A Macroeconomic Analysis of Cryptocurrencies —A DSGE Approach—*

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Abstract

The invention of Bitcoin by Nakamoto (2008) enabled value transfers beyond physical and geographical constraints. The rapid expansion of Bitcoin and the broader cryptocurrency market – underpinned by cryptography—has spawned novel ecosystems such as decentralized finance (DeFi). As these markets grow, they may exert a non negligible influence on the real economy. This paper asks: what macroeconomic effects do cryptocurrencies and crypto assets have? While prior studies analyzed isolated crypto properties or used partial equilibrium frameworks, we build and estimate a dynamic stochastic general equilibrium (DSGE) model following Asimakopoulos et al. (2023)—that incorporates both standard fiat money and cryptocurrencies, along with their producers, as substitutes for government issued currency. Unlike earlier work based on U.S. data, we estimate structural parameters using Japanese data to highlight cryptocurrencies' distinctive features in the Japanese economy. We first analyze how conventional shocks—household preference, technology, and monetary policy—affect endogenous variables like output and consumption. We then simulate three crypto specific shocks—fiat demand, crypto demand, and crypto productivity—to examine interactions between fiat money and crypto assets, drawing policy implications.

We find that preference and technology shocks boost output but reduce real crypto balances. A monetary policy shock temporarily raises real crypto balances. A fiat demand shock increases real balances of both fiat currency and cryptocurrencies, whereas a crypto demand shock produces an even stronger rise in both.

Keywords: DSGE model; cryptocurrency; Bayesian estimation
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