



Economists and visiting scholars at the Philadelphia Fed produce papers of interest to the professional researcher on banking, financial markets, economic forecasting, the housing market, consumer finance, the regional economy, and more. More abstracts may be found at www.philadelphiafed.org/research-and-data/publications/research-rap/. You can find their full working papers at <http://www.philadelphiafed.org/research-and-data/publications/working-papers/>.

The Continuing Power of the Yield Spread in Forecasting Recessions

The authors replicate the main results of Rudebusch and Williams (2009), who show that the use of the yield spread in a probit model can predict recessions better than the Survey of Professional Forecasters. Croushore and Marsten investigate the robustness of their results in several ways: extending the sample to include the 2007-09 recession, changing the starting date of the sample, changing the ending date of the sample, using rolling windows of data instead of just an expanding sample, and using alternative measures of the “actual” value of real output. The results show that the Rudebusch-Williams findings are robust in all dimensions.

Working Paper 14-5. Dean Croushore, University of Richmond and Federal Reserve Bank of Philadelphia Visiting Scholar; Katherine Marsten, University of Richmond.

Continuous Markov Equilibria with Quasi-Geometric Discounting

The authors prove that the standard quasi-geometric discounting model used in dynamic consumer theory and political economics does not possess continuous Markov perfect equilibria (MPE) if there is a strictly positive lower bound on wealth. The authors also show that, at points of discontinuity, the decision maker strictly prefers lotteries over the next period’s assets. The authors then extend the standard model to have lotteries and establish the existence of an MPE with continuous decision

rules. The models with and without lotteries are numerically compared, and it is shown that the model with lotteries behaves more in accord with economic intuition.

Working Paper 14-6. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia; Burcu Eyigungor, Federal Reserve Bank of Philadelphia.

The Economics of Debt Collection: Enforcement of Consumer Credit Contracts

In the U.S., third-party debt collection agencies employ more than 140,000 people and recover more than \$50 billion each year, mostly from consumers. Informational, legal, and other factors suggest that original creditors should have an advantage in collecting debts owed to them. Then, why does the debt collection industry exist and why is it so large? Explanations based on economies of scale or specialization cannot address many of the observed stylized facts. The authors develop an application of common agency theory that better explains those facts. The model explains how reliance on an unconcentrated industry of third-party debt collection agencies can implement an equilibrium with more intense collections activity than creditors would implement by themselves. The authors derive empirical implications for the nature of the debt collection market and the structure of the debt collection industry. A welfare analysis shows that, under certain conditions, an equilibrium in which creditors rely on third-party debt collectors can generate more credit supply and aggregate borrower surplus than an equilibrium where lenders collect debts owed to them on their own. There are, however,

situations where the opposite is true. The model also suggests a number of policy instruments that may improve the functioning of the collections market.

Working Paper 14-7. Viktor Fedaseyev, Bocconi University and Federal Reserve Bank of Philadelphia Visiting Scholar; Robert M. Hunt, Federal Reserve Bank of Philadelphia.

Foreclosure Delay and Consumer Credit Performance

The deep housing market recession from 2008 through 2010 was characterized by a steep increase in the number of foreclosures. Foreclosure timelines — the length of time between initial mortgage delinquency and completion of foreclosure — also expanded significantly, averaging up to three years in some states. Most individuals undergoing foreclosure are experiencing serious financial stress. However, extended foreclosure timelines enable mortgage defaulters to live in their homes without making housing payments until the completion of the foreclosure process, thus providing a liquidity benefit. This paper tests whether the resulting liquidity was used to help cure nonmortgage credit delinquency. The authors find a significant relationship between longer foreclosure timelines and household performance on nonmortgage consumer credit during and after the foreclosure process. Their results indicate that a longer period of nonpayment of housing-related expenses results in higher cure rates on delinquent nonmortgage debts and improved household balance sheets. Foreclosure delay may have mitigated the impact of the economic downturn on credit card default. However, credit card performance may deteriorate in the future as the current foreclosure backlog is cleared and the affected households once again incur housing expenses.

Working Paper 14-8. Paul Calem, Federal Reserve Bank of Philadelphia; Julapa Jagtiani, Federal Reserve Bank of Philadelphia; William W. Lang, Federal Reserve Bank of Philadelphia.

Competing for Order Flow in OTC Markets

The authors develop a model of a two-sided asset market in which trades are intermediated by dealers and are bilateral. Dealers compete to attract order flow by posting the terms at which they execute trades, which can include prices, quantities, and execution times, and investors direct their orders toward dealers that offer the most attractive terms of trade. Equilibrium outcomes have the following properties. First, investors face a trade-off between trading costs and speeds of execution. Second, the asset market is endogenously segmented in the sense that investors with different asset valuations and different asset holdings will trade at different speeds and different costs. For example, under a Leontief technology to match investors and dealers, per unit trading costs decrease with the size of the trade, in accordance with the evidence from the market for corporate bonds. Third,

dealers' implicit bargaining powers are endogenous and typically vary across sub-markets. Finally, the authors obtain a rich set of comparative statics both analytically, by studying a limiting economy where trading frictions are small, and numerically. For instance, the authors find that the relationship between trading costs and dealers' bargaining power can be hump-shaped.

Working Paper 14-9. Benjamin Lester, Federal Reserve Bank of Philadelphia; Guillaume Rocheteau, University of California-Irvine; Pierre-Olivier Weill, University of California-Los Angeles.

