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ResearchUpdate

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Challenges of Risk Management Evolve with Retail Payment Landscape

As retail payments shift increasingly from paper to electronic form, payment products, services, rules, and technologies are changing rapidly. So too are the risks associated with operational disruptions, fraud, illicit use, and breaches of data security. However, emerging—and even established—providers of payment methods can manage these risks by employing the right techniques, according to a forthcoming study in the *Economic Policy Review*.

In "Understanding Risk Management in Emerging Retail Payments," Michele Braun, James McAndrews, William Roberds, and Richard Sullivan consider whether, in an evolving payment environment, providers of emerging payment methods have sufficient incentives and tools to control risk before problems materialize.

The authors explain that emerging payment methods are making retail transactions less expensive and easier to process, while opening new commercial venues for the transactions. As with more established forms of payment, the ultimate success of these methods will depend on the ability of providers to manage and mitigate risk; new payment methods that fail to do so face rejection in the market.

The study presents an economic framework for understanding risk control in retail payments and applies it to the risk associated with three types of payments: general-purpose prepaid cards, e-check payments made through the Automated Clearinghouse system, and proprietary online balance-transfer systems. The payment types incorporate new technologies, new networks, and new rules to create an entirely new payment method. They are used in different venues, employ different means for initiating payments, and clear and settle transactions

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differently—yet they rely on similar risk mitigation strategies.

Braun et al. argue that containment programs are critical to payment risk management. These programs include coordinated industry efforts to develop and maintain risk mitigation standards, monitor compliance with standards, and enforce penalties for noncompliance. Limiting access to the payments system is an essential tool, with exclusion from the system serving as the ultimate penalty.

The authors caution that containment alone does not eliminate risk. However, a payments system can successfully manage risk if it recognizes problems quickly, encourages commitment from all participants to control risk, and uses an appropriate mix of market and public policy mechanisms to align risk management incentives.

An important lesson to be taken from the study, the authors observe, is that the techniques for mitigating the risks associated with fraud and data breaches are thus far meeting with success. "Generally, market mechanisms appear to encourage providers to mitigate risks appropriately," they note. "Most private sector providers have the tools to manage many of these risks, particularly because they treat the integrity of the network as a "club good"; in other words, they retain the option to exclude any party that fails to comply with the network's safeguards."

The study is available at www.newyorkfed.org/research/epr/forthcoming/0711brau.html.

Publications and Papers

The Research and Statistics Group produces a wide range of publications:

- The *Economic Policy Review*—a policy-oriented journal focusing on economic and financial market issues.
- *EPR Executive Summaries*—online versions of selected *Economic Policy Review* articles, in abridged form.
- *Current Issues in Economics and Finance*—concise studies of topical economic and financial issues.
- *Second District Highlights*—a regional supplement to *Current Issues*.
- *Staff Reports*—technical papers intended for publication in leading economic and finance journals, available only online.
- *Publications and Other Research*—an annual catalogue of our research output.

New Study Examines Financial Institutions' Pro-cyclical Leverage

The financial turmoil of 2007-08 has dramatically underscored the significance of financial intermediaries' balance sheets for financial market and macroeconomic performance. In "Liquidity, Monetary Policy, and Financial Cycles" (*Current Issues in Economics and Finance*, vol. 14, no. 1), Tobias Adrian and Hyun Song Shin examine how banks and other financial intermediaries manage their balance sheets in response to market price fluctuations. In particular, the authors track how these institutions adjust their leverage when the value of their balance sheet assets rises or falls.

The authors find that, contrary to common assumptions, financial institutions increase their leverage during asset price booms and reduce it during downturns—in other words, financial institution leverage is *pro-cyclical*. Such behavior, the authors argue, tends to exacerbate the fluctuations of the financial cycle.

How does this occur? As Adrian and Shin explain, the balance sheet adjustments of individual institutions have the potential to set adverse feedback effects in motion. During a boom, institutions react to the increase in the value of their assets by using borrowed funds to buy more of the assets. The increased demand for these assets pushes up the price, strengthening the institutions' balance sheets, and prompts the institutions to boost their leverage and further expand their asset holdings.

During downturns, this dynamic is reversed: Institutions react to a decline in asset value and the weakening of their balance sheets by reducing leverage. To pay down debt, they may sell assets; such sales depress the price of the assets and weaken balance sheets further, setting off another round of selling and price declines.

These institutional behaviors can affect the economy as a whole: Balance sheet adjustments that result in pro-cyclical leverage will amplify shocks to asset prices.

