Summaries

A Study on the Application of Weighted Average Land Prices to Macroeconomic Analysis

Masaaki Tokuda

One key feature of this study is that it includes asset prices, specifically land prices, among the endogenous variables utilized in the SVAR model to quantitatively assess and examine the macroeconomic impact of asset prices. Representative asset prices, such as those of stocks, bonds, and commodities, are readily available as macro-level time-series data at national level. By contrast, land price data, such as official land prices and land value survey data typified by appraised land values, are primarily used for micro-level purposes. These include reference indicators in individual real estate transactions and as the basis for tax assessments. This study examines whether land price statistics can provide meaningful insights when applied to macroeconomic analysis.

Land prices have increased throughout Japan during the period 2020 to 2025. The 2025 Official Land Price Survey (a representative appraised land price index) found that the average prices for all land use — residential, commercial, and overall — have increased for four consecutive years, with the increase accelerating. Focusing on residential land, housing demand has remained robust, partly because of the continued low-interest-rate environment. Areas with high levels of transportation accessibility and convenience in daily life, which attract many new residents, have specifically experienced relatively strong and sustained increases in residential land prices, supported by solid housing demand.

Rising land prices lead to increases in asset values of owner-occupied housing, and these asset effects have wide-ranging influences on the macroeconomy, including consumption, employment, and bank lending. SVAR models are commonly used to empirically analyze the relationships among macroeconomic variables. However, such models primarily use flow variables, while the use of stock variables remains relatively limited. This study therefore processes and organizes appraisal land price data (primarily used for micro-level applications) into (1) simple average land price data and (2) weighted average land price data through statistical manipulation. Furthermore, we incorporate the weighted average land price data as an endogenous variable in the SVAR model. Our estimation using the four- and five-variable AD-AS models revealed that several cases (including the weighted average land price) exhibited significant relationships with macroeconomic variables.

Relatively small banks initially misjudged the response of interest rates to an upward shock in the weighted average land price, sometimes resulting in an interest rate decline rather than an appropriate increase. Conversely, in the case of a negative shock represented by an unintended decline in asset prices, such as a bubble collapse, interest rates may not be immediately reduced. Instead, interest rates may increase, potentially worsening the economic conditions in banks' regional bases. Concerns arise in areas where small-scale banks are concentrated, and economic fluctuations may be amplified beyond necessity. It is sensible to establish a system for the timely collection of land price information and expand information analysis capabilities through capital and business alliances, management integration, or mergers with neighboring banks.

Debt Monetization and Financial Instability in an Oligopolistic Economy

Kenshiro Ninomiya

The Japanese government is facing a massive debt burden. The Bank of Japan holds a large portion of this debt, which may be considered *de facto* debt monetization. Modern Monetary Theory (MMT) argues that a country with a floating exchange rate and its own sovereign currency can continue to finance government expenditures in that currency without issuing additional government bonds provided it does not trigger inflation.

After the collapse of the economic bubble, the Japanese government implemented market-oriented structural reforms grounded in new classical economics, emphasizing the role of market mechanisms. However, the Japanese economy has remained trapped in prolonged stagnation and deflation. Furthermore, these economic paradigms failed to predict or prevent the global financial crisis triggered by the United States of America (USA)'s subprime mortgage market collapse in 2008.

Against this backdrop, MMT, which appears to have diverged from conventional economics, has gained prominence in the USA. MMT proponents often cite Japan as a successful example, pointing to the absence of inflation despite the country's vast accumulation of government debt and large-scale monetary easing. Consequently, MMT has attracted considerable attention in Japan.

This study focuses on debt monetization and financial instability. It constructs a macrodynamic model for an oligopolistic economy and examines how debt monetization and financial fragility affect a dynamic system's behavior. The study's main findings are as follows: 1) excessive debt monetization destabilizes the dynamic system in an oligopolistic economy, and 2) financial instability can arise even in the absence of debt monetization.

