

# Research Update

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## Firm Wages in a Frictional Labor Market

This paper studies a labor market with directed search, where multi-worker firms follow a firm wage policy: They pay equally productive workers the same. The policy reduces wages, due to the influence of firms' existing workers on their wage-setting problem, increasing the profitability of hiring. It also introduces a time-inconsistency into the dynamic firm problem, because firms face a less elastic labor supply in the short run. To consider outcomes when firms reoptimize each period, I study Markov perfect equilibria, proposing a tractable solution approach based on standard Euler equations. In two applications, I first show that firm wages dampen wage variation over the business cycle, amplifying that in unemployment, with quantitatively significant effects. Second, I show that firm-wage firms may find it profitable to fix wages for a period of time, and that an equilibrium with fixed wages can be good for worker welfare, despite added volatility in the labor market.

Working Paper 19-05. Leena Rudanko, Federal Reserve Bank of Philadelphia.

## How Big Is the Wealth Effect? Decomposing the Response of Consumption to House Prices

We investigate the effect of declining house prices on household consumption behavior during 2006–2009. We use an individual-level dataset that has detailed information on borrower characteristics, mortgages, and credit risk. Proxying consumption by individual-level auto loan originations, we decompose the effect of declining house prices on consumption into three main channels: wealth effect, household financial constraints, and bank health. We find a negligible wealth effect. Tightening household-level financial constraints can explain 40–45 percent of the response of consumption to declining house prices. Deteriorating bank health leads to reduced credit supply both to households and firms. Our dataset allows us to estimate the effect of this on households as 20–25 percent of the consumption response. The remaining 35 percent is a general equilibrium effect that works via a decline in employment as a result of either lower credit supply to firms or the feedback from lower consumer demand. Our estimate of a negligible wealth effect is robust to accounting for the endogeneity of house prices and unemployment. The contribution of tightening household financial constraints goes down to 35 percent, whereas declining bank credit supply to households captures about half of the overall consumption response, once we account for endogeneity.

Working Paper 19-06. S. Borağan Aruoba, University of Maryland and Federal Reserve Bank of Philadelphia Research Department Visiting Scholar; Ronel Elul, Federal Reserve Bank of Philadelphia; Şebnem Kalemli-Özcan, University of Maryland.

### **Incumbency Disadvantage of Political Parties: The Role of Policy Inertia and Prospective Voting**

We document that postwar U.S. elections show a strong pattern of “incumbency disadvantage”: If a party has held the presidency of the country or the governorship of a state for some time, that party tends to lose popularity in the subsequent election. To explain this fact, we employ Alesina and Tabellini’s (1990) model of partisan politics, extended to have elections with prospective voting. We show that inertia in policies, combined with sufficient uncertainty in election outcomes, implies incumbency disadvantage. We find that inertia can cause parties to target policies that are more extreme than the policies they would support in the absence of inertia and that such extremism can be welfare reducing.

Supersedes Working Paper 17-43.

Working Paper 19-07. Satyajit Chatterjee, Federal Reserve Bank of Philadelphia; Burcu Eyigungor, Federal Reserve Bank of Philadelphia.

### **The Roles of Alternative Data and Machine Learning in Fintech Lending: Evidence from the LendingClub Consumer Platform**

Fintech has been playing an increasing role in shaping financial and banking landscapes. There have been concerns about the use of alternative data sources by fintech lenders and the impact on financial inclusion. We compare loans made by a large fintech lender and similar loans that were originated through traditional banking channels. Specifically, we use account-level data from LendingClub and Y-14M data reported by bank holding companies with total assets of \$50 billion or more. We find a high correlation with interest rate spreads, LendingClub rating grades, and loan performance. Interestingly, the correlations between the rating grades and FICO scores have declined from about 80 percent (for loans that were originated in 2007) to only about 35 percent for recent vintages (originated in 2014–2015), indicating that nontraditional alternative data have been increasingly used by fintech lenders. Furthermore, we find that the rating grades (assigned based on alternative data) perform well in predicting loan performance over the two years after origination. The use of alternative data has allowed some borrowers who would have been classified as subprime by traditional criteria to be slotted into “better” loan grades, which allowed them to get lower-priced credit. In addition, for the same risk of default, consumers pay smaller spreads on loans from LendingClub than from credit card borrowing.

Supersedes Working Paper 17-17.

Working Paper 18-15 Revised. Julapa Jagtiani, Federal Reserve Bank of Philadelphia; Catharine Lemieux, Federal Reserve Bank of Chicago.

## **From Incurred Loss to Current Expected Credit Loss (CECL): A Forensic Analysis of the Allowance for Loan Losses in Unconditionally Cancelable Credit Card Portfolios**

The Current Expected Credit Loss (CECL) framework represents a new approach for calculating the allowance for credit losses. Credit cards are the most common form of revolving consumer credit and are likely to present conceptual and modeling challenges during CECL implementation. We look back at nine years of account-level credit card data, starting with 2008, over a time period encompassing the bulk of the Great Recession as well as several years of economic recovery. We analyze the performance of the CECL framework under plausible assumptions about allocations of future payments to existing credit card loans, a key implementation element. Our analysis focuses on three major themes: defaults, balances, and credit loss. Our analysis indicates that allowances are significantly impacted by specific payment allocation assumptions as well as downturn economic conditions. We also compare projected allowances with realized credit losses and observe a significant divergence resulting from the revolving nature of credit card portfolios. We extend our analysis across segments of the portfolio with different risk profiles. Interestingly, fewer risky segments of the portfolio are proportionally more impacted by specific payment assumptions and downturn economic conditions. Our findings suggest that the effect of the new allowance framework on a specific credit card portfolio will depend critically on its risk profile. Thus, our findings should be interpreted qualitatively, rather than quantitatively. Finally, the goal is to gain a better understanding of the sensitivity of allowances to plausible variations in assumptions about the allocation of future payments to present credit card loans. Thus, we do not offer specific best practice guidance.

