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**A KEYNESIAN CRITIQUE OF RECENT FINANCE AND
MACROECONOMIC APPLICATIONS
OF RISK-SENSITIVE AND ROBUST CONTROL THEORY**

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THESIS ABSTRACT

The objective of this thesis is to assess the strengths and weaknesses of recent economic applications of robust and risk-sensitive control theory from a Keynesian perspective. In particular, I review papers by Anderson, Hansen and Sargent (1999) and Hansen, Sargent and Tallarini (1999) that adopt this theoretical approach in an attempt to overcome certain limitations in the rational expectations literature. The first of these papers constructs a representative agent, permanent income model of optimal consumption-investment under habit persistence. The optimal sequence of consumption streams is then treated as an exogenous endowment within a Lucas-style asset-pricing model (Lucas, 1978).

For control purposes, the authors introduce risk-sensitive value functions based on Epstein and Zin's (1989) recursive utility framework. Theoretical analysis draws on the limiting relationships that hold between risk-sensitive control, H -infinity control and risk-neutral control. The solution for the risk-neutral control problem is determined using the Kalman-Bucy filter. The authors then apply the robust optimality conditions to calculate the range of parameter values that are consistent with observed data, while reflecting varying degrees of sensitivity to risk. In an asset-pricing context, the authors show that risk-sensitivity is manifested in the

stochastic discount factors, which can be decomposed into two multiplicative components: representing factor risk and uncertainty, respectively.

The second of the papers follows a similar pattern but is more general, accounting for more complex value functions and stochastic processes, in both discrete-time and continuous-time. In the main I focus, in my critique, on the limitations of this robust control framework in regard to its ability to capture what I see to be the essential aspects of a monetary production economy. These aspects include: the prevalence of nominal, non-indexed contracts; liquidity effects associated with the existence of transactions costs; the need to control and estimate time-varying systems to adequately account for financial instability; and the prospect that dynamic aspects of investment behaviour are governed by complex, non-linear relationships and concern non-ergodic stochastic processes. However, I also question the representative agent assumption on the basis that it precludes the possibility of insufficient effective demand or involuntary unemployment. For scholars working within the Keynesian tradition the existence of the latter phenomena is largely explained on the basis of liquidity preference effects associated with uncertainty. While a risk-sensitive control approach to asset demand can introduce liquidity preference effects, the usual accompanying assumptions of either a pure exchange setting or an exogenously determined

accumulation process imply that these effects can exert no substantive influence over the macroeconomy.

In a control framework, I suggest that endogenously influenced fluctuations in the state of uncertainty perception and uncertainty aversion, which I interpret in the form of respective variations in the risk-sensitivity parameter and the norm bounds governing observation error, model uncertainty and external perturbation, are factors that would be difficult to accommodate within existing neoclassically inspired applications of risk-sensitive and robust control theory. I contend that the complexity introduced by the need to model all the relevant aspects of a monetary production economy could not be satisfactorily encompassed within such a framework because the neoclassical logic excludes interactions between environmental factors and preferences such as feedback from increasing financial instability onto the general level of investor uncertainty aversion. In contrast, I argue for a modeling strategy informed by the richer and broader notions of communicative or intersubjective rationality and bounded rationality that are to be found in the respective philosophical works of Jürgen Habermas and Herbert Simon.