Despite its massive stock of government bonds, Japan faces increasing pressure to issue additional deficit-financed bonds to support increased public spending. In response to public sentiment, politicians from both the ruling and opposition parties have proposed measures such as cash handouts as well as reduction and/or abolition of the consumption tax rate. The authors view this situation as precarious.

Our model suggests that debt monetization contributes to instability through both real and financial channels. This instability manifests as economic overheating rather than stagnation. However, Japan continues to experience prolonged economic stagnation despite the large-scale issuance of government bonds. Therefore, it is essential to conduct econometric analyses to determine whether debt monetization contributes to economic instability in Japan.

It should be noted that the conclusions drawn in this study are based on a highly simplified post-Keynesian macroeconomic framework. The analysis does not consider the effects of increasing income tax rates or reducing government expenditures in response to rising inflation. It is also crucial to examine the role of counter-cyclical fiscal and tax policies when assessing the broader implications of debt monetization and financial instability.

Keywords: debt monetization, MMT, oligopolistic economy, financial Instability

JEL classifications: B52, E12, E31, E43

Environmental Pollution in a Delay Solow Model with Constant Population Growth

Akio Matsumoto

In this paper, we introduce a time-to-build production technology into an economy where environmental pollution arises as a byproduct of production. The population grows at a nonzero constant rate, which may be either positive or negative. We then derive conditions under which the interaction between production delays and the population growth rate generates a variety of dynamic behaviors, ranging from stable growth to growth cycles that are not unlike those observed in reality. In particular, we show that the population growth rate admits a threshold value. When the actual growth rate falls below this threshold, the steady state loses stability through a Hopf bifurcation, giving rise to cyclical oscillations. By contrast, when the growth rate exceeds the threshold value, no stability switching occurs, and the delay proves to be harmless: the steady state remains stable regardless of the length of the delay, and the economy converges to a balanced growth path. Numerical experiments are provided to confirm the analytical results.

Strange Attractors in an Open Economy Model with External Forcing

Hiroyuki Yoshida

The global economy continues to gain momentum while undergoing profound structural transformation. However, in recent years, it has been increasingly disrupted by geopolitical tensions and climate-related events, both of which have had substantial global impact on economic activity. These external shocks amplify volatility and heighten uncertainty, reinforcing the need to improve the understanding of the underlying mechanisms driving macroeconomic fluctuations.

This study investigates the emergence of business cycles in a small open economy by developing a dynamic macroeconomic model that exhibits both limit cycles and complex nonlinear behavior. The analytical framework builds upon the Keynesian cross model augmented with a Kaldorian (1940) investment function that explicitly depends on both the Gross Domestic Product (GDP) and existing capital stock. This investment formulation is pivotal to the model's explanatory power in generating endogenous cyclical dynamics. Additionally, international trade is incorporated through a net export function that serves as a key driver of aggregate demand and contributes to the propagation of economic fluctuations.

The analysis was conducted for two distinct scenarios.

Case 1: Constant Foreign GDP

In the first scenario, we assume that foreign GDP remains fixed over time. Under this condition, the existence of limit cycles is established by applying the Hopf bifurcation theorem, thereby providing a rigorous theoretical basis for the emergence of self-sustained oscillations in the output. Numerical simulations are employed to validate the theoretical predictions, confirm the presence of a stable limit cycle, and provide quantitative insights into the dynamics of the model.

Case 2: Periodically Varying Foreign GDP

In the second scenario, we relax the assumption of constant foreign output and introduce periodic fluctuations modeled as a cosine function of time. This results in a non-autonomous system of differential equations, complicating the qualitative analysis. Consequently, we rely on numerical methods to explore the behavior of the system. The simulation results reveal the emergence of a strange attractor under certain parameter configurations, suggesting the potential for chaotic dynamics driven by externally induced economic variability.

Conclusion

This study offers a comprehensive examination of business cycle phenomena in the context of a small open economy. This demonstrates that both stable periodic cycles and chaotic fluctuations may arise endogenously, depending on the nature of external economic conditions. Through the combination of analytical and numerical techniques, this study contributes to a deeper understanding of the roles of investment dynamics and international trade in shaping macroeconomic instability.