Working Paper 19-08. José J. Canals-Cerdá, Federal Reserve Bank of Philadelphia.

## **Investigating Nonneutrality in a State-Dependent Pricing Model with Firm-Level Productivity Shocks**

In recent years, there has been an abundance of empirical work examining price-setting behavior at the micro level. First-generation models with price-setting rigidities were generally at odds with much of the microprice data. A second generation of models, with fixed costs of price adjustment and idiosyncratic shocks, have attempted to rectify this shortcoming. Using a model that matches a large set of microeconomic facts, we find significant nonneutrality. We decompose the nonneutrality and find that state dependence plays an important part in the responses of output and inflation to a monetary shock. We also examine how aggregating firm behavior can generate flat hazards. Last, we find that the steady state statistic developed by Alvarez, Le Bihan, and Lippi (2016) is an imperfect guide to characterizing nonneutrality in our model.

Working Paper 19-09. Michael Dotsey, Federal Reserve Bank of Philadelphia; Alexander L. Wolman, Federal Reserve Bank of Richmond.

## **Frictional Intermediation in Over-the-Counter Markets**

We extend Duffie, Gârleanu, and Pedersen's (2005) search-theoretic model of over-the-counter (OTC) asset markets, allowing for a decentralized interdealer market with arbitrary heterogeneity in dealers' valuations or inventory costs. We develop a solution technique that makes the model fully tractable and allows us to derive, in closed form, theoretical formulas for key statistics analyzed in empirical studies of the intermediation process in OTC markets. A calibration to the market for municipal securities reveals that the model can generate trading patterns and prices that are quantitatively consistent with the data. We use the calibrated model to compare the gains from trade that are realized in this frictional market with those from a hypothetical, frictionless environment, and to distinguish between the quantitative implications of various types of heterogeneity across dealers.

Supersedes Working Paper 15-22.

Working Paper 19-10. Julien Hugonnier, EPFL and Swiss Finance Institute; Benjamin Lester, Federal Reserve Bank of Philadelphia; Pierre-Olivier Weill, UCLA and Visiting Scholar, Federal Reserve Bank of Philadelphia Research Department.

## **The Paper Trail of Knowledge Spillovers: Evidence from Patent Interferences**

We show evidence of localized knowledge spillovers using a new database of U.S. patent interferences terminated between 1998 and 2014. Interferences resulted when two or more independent parties submitted identical claims of invention nearly simultaneously. Following the idea that inventors of identical inventions share common knowledge inputs, interferences provide a new method for measuring knowledge spillovers. Interfering inventors are 1.4 to 4 times more likely to live in the same local area than matched control pairs of inventors. They are also more geographically concentrated than citation-linked inventors. Our results emphasize geographic distance as a barrier to tacit knowledge flows.

Working Paper 17-44 Revised. Ina Ganguli, University of Massachusetts–Amherst; Jeffrey Lin, Federal Reserve Bank of Philadelphia; Nicholas Reynolds, Brown University.

## **A Dynamic Model of Intermediated Consumer Credit and Liquidity**

We construct a model of consumer credit with payment frictions, such as spatial separation and unsynchronized trading patterns, to study optimal monetary policy across different interbank market structures. In our framework, intermediaries play an essential role in the functioning of the payment system, and monetary policy influences the equilibrium allocation through the interest rate on reserves. If interbank credit markets are incomplete, then monetary policy plays a crucial role in the smooth operation of the payment system. Specifically, an equilibrium in which privately issued debt claims are not discounted is shown to exist provided the initial wealth in the intermediary sector is sufficiently large relative to the size of the retail sector. Such an equilibrium with an efficient payment system requires setting the interest rate on reserves sufficiently close to the rate of time preference.

Working Paper 19-12. Pedro Gomis-Porqueras, Deakin University; Daniel Sanches, Federal Reserve Bank of Philadelphia.

## **Toward a Framework for Time Use, Welfare, and Household-Centric Economic Measurement**

What is meant by economic progress, and how should it be measured? The conventional answer is growth in real GDP over time or compared across countries, a monetary measure adjusted for the general rate of increase in prices. However, there is increasing interest in developing an alternative understanding of economic progress, particularly in the context of digitalization of the economy and the consequent significant changes Internet use is bringing about in production and household activity. This paper discusses one alternative approach, combining an extended utility framework considering time allocation over paid work, household work, leisure, and consumption with measures of objective or subjective well-being while engaging in different activities. Developing this wider economic welfare measure would require the collection of time use statistics as well as well-being data and direct survey evidence, such as the willingness to pay for leisure time. We advocate an experimental set of time and well-being accounts, with a particular focus on the digitally driven shifts in behavior.

Working Paper 19-11. Diane Coyle, University of Cambridge; Leonard Nakamura, Federal Reserve Bank of Philadelphia.

## A Shortage of Short Sales: Explaining the Underutilization of a Foreclosure Alternative

The Great Recession led to widespread mortgage defaults, with borrowers resorting to both foreclosures and short sales to resolve their defaults. I first quantify the economic impact of foreclosures relative to short sales by comparing the home