According to Adrian and Shin, the tool that financial institutions use to adjust their leverage is collateralized borrowing or, more specifically, the repurchase agreement (repo). The authors suggest that the growth rate of the stock of repos may consequently be a very useful measure of liquidity in a market-based system.

Taking their analysis a step further, Adrian and Shin show a close correlation between the growth rate of repos and the degree of ease in monetary policy: "When monetary policy is loose, the stock of repos grows rapidly and market liquidity is high; when monetary policy is tight, repo growth is slow and market liquidity declines markedly." This correlation leads the authors to observe that the federal funds rate—the short-term rate targeted by policymakers—could be an important determinant of the growth of balance sheets and the liquidity of the financial system.

The article is available at www.newyorkfed.org/research/current_issues/ci14-1.html.

Upcoming in the *Economic Policy Review*

The articles below are now available on our website (www.newyorkfed.org/research/epr/index.html). All but the first one will be part of an upcoming volume devoted to payments systems.

Signal or Noise? Implications of the Term Premium for Recession Forecasting
Joshua V. Rosenberg and Samuel Maurer

Since the 1970s, an inverted yield curve has been a reliable signal of an imminent recession. One interpretation of this signal is that markets expect monetary policy to ease as the Federal Reserve responds to an upcoming deterioration in economic conditions. Some have argued that the yield curve inversion in August 2006 did not signal an imminent recession, but instead was triggered by an unusually low level of the term premium. This article examines whether changes in the term premium can distort the recession signal given by an inverted yield curve. The authors use the Kim and Wright (2005) decomposition of the term spread into an expectations component and a term premium component to compare recession forecasting models with and without the term premium. They find that the expectations component of the term spread is a leading indicator of recession, while the term premium component is not. Their analysis of recession forecasting performance provides some evidence that a model based on the expectations component is more accurate than the standard model that uses the term spread.

Changes in the Timing Distribution of Fedwire Funds Transfers
Olivier Armantier, Jeffrey Arnold, and James McAndrews

The Federal Reserve's Fedwire funds transfer service—the biggest large-value payments system in the United States—has long displayed a peak of activity in the late afternoon. Theory suggests that the concentration of late-afternoon Fedwire activity reflects coordination among participating banks to reduce liquidity costs, delay costs, and credit risk; as these costs and risk change over time, payment timing most likely will be affected. This article seeks to quantify how the changing environment in which Fedwire operates has affected the timing of payment value transferred within the system between 1998 and 2006. It finds that the peak of the timing distribution has become more concentrated, has shifted to later in the day, and has actually divided into two peaks. The authors suggest that these trends can be explained by a rise in the value of payments transferred over Fedwire, the settlement patterns of the private settlement institutions that use the system, and an increase in industry concentration. Although the study's results provide no specific evidence of heightened operational risk attributable to activity occurring later in the day, they point to a high level of interaction between Fedwire and private settlement institutions.

The Timing and Funding of CHAPS Sterling Payments
Christopher Becher, Marco Galbiati, and Merxe Tudela

Real-time gross settlement (RTGS) systems such as CHAPS Sterling require large amounts of liquidity to support payment activity. To meet their liquidity needs, RTGS participants borrow from the central bank or rely on incoming payments from other participants. Both options can prove costly—the latter in particular if participants delay outgoing payments until incoming ones arrive. This article presents an empirical analysis of the timing and funding of payments in CHAPS. The authors seek to identify the factors driving the intraday profile of payment activity and the extent to which incoming funds are used as a funding source, a process known as liquidity recycling. They show that the level of liquidity recycling in CHAPS is high and stable throughout the day, and attribute this result to several features of the system. First, the settlement of time-critical payments provides liquidity to the system early in the settlement day; this liquidity can be recycled for the funding of less urgent payments. Second, CHAPS throughput guidelines provide a centralized coordination mechanism, in effect limiting any tendency toward payment delay. Third, the relatively small direct membership of CHAPS facilitates coordination between members, for example, through the use of bilateral net sender limits. Coordination encourages banks to maintain a relatively constant flux of payments throughout the day. The authors also argue that the high level of recycling helps to reduce liquidity risk, and that the relatively smooth intraday distribution of payments serves to mitigate operational risk associated with highly concentrated payment activity. They note, however, that the benefits of liquidity recycling are not evenly distributed among members of CHAPS.

