

**TEME CONFERENCE 2022**  
**Theory and Experiments in Monetary Economics**

**DAY 1: Friday, October 28<sup>th</sup>, 2022**

8:30 – 9:00 am	<b>Breakfast</b>	
9:00 – 9:15 am	<b>CHSS Dean Daniel Houser Daniela Puzzello</b>	<b>Opening remarks</b>
9:15 – 10:15 am	<b>Rod Garratt</b>	<b>Keynote address 1:</b> “An Impossibility Theorem on Truthful Reporting in Fully Decentralized Systems”
10:15 – 11:00 am	<b>Gabriele Camera</b>	“Financial Contagion and Financial Lockdowns”
11:00 – 11:30 am	<b>Break 1</b>	
11:30 – 12:15 pm	<b>John Duffy</b>	“Search, Unemployment, and the Beveridge Curve: Experimental Evidence”
12:15 – 1:00 pm	<b>Cars Hommes</b>	“Equilibrium Selection through Laboratory Experiments in a Complex OLG Economy”
1:00 – 2:00 pm	<b>Lunch</b>	
2:00 – 2:45 pm	<b>Janet Jiang</b>	“Is Money Essential? An Experimental Approach”
2:45 – 3:30 pm	<b>Cathy Zhang</b>	“On the Emergence of an International Currency”
3:30 – 4:00 pm	<b>Break 2</b>	
4:00 – 5:00 pm	<b>Neil Wallace</b>	<b>Keynote address 2:</b> “Three Topics in Monetary History: Some Surprising Results”
5:00 – 5:45 pm	<b>Justin Rietz</b>	“An Idea Worth Its Salt?”
5:45 – 6:45 pm	<b>Reception</b>	

**DAY 2: Saturday, October 29<sup>th</sup>, 2022**

8:30 – 9:15 am	<b>Breakfast</b>	
9:15 – 10:15 am	<b>Elena Asparouhova</b>	<b>Keynote address 3:</b> “The Role of Financial Markets in Mitigating Credit Market Bubbles”
10:15 – 11:00 am	<b>Charles Noussair</b>	“Emotions and Markets: Cause or Effect?”
11:00 – 11:30 am	<b>Break 1</b>	
11:30 – 12:15 pm	<b>Olivier Armantier</b>	“A New Approach to Assess Inflation Expectations Anchoring Using Strategic Surveys”
12:15 – 1:00 pm	<b>Luba Petersen</b>	“Macroeconomic Literacy and Expectations”
1:00 – 2:00 pm	<b>Lunch</b>	
2:00 – 2:45 pm	<b>Marco Cipriani</b>	“Trading by Professional Traders: An Experiment”
2:45 – 3:30 pm	<b>Charles Holt</b>	“The Effects of Behavioral Wedges with Retirement Savings”
3:30 – 4:00 pm	<b>Break 2</b>	
4:00 – 4:45 pm	<b>Yohanes Eko Riyanto</b>	“The Bright Side of Dark Markets”
4:45 – 5:30 pm	<b>Kristian Lopez-Vargas</b>	“Price Impact and Order Shredding: Testing Flow Trading Format in the Laboratory”

# **ABSTRACTS**

## **Day 1**

### **Rod Garratt: “An Impossibility Theorem on Truthful Reporting in Fully Decentralized Systems”**

We show that truthful reporting about the realization of a publicly observed event cannot be implemented as a unique equilibrium in a completely decentralized environment. Our works provides a theoretical underpinning of the need for oracles and the related “oracle problem.”

### **Gabriele Camera      “Financial Contagion and Financial Lockdowns”**

Large financial shocks often elicit extraordinary policy interventions that preclude financial activity on a large scale. An example is the 1933 U.S. “bank holiday.” We investigate these extraordinary interventions using a random matching framework that makes the financial contagion process explicit. This allows us to develop a closed-form characterization of the evolution of financially distressed firms, following a shock. This technique is then applied to numerically assess the impact of extraordinary interventions on the expected evolution of the shock and on social welfare. We also compare large-scale interventions to targeted interventions, which are made possible by novel digital monetary instruments that allow real-time monitoring of identity-verified financial flows.

### **John Duffy: “Search, Unemployment, and the Beveridge Curve: Experimental Evidence”**

We report on a laboratory experiment testing the predictions of the Diamond-Mortensen-Pissarides (DMP) search-and-matching model, which is a workhorse, decentralized model of unemployment and the labor market. We focus on the job vacancy posting problem that firms face in the DMP model. We explore comparative statics predictions concerning variations in the separation rate, the vacancy posting cost, and the firm’s surplus earned per employee. Across all treatments, we find strong evidence for an inverse relationship between vacancies and unemployment, consistent with the Beveridge curve. We also find that the results of our various comparative statics exercises are in-line with the predictions of the theory.