Multifractal Analysis of Stock Price Volatility Using Wavelet Transform

Hideomi Totsuka

This study applies multifractal analysis based on the continuous wavelet transform to compare and evaluate the scaling properties of the log-differenced realized volatility of the Nikkei 225 and the S&P 500, as well as the log-differenced closing values of the Nikkei 225 Volatility Index and the CBOE VIX. For the stock-index realized volatilities, the singularity spectra are relatively narrow with peaks near one, suggesting behavior close to single scaling. By contrast, for the volatility indices, the spectra are broad with pronounced q-dependence, indicating strong multifractality. In particular, for the CBOE VIX the peak of the singularity spectrum occurs at a negative Hölder exponent, consistent with the predominance of spike-like fluctuations. Across all series, the generalized Hurst exponent $h(q)$ varies with q — larger for $q < 0$ (small fluctuations) and smaller for $q > 0$ (large fluctuations) — revealing a marked asymmetry between quiescent and bursty regimes.

Pricing Options under Stochastic Volatility Models Using Bayesian Estimation via Hamiltonian Monte Carlo Method

Hidetoshi Mitsui

This paper explains a method for option valuation using stochastic volatility models via Bayesian estimation based on Hamiltonian Monte Carlo methods. When conducting time-series analysis of risk asset price returns, the Stochastic Volatility (SV) model is frequently employed. However, many cases are difficult to estimate, and in recent years, Bayesian estimation using Markov chain Monte Carlo methods has become increasingly common. While Gibbs sampling and the Metropolis-Hastings algorithm have been used for MCMC methods, they suffer from efficiency issues. This paper proposes Bayesian inference using Hamiltonian Monte Carlo methods. Furthermore, we apply it to option valuation using the SV model. In option valuation, volatility is a crucial parameter; we attempt to estimate volatility using the SV model and apply it to option valuation. Furthermore, when using this method, it demonstrates that option valuation is possible even with models incorporating the leverage effect and the thick-tailed t-distribution characteristic of the risk asset return distribution.

Shortest Path Rewriting Algorithm for Maximal Outerplanar Graphs

Shun-ichi Kurino

As a variation of the graph shortest path problem, we consider rewriting a pre-computed solution to the single-source shortest path problem to solve the single-source shortest path problem from adjacent sources. The application filed of this method is limited, but for restricted graphs it may be more efficient than traditional algorithms. In this study, we demonstrate that this method is effective for special graphs called maximal outerplanar graphs (which is a polygon with as many non-intersecting diagonals as possile), and propose an algorithm that is $O(1)$ on average, compared to the $O(|V|)$ required by conventional methods.

Prolonged Monetary Easing in the United States and Financial Instability in Emerging Countries

Kazuhiro Teramoto

This study examines how and how much the prolonged monetary easing in the United States affects risk-taking and financial stability of emerging market economies (EMEs). Two different U.S. monetary policy regimes, a conventional and an unconventional regime, are incorporated into a dynamic general equilibrium model of a small open economy with an occasionally binding credit constraint. The simulation analysis finds that, in the unconventional regime, expectations of a persistently low world interest rate amplify credit externalities and fuel inefficient risk-taking in EMEs and, as a result, lead to an about 3 times higher likelihood of a major emerging market crisis when a negative productivity shock hits EMEs. It is also shown that, in the unconventional regime, the likelihood of a major emerging market crisis in response to an end to monetary easing remains high even in the presence of optimal macroprudential taxation.