An Economic Analysis of Liquidity-Saving Mechanisms

Antoine Martin and James McAndrews

A recent innovation in large-value payments systems has been the design and implementation of liquidity-saving mechanisms (LSMs), tools used in conjunction with real-time gross settlement (RTGS) systems. LSMs give system participants, such as banks, an option not offered by RTGS alone: they can queue their outgoing payments. Queued payments are released if some prespecified event occurs. LSMs can reduce the amount of central bank balances necessary to operate a payments system as well as quicken settlement. This article analyzes the performance of RTGS systems with and without the addition of an LSM. The authors find that, in terms of settling payments early, these mechanisms typically outperform pure RTGS systems. However, there are times when RTGS systems can be preferable to LSMs, such as when many banks that send payments early in RTGS choose to queue their payments when an LSM is available. The authors also show that the design of a liquidity-saving mechanism has important implications for the welfare of system participants, even in the absence of payment netting. In particular, the parameters specified determine whether the addition of an LSM increases or decreases welfare. ■

Other New Publications

- *Publications and Other Research*. The 2007 edition of our catalogue lists all of the papers published in our research series as well as many papers published by our economists in economic and finance journals, conference volumes, and scholarly books.

www.newyorkfed.org/research/publication_annuals/publications_otherresearch.html

New Titles in the *Staff Reports* Series

The following new staff reports are available at **www.newyorkfed.org/research/staff_reports**.

MACROECONOMICS AND GROWTH

No. 313, January 2008
Monetary Policy Implementation Frameworks: A Comparative Analysis
Antoine Martin and Cyril Monnet

Martin and Monnet compare two stylized frameworks for the implementation of monetary policy. The first framework relies only on standing facilities, and the second one relies only on open market operations. They show that the Friedman rule cannot be implemented in the first framework, but can be implemented using the second framework. However, for a given rate of inflation, they show that the first framework unambiguously achieves higher welfare than the second one. The authors conclude that an optimal system of monetary policy implementation should contain elements of both frameworks. Their results also suggest that any such system should pay interest on both required and excess reserves.

No. 320, March 2008
Forming Priors for DSGE Models (and How It Affects the Assessment of Nominal Rigidities)
Marco Del Negro and Frank Schorfheide

This paper discusses prior elicitation for the parameters of dynamic stochastic general equilibrium (DSGE) models and provides a method for constructing prior distributions for a subset of these parameters from beliefs about the moments of the endogenous variables. The empirical application studies the role of price and wage rigidities in a New Keynesian DSGE model and finds that standard macro time series cannot discriminate among theories that differ in the quantitative importance of nominal frictions.

No. 321, March 2008
Monetary Policy Analysis with Potentially Misspecified Models
Marco Del Negro and Frank Schorfheide

Policy analysis with potentially misspecified dynamic stochastic general equilibrium (DSGE) models faces two challenges: estimation of parameters that are relevant for policy trade-offs, and treatment of estimated deviations from the cross-equation restrictions. This paper develops and explores policy analysis approaches that are based on either the generalized shock structure for the DSGE model or the explicit modeling of deviations from cross-equation restrictions. Using post-1982 U.S. data, the authors first quantify the degree of misspecification in a state-of-the-art DSGE model and then document the performance of different interest rate feedback rules. They find that many of the policy prescriptions derived from the benchmark DSGE model are robust to the various treatments of misspecifications considered in this paper, but that quantitatively the cost of deviating from such prescriptions varies substantially.

No. 322, March 2008
Investment Shocks and Business Cycles
Alejandro Justiniano, Giorgio E. Primiceri, and Andrea Tambalotti

Shocks to the marginal efficiency of investment are the most important drivers of business cycle fluctuations in U.S. output and hours. Moreover, like a textbook demand shock, these disturbances drive prices higher in expansions. The authors reach these conclusions by estimating a dynamic stochastic general equilibrium (DSGE) model with several shocks and frictions. They also find that neutral technology shocks are not negligible, but their share in the variance of output is only around 25 percent and even lower for hours. Labor supply shocks explain a large fraction of the variation of hours at very low frequencies, but not over the business cycle. Finally, the study shows that imperfect competition and, to a lesser extent, technological frictions are key to the transmission of investment shocks in the model.

INTERNATIONAL

No. 316, February 2008
Macroeconomic Interdependence and the International Role of the Dollar
Linda Goldberg and Cédric Tille

The U.S. dollar plays a key role in international trade invoicing along two complementary dimensions. First, most U.S. exports and imports are invoiced in dollars; second, trade flows that do not involve the United States are often invoiced in dollars, a fact that has received relatively little attention. Using a simple center-periphery model, Goldberg and Tille show that the second dimension magnifies the exposure of periphery countries to the center's monetary policy, even when direct trade flows between the center and the periphery are limited. When intra-periphery trade volumes are sensitive to the center's monetary policy, the model predicts substantial welfare gains from coordinated monetary policy. The model also shows that although exchange rate movements are not fully efficient, flexible exchange rates are a central component of optimal monetary policy.

MICROECONOMICS

No. 315, January 2008
Impact of Voucher Design on Public School Performance: Evidence from Florida and Milwaukee Voucher Programs
Rajashri Chakrabarti

This paper examines the impact of vouchers and voucher design on public school performance. The 1990 Milwaukee experiment can be viewed as a "voucher shock" program that suddenly made low-income students eligible for vouchers. The 1999 Florida program can be viewed as a "threat of voucher" program, in which schools getting an "F" grade for the first time are exposed to the threat of vouchers, but do not face vouchers unless and until they get a second "F" within the next three years. In the context of a theoretical model, the study argues that the threatened public schools will unambiguously improve under the Florida-type program, and this improvement will exceed that achieved under the Milwaukee-type program. It then shows that these findings are validated empirically.

BANKING AND FINANCE

No. 312, January 2008
Run Equilibria in a Model of Financial Intermediation
Huberto M. Ennis and Todd Keister

The authors study the Green and Lin (2003) model of financial intermediation with two new features: traders may face a cost of contacting the intermediary, and consumption needs may be correlated across traders. They show that each feature is capable of generating an equilibrium in which some (but not all) traders "run" on the intermediary by withdrawing their funds at the first opportunity regardless of their true consumption needs. Their results also provide some insight into elements of the economic environment that are necessary for a run equilibrium to exist in general models of financial intermediation. In particular, the findings highlight the importance of information frictions that cause the intermediary and traders to have different beliefs, in equilibrium, about the consumption needs of traders who have yet to contact the intermediary.

No. 314, January 2008
What Can We Learn from Privately Held Firms about Executive Compensation?
Rebel A. Cole and Hamid Mehran

This study examines the determinants of CEO compensation using data from a nationally representative sample of privately held U.S. corporations. It finds that 1) pay-size elasticity is much larger for privately held firms than for the publicly traded firms on which previous research has almost exclusively focused; 2) executives at C-corporations are paid significantly more than executives at S-corporations; 3) executive pay is inversely related to CEO ownership; 4) executive pay is inversely related to leverage; and 5) executive pay is associated with a number of CEO characteristics, including age, education, and gender; it is inversely related to CEO age and positively related to educational attainment, and female executives are paid significantly less than their male counterparts.

No. 318, March 2008
Understanding the Securitization of Subprime Mortgage Credit
Adam B. Ashcraft and Til Schuermann

Ashcraft and Schuermann provide an overview of the subprime mortgage securitization process and the seven key informational frictions that arise. They discuss the ways that market participants work to minimize these frictions and speculate on how this process broke down. They continue with a complete picture of the subprime borrower and the subprime loan, discussing both predatory borrowing and predatory lending. The authors present the key structural features of a typical subprime securitization, document how rating agencies assign credit ratings to mortgage-backed securities, and outline how these agencies monitor the performance of mortgage pools over time. Throughout the paper, they draw upon the example of a mortgage pool securitized by New Century Financial during 2006.

No. 319, March 2008
Settlement Delays in the Money Market
Leonardo Bartolini, Spence Hilton, and James McAndrews

The authors track 38,000 money market trades from execution to delivery and return to provide a first empirical analysis of settlement delays in financial markets. In line with predictions from recent models showing that financial claims are settled strategically, they document a tendency by lenders to delay delivery of loaned funds until the afternoon hours. The authors find that banks follow a simple strategy to manage the risk of account overdrafts—delaying the settlement of large payments relative to that of small payments. They also find evidence of strategic delay in the return of borrowed funds, although they can explain a smaller fraction of the dispersion in delays in the return than in the delivery leg of money market lending.

QUANTITATIVE METHODS

No. 317, February 2008
Forecasting Economic and Financial Variables with Global VARs
M. Hashem Pesaran, Til Schuermann, and L. Vanessa Smith

The authors use a global vector autoregressive (GVAR) model to generate out-of-sample one-quarter- and four-quarters-ahead forecasts of real output, inflation, real equity prices, exchange rates, and interest rates over the period 2004:1-2005:4 for 134 variables from twenty-six regions made up of thirty-three countries covering about 90 percent of world output. The forecasts are compared with typical benchmarks, and the effects of model and estimation uncertainty on forecast outcomes are examined by pooling forecasts obtained from different GVAR models estimated over alternative sample periods. The authors find that averaging forecasts across both models and windows makes a significant difference. Indeed, the double-averaged GVAR forecasts performed better than the benchmark forecasts, especially for output, inflation, and real equity prices. ■

Recently Published

Mary Amiti. 2008. "Trade Costs and Location of Foreign Firms in China," with Beata S. Javorcik. *Journal of Development Economics* 85, no. 1-2 (February): 129-49.