### **Cars Hommes: “Equilibrium Selection through Laboratory Experiments in a Complex OLG Economy”**

This paper investigates equilibria selection and price dynamics in a complex OLG economy with multiple perfect-foresight equilibria using learning-to-forecast and learning-to-optimize experiments. In the theoretical model, these dynamics depend on one utility function parameter. We conduct five treatments to test price convergence and coordination with different values of this parameter corresponding to (i) a stable 2-cycle, (ii) a stable 3-cycle, (iii) a stable 4-cycle, and (iv) chaos. This paper highlights three key findings: First, price converges to the simplest equilibria (steady state and 2-cycle) in all groups of the learning-to-forecast experiment. Second, convergence to the 2-cycle occurs for the intermediate parameter range, while theoretical scenarios of 2-cycle and highly nonlinear dynamics (chaos) lead to coordination on the steady state in the lab. Finally, convergence in the learning-to-optimize experiment is harder to achieve, and the 2-cycle is not observed although it Pareto dominates the steady state in terms of payoff.

### **Janet Jiang: “Is Money Essential? An Experimental Approach”**

Money is called essential when better outcomes are incentive feasible with money than without it. We study essentiality theoretically and experimentally, using finite-horizon monetary models that suit our purposes well in the lab. Following mechanism design, we also study the effects of strategy recommendations when they are incentive compatible and when they are not. Results show the use of money and welfare are significantly higher in treatments where it is essential, and recommendations help when incentive compatible but not much otherwise. Sometimes money gets used when it should not, and we investigate why using surveys plus measures of social preferences.

### **Cathy Zhang: “On the Emergence of International Currency: Experimental Evidence”**

We integrate theory and experimental evidence to study the emergence of different international monetary arrangements based on the circulation of two intrinsically worthless fiat currencies as media of exchange. Our framework is based a simple two-country, two-currency search model where value of each currency is determined without requiring agents to use a particular currency to purchase a country's goods and monetary policy is formalized as changes in a country's money growth rate. We interpret the dynamics of acceptance patterns and inflation from the laboratory through the lens of an evolutionary learning model and show how the emergence of international currency depends on monetary policy and acceptance costs.

### **Neil Wallace: “Three Topics in Monetary History: Some Surprising Results”**

My topics are: (i) how best to control the quantity of privately-issued currency; (ii) how best to conduct seasonal monetary policy; (iii) how best to finance the costly replacement of worn currency. I will be summarizing published papers, but will make new comments about them. In addition, I will emphasize the modeling ingredients that are common to my study of all three topics and will mention some new results. I call the presentation topics in monetary history, because the models are designed to provide a beneficial role for spot trade using an intrinsically useless object that I label currency. For the first topic, the surprise is that the best arrangement has steady-state inflation brought about by increases in the amount of privately issued currency. For the second topic, the surprise is that the quantity of money should be higher in the low-trade season than in the high-trade season. For the third topic, the surprise is that a recommendation of Jevons concerning how to finance the costly replacement of worn currency is shown not to hold.

### **Justin Rietz: “An Idea Worth Its Salt?”**

Recent archaeological excavations in the prehistoric town of Provadia in Bulgaria (ca 5500 BC) revealed an entire society specialized in the production of salt, as well as accumulated wealth unmatched anywhere in the world during this time period. Anthropologists believe that salt, a high demand good critical for survival in the agricultural Neolithic Era, was likely used as a regional medium of exchange but given the time period no supporting written evidence exists. To shed light on this conundrum, we model the use of salt money using a money search model in which agents are specialists in production but generalists in consumption. Our experimental results show that a high-demand good such as salt is almost always used as a medium of exchange, and that the producers of the high demand good capture a disproportionate share of the economy's wealth, providing support for the hypothesis that salt was an early form of money.

## **Day 2**

### **Elena Asparouhova: “The Role of Financial Markets in Mitigating Credit Market Bubbles”**

We investigate how long an insolvent debtor can avoid default when survival is beneficial to creditors collectively, but individual creditors gain by forcing early repayment. Theory predicts that the debt is not rolled over and default is immediate. With 23 experimental sessions, default is never immediate, with or without secondary debt markets. With markets, prices do not reveal survival length but correlate with payoffs. Creditors are better off with markets, but markets exacerbate wealth inequality. Survival length is reduced upon repetition with the same cohort. When new creditors are introduced, survival length remains constant, even with access to default history.

### **Charles Noussair: “Emotions and Markets: Cause or Effect?”**

Popular commentary has long associated emotional state with asset market behavior. High prices are said to be characterized by exuberance, euphoria, or excitement. Low prices and volatility are linked to the presence of fear in the market. Previous research on the relationship between emotions and market behavior tends to propose the interpretation that the causality runs from emotions to market behavior without direct measurement of emotional state. The experiment reported here explores the direction of the causality. Emotional state is induced, with 360-degree videos shown in virtual reality, before traders participate in experimental asset markets. Emotional state is measured before and after the market takes place. The results show that emotional state has no effect on price level or on the appetite for risky assets. On the other hand, market activity has a strong effect on subsequent emotional state.