Keywords: Unconventional Monetary Policy, International Capital Flows, Emerging Market Economies, Financial Crisis, Macroprudential Policy

JEL Classification: E32, E44, E52, F32, F41

Estimating Fiscal Multiplier in Japan using a Markov Switching DSGE model with Fiscal and Monetary Policy Regimes

Masataka Eguchi, Hirokuni Iiboshi

In this paper, we evaluate the fiscal multiplier in Japan by estimating a Markov-switching DSGE model that allows for changes in fiscal and monetary policy regimes. It is well known that the size of the fiscal multiplier can vary substantially depending on the prevailing policy regime. To this end, we develop a two-agent New Keynesian (TANK) model with hand-to-mouth households and introduce the possibility of regime switches in fiscal and monetary policy between active and passive stances. In general, the fiscal multiplier is larger when fiscal policy is active (non-Ricardian) and monetary policy is passive (not stabilizing inflation). We estimate the model using Japanese data from the 1970s to the 1990s, excluding the zero nominal interest rate period. Our results suggest that fiscal policy was relatively active in the late 1970s and during the bubble period (late 1980s), but passive in other periods. Conversely, monetary policy was relatively passive in the late 1970s and the bubble period (late 1980s to early 1990s), and active otherwise. The estimated average short-run fiscal multiplier is similar across regimes (around 1.38), but differences emerge in the long run (ranging from 1.40 to 1.55). Moreover, the long-run effect on consumption differs markedly across regimes, ranging from 0.32 to 1.29.

Keywords: Fiscal policy, Fiscal multiplier, Markov-switching DSGE

JEL Classification: E62, E63, C32

Money-Financed Fiscal Stimulus: The Effects of Belief and Implementation Lag

Masataka Eguchi, Hirokuni Iiboshi, and Takayuki Tsuruga

This paper studies how fiscal policy effectiveness depends on the interaction between implementation lags and regime credibility. We construct a New Keynesian DSGE model with Markov-switching fiscal regimes, where government spending is financed either by debt issuance or money creation. Agents form beliefs over the prevailing regime, reflecting credibility in fiscal financing strategies. Implementation lags are modeled as news shocks, introducing delays between policy announcements and execution. Our results show that, when the money-financed regime is highly credible, fiscal multipliers are large under short lags but decline with longer lags. However, when regime credibility is low or money demand elasticity is high, this relationship may weaken or reverse. With sufficiently long lags, the effect of credibility vanishes, and fiscal multipliers converge across regimes.

Keywords: Fiscal multiplier, Money finance, Government spending, Regime-switching

JEL Classification: E32, E52, E62

The Effects of Active and Passive Monetary Policy Stances under the Neo-Fisher Effect

Masataka Eguchi, Hirokuni Iiboshi

This study examines the medium- to long-term effects of monetary policy by taking into account the Fisher equation, which represents the relationship between the long-run inflation rate and the nominal interest rate. Traditionally, the effects of monetary policy have been regarded as limited to the short- to medium-term horizon, mainly within the scope of business cycle fluctuations. To address this issue, we employ the New Keynesian framework with Permanent Trend-Inflation Shocks developed by Uribe (2022). Our primary research question is to quantitatively analyze how changes in the stance of monetary policy — whether active or passive — affect long-run economic growth. To this end, we adopt the solution method of a regimeswitching DSGE model developed by Cho (2021). Our results show that regime switching enhances equilibrium determinacy when policy durations are realistic and that both permanent and transitory monetary shocks generate Neo-Fisherian dynamics. Moreover, a credible active stance amplifies positive responses in inflation, interest rates, and output, suggesting that persistent monetary discipline supports both price stability and long-term economic growth.

Keywords: Neo-Fisher Effect, Monetary Policy, Regime-switching

JEL Classification: E32, E52, E62

Monetary Policy and Firm Investment: Evidence from Japan

Kwon, Hyeog Ug

This paper estimates a Q-type investment function using firm-level data from *The Corporate Financial Databank* covering the period 2009-2018, to investigate how Japanese firms' fixed investment responded to the implementation of unconventional monetary policies introduced after the global financial crisis. The empirical results can be summarized as follows: (1) firms with higher Tobin's Q tended to invest more; (2) increases in cash flow stimulated fixed investment; and (3) a higher debt ratio was associated with a decline in fixed investment.