Leonardo Bartolini. 2008. "Money Market Integration," with Spence Hilton and Alessandro Prati. *Journal of Money, Credit, and Banking* 40, no. 1 (February): 193-214.

Charles Steindel. 2008. "Propensity to Consume, Marginal." In William A. Darity, Jr., ed., *International Encyclopedia of the Social Sciences*, 2nd ed., 544-6. Farmington Hills, Mich.: Macmillan Reference USA.

Charles Steindel. 2008. "Propensity to Save, Marginal." In William A. Darity, Jr., ed., *International Encyclopedia of the Social Sciences*, 2nd ed., 546-7. Farmington Hills, Mich.: Macmillan Reference USA.

Tanju Yorulmazer. 2008. "Information Contagion and Bank Herding," with Viral V. Acharya. *Journal of Money, Credit, and Banking* 40, no. 1 (February): 215-32. ■

Papers Presented by Economists in the Research and Statistics Group

"Intertemporal Distortions in the Second Best," Roc Armenter. Duke University seminar, Durham, North Carolina, January 18. With Stefania Albanesi.

"Gains from a Redrawing of Political Boundaries: Evidence from State Reorganization in India," Rajashri Chakrabarti. 120th Annual Meeting of the American Economic Association, New Orleans, Louisiana, January 4. With Joydeep Roy.

"The Intended and Unintended Consequences of No Child Left Behind: Evidence from Wisconsin," Rajashri Chakrabarti. 120th Annual Meeting of the American Economic Association, New Orleans, Louisiana, January 5.

"Optimal Monetary Policy under Sudden Stops," Vasco Cúrdia. Econometric Society North American Winter Meeting, New Orleans, Louisiana, January 6.

"Current Account Dynamics and Monetary Policy," Andrea Ferrero. Workshop cosponsored by DEFAP (Graduate School in the Economics and Finance of Public Administration) and the Economic Research Department of the Bank of Italy, Università Cattolica, Milan, Italy, December 20, 2007. With Mark Gertler and Lars Svensson. Also presented at the CEPR (Centre for Economic Policy Research) – CREI (Centre de Recerca en Economia Internacional) Third Annual Workshop on Global Interdependence, Barcelona, Spain, March 28.

"The Long-Run Determinants of the U.S. External Imbalances," Andrea Ferrero. 120th Annual Meeting of the American Economic Association, New Orleans, Louisiana, January 4.

"How Do Treasury Dealers Manage Their Positions?" Michael Fleming and Joshua Rosenberg. American Finance Association annual meeting, New Orleans, Louisiana, January 4.

"The Lending Channel in Emerging Markets: Are Foreign Banks Different?" Linda Goldberg. European Central Bank conference, Frankfurt, Germany, November 16, 2007.

"Macroeconomic Interdependence and the International Role of the Dollar," Linda Goldberg. City University of New York Graduate Center seminar, New York City, March 4.

"The Optimal Level of International Reserves for Emerging Market Countries: A New Formula and Some Applications," Linda Goldberg. 120th Annual Meeting of the American Economic Association, New Orleans, Louisiana, January 4. With Olivier Jeanne and Romain Rancière.

"Market Turmoil: Is It Liquidity or Is It Credit?" Til Schuermann. Conference sponsored by Trader Monthly and World Research Group, New York City, January 29.

"The Seven Deadly Frictions of Mortgage Credit Securitization," Til Schuermann. PRMIA (Professional Risk Managers' International Association) 2008 New York Credit Risk Forum, New York City, February 13. With Adam Ashcraft.

"Investment Shocks and Business Cycles," Andrea Tambalotti. NBER Economic Fluctuations and Growth Program meeting, New York City, February 11. With Alejandro Justiniano and Giorgio Primiceri.

"Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes," Giorgio Topa. Seminar cosponsored by Dijon University, CESAER (Conference of European Schools for Advanced Engineering Education and Research), and INRA-ENESAD (Institut National de la Recherche Agronomique–Etablissement National d'Enseignement Supérieur Agronomique de Dijon), Dijon, France, October 22, 2007. With Patrick Bayer and Stephen L. Ross. ■

Research and Statistics Group Publications and Papers: January-March 2008

Publications are available at **www.newyorkfed.org/research/publication_annuals/index.html**.

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Olivier Armantier, Jeffrey Arnold, and James McAndrews

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