### **Olivier Armantier: “A New Approach to Assess Inflation Expectations Anchoring Using Strategic Surveys”**

We propose a new approach to assessing the anchoring of inflation expectations using “strategic surveys.” Namely, we measure households’ revisions in long-run inflation expectations after they are presented with different economic scenarios. A key advantage of this approach is that it provides a causal interpretation in terms of how inflation events affect long-run inflation expectations. We implement the method in the summer of 2019 and the spring-summer of 2021 when the anchoring of long-run inflation expectations was in question. We find that the risk of unanchoring of expectations was reasonably low in both periods, and that long-run inflation expectations were essentially as well anchored in August 2021 as in July 2019, before the COVID-19 pandemic.

### **Luba Petersen: “Macroeconomic Literacy and Expectations”**

We explore the effects of macroeconomic literacy on expectation formation in an experimental economy where participants' aggregated expectations endogenously influence macroeconomic variables. We systematically vary the information participants receive about the economy's data-generating process (no information, qualitative information, and quantitative information) and the central bank's targets. Our experimental results suggest there are many advantages to providing precise quantitative training about the macroeconomy. Compared to an environment where forecasters have no initial information about the structure of the economy, quantitative information

about the underlying data generating process consistently reduces inflation forecast errors, reduce disagreements about inflation, and encourages a larger reaction to past forecast errors. Inflation variability is on average lower with quantitative information. Qualitative information, by contrast, is inconsistently effective at influencing forecasting behavior. Providing information about the central bank's targets increases inflation forecast errors and disagreement about inflation as it introduces an additional piece of information into subjects' information sets to coordinate on.

### **Marco Cipriani: “Trading by Professional Traders: An Experiment”**

We examine how professional traders behave in two financial market experiments; we contrast professional traders' behavior to that of undergraduate students, the typical experimental subject pool. In our first experiment, both sets of participants trade an asset over multiple periods after receiving private information about its value. Second, participants play the Guessing Game. Finally, they play a novel, individual-level version of the Guessing Game and we collect data on their cognitive abilities, risk preferences, and confidence levels. We find three differences between traders and students: Traders do not generate the price bubbles observed in previous studies with student subjects; traders aggregate private information better; and traders show higher levels of strategic sophistication in the Guessing Game. Rather than reflecting differences in cognitive abilities or other individual characteristics, these results point to the impact of traders' on-the-job learning and traders' beliefs about their peers' strategic sophistication.

### **Charles Holt: “The Effects of Behavioral Wedges with Retirement Savings”**

Saving for retirement is one of the most important financial decisions, yet there is limited empirical evidence comparing the two main alternatives: the Roth (tax-prepaid) retirement account and the traditional (tax-deferred) account. Moreover, the causes for under-saving patterns that have been documented empirically are still unclear. Roth accounts have recently gained popularity, but have not been in existence long enough for a full life-cycle comparison. Furthermore, there is the concern that individuals who self-select into Roth accounts are systematically different from others. In order to deal with the limited time horizons and selection biases associated with Roth accounts, this study considers consumption and savings in a laboratory experiment with a pre-assigned retirement accounts (tax pre-paid or deferred). In both treatments, subjects make incentivized decisions about savings and consumption over a simulated lifetime. Subjects earn interest on cash held in a savings account, which introduces present-value considerations with compound interest. In addition to earnings from interest on savings, subjects receive exogenous incomes that fall to zero during “retirement.” The alternative treatments introduce variation in the timing of tax payments. Preliminary results show that subjects in both treatments did not save enough for retirement, i.e. they consumed too much early on, which forced them to consume too little relative to optimality benchmarks during later periods. In contrast to the conventional wisdom, subjects in the traditional, tax-deferred treatment performed better (by overconsuming to a lesser extent early on) than those in the Roth account treatment. We reconcile our findings using behavioral concepts like loss aversion, present bias, and a failure to anticipate future consumption needs and tax liabilities. Other biases such as aversion to paying taxes in the present or aversion to early withdrawals penalties are also explored.

### **Yohanes Eko Riyanto: “The Bright Side of Dark Markets”**

We design an experiment to study the effects of dark trading on incentives to acquire costly information, price efficiency, market liquidity, and investors' earnings in a financial market. When

the information precision is high, adding a dark pool alongside a lit exchange encourages information acquisition, crowds out liquidity from the lit market, and results in a non-linear relationship between price efficiency and dark pool participation. At modest levels, dark pools enhance information aggregation. Investors with stronger signals use the lit exchange relatively more, and uninformed traders are better off when they trade more in the dark pool.

**Kristian Lopez-Vargas: “Price Impact and Order Shredding: Testing Flow Trading Format in the Laboratory”**

In this paper, we present an experimental study of flow trading in financial markets proposed by Kyle and Lee (2017) and Budish, Cramton, Kyle, Lee, and Malec (2021). In flow-trading markets, agents submit persistent flow demand and supply curves to trade in shares per each fraction of a second. The market clears by crossing these flow demand and supply. This format favors investors because it has built-in ways to shred orders and consequently limit the price impact of their trades. It also limits the arms race for fast communication technology (intrinsic to the current market design, the continuous double auction), and so the rents of HFT firms. This implies the flow market would tend to lower bid-ask spreads relative to the prevalent institutions. We deploy an experiment that some of these predictions.