Forecasting Credit Card Portfolio Losses in the Great Recession: A Study in Model Risk

Credit card portfolios represent a significant component of the balance sheets of the largest US banks. The charge-off rate in this asset class increased drastically during the Great Recession. The recent economic downturn offers a unique opportunity to analyze the performance of credit risk models applied to credit card portfolios under conditions of economic stress. Specifically, the authors evaluate three potential sources of model risk: model specification, sample selection, and stress scenario selection. Their analysis indicates that model specifications that incorporate interactions between policy variables and core account characteristics generate the most accurate loss projections across risk segments. Models estimated over a time frame that includes a significant economic downturn are able to project levels of credit loss consistent with those experienced during the Great Recession. Models estimated over a time frame that does not include a significant economic downturn can severely underpredict credit loss in some cases, and the level of forecast error can be significantly impacted by model specification assumptions. Higher credit-score segments of the portfolio are proportionally more severely impacted by downturn economic conditions and model specification assumptions. The selection of the stress scenario can have a dramatic impact on projected loss.

Working Paper 14-10. José J. Canals-Cerdá, Federal Reserve Bank of Philadelphia; Sougata Kerr, Federal Reserve Bank of Philadelphia.

Misallocation, Informality, and Human Capital: Understanding the Role of Institutions

The aim of this paper is to quantify the role of formal-sector institutions in shaping the demand for human capital and the level of informality. The authors propose a firm dynamics model where firms face capital market imperfections and costs of operating in the formal sector. Formal firms have a larger set of production opportunities and the ability to employ skilled workers, but informal firms can

avoid the costs of formalization. These firm-level distortions give rise to endogenous formal and informal sectors and, more importantly, affect the demand for skilled workers. The model predicts that countries with a low degree of debt enforcement and high costs of formalization are characterized by relatively lower stocks of skilled workers, larger informal sectors, low allocative efficiency, and measured TFP. Moreover, the authors find that the interaction between entry costs and financial frictions (as opposed to the sum of their individual effects) is the main driver of these differences. This complementarity effect derives from the introduction of skilled workers, which prevents firms from substituting labor for capital and in turn moves them closer to the financial constraint.

Working Paper 14-11. Pablo N. D'Erasmus, University of Maryland and Federal Reserve Bank of Philadelphia; Hernan J. Moscoso Boedo, University of Virginia; Asli Senkal, University of Virginia.

Market Exposure and Endogenous Firm Volatility over the Business Cycle

The authors propose a theory of endogenous firm-level volatility over the business cycle based on endogenous market exposure. Firms that reach a larger number of markets diversify market-specific demand risk at a cost. The model is driven only by total factor productivity shocks and captures the business cycle properties of firm-level volatility. Using a panel of U.S. firms (Compustat), the authors empirically document the countercyclical nature of firm-level volatility. They then match this panel to Compustat's Segment data and the U.S. Census's Longitudinal Business Database (LBD) to show that, consistent with their model, measures of market reach are procyclical, and the countercyclicality of firm-level volatility is driven mostly by those firms that adjust the number of markets to which they are exposed. This finding is explained by the negative elasticity between various measures of market exposure and firm-level idiosyncratic volatility the authors uncover using Compustat, the LBD, and the Kauffman Firm Survey.

Working Paper 14-12. Ryan Decker, University of Maryland; Pablo N. D'Erasmus, University of Maryland and Federal Reserve Bank of Philadelphia; Hernan J. Moscoso Boedo, University of Virginia.

Capital Requirements in a Quantitative Model of Banking Industry Dynamics

The authors develop a model of banking industry dynamics to study the quantitative impact of capital requirements on bank risk taking, commercial bank failure, and market structure. They propose a market structure where big, dominant banks interact with small, competitive fringe

banks. Banks accumulate securities like Treasury bills and undertake short-term borrowing when there are cash flow shortfalls. A nontrivial size distribution of banks arises out of endogenous entry and exit, as well as banks' buffer stocks of securities. The authors test the model using business cycle properties and the bank lending channel across banks of different sizes studied by Kashyap and Stein (2000). They find that a rise in capital requirements from 4% to 6% leads to a substantial reduction in exit rates of small banks and a more concentrated industry. Aggregate loan supply falls and interest rates rise by 50 basis points. The lower exit rate causes the tax/output rate necessary to fund deposit insurance to drop in half. Higher interest rates, however, induce higher loan delinquencies as well as a lower level of intermediated output.

Working Paper 14-13. Dean Corbae, University of Wisconsin–Madison and National Bureau of Economic Research; Pablo N. D'Erasmus, Federal Reserve Bank of Philadelphia.

Trade Adjustment Dynamics and the Welfare Gains from Trade

The authors build a micro-founded two-country dynamic general equilibrium model in which trade responds more to a cut in tariffs in the long run than in the short run. The model introduces a time element to the fixed-variable cost trade-off in a heterogeneous producer trade model. Thus, the dynamics of aggregate trade adjustment arise from producer-level decisions to invest in lowering their future variable export costs. The model is calibrated to match salient features of new exporter growth and provides a new estimate of the exporting technology. At the micro level, the authors find that new exporters commonly incur substantial losses in the first three years in the export market and that export profits are back-loaded. At the macro level, the slow export expansion at the producer level leads to sluggishness in the aggregate response of exports to a change in tariffs, with a long-run trade elasticity that is 2.9 times the short-run trade elasticity. The authors estimate the welfare gains from trade from a cut in tariffs, taking into account the transition period. While the intensity of trade expands slowly, consumption overshoots its new steady-state level, so the welfare gains are almost 15 times larger than the long-run change in consumption. Models without this dynamic export decision underestimate the gains to lowering tariffs, particularly when constrained to also match the gradual expansion of aggregate trade flows.

Working Paper 14-14. George Alessandria, Federal Reserve Bank of Philadelphia; Horag Choi, Monash University; Kim Ruhl, New York University Stern School of Business.