the dynamics with stochastic bubbles, which is characterized by unbalanced growth, can be seen as a temporary deviation from a balanced growth path in which asset prices equal the fundamentals, i.e., the expected present discounted value of future dividends.

Our construction of a macro-finance model where unbalanced growth dynamics can temporarily occur provides a new perspective on the methodology of macro-theory construction because asset pricing implications change markedly. That is to say, as is well known as “Uzawa steady-state growth theorem”, which is the heart of macro-theory construction with a balanced growth path (BGP), any growth model that produces a BGP is knife edge theory. Under knife-edge conditions that generate balanced growth, in many cases, there is a single dynamic path that can be drawn with one stroke of the brush and along the dynamic path, the macroeconomy converges to a steady state characterized by balanced growth, in which asset prices and dividends grow at the same rate. As long as we construct a model in this way, it is assumed from the beginning of model construction that asset prices are equal to the fundamentals. What our paper shows is that even the slightest deviation from the knife-edge cases leads to markedly different implications for asset prices. The macroeconomy temporarily takes a different dynamic path from the BGP, and in this transitional

dynamics, stochastic bubbles emerge. Based on these insights, we will also uncover the relationship between the Uzawa steady-state growth theorem and asset price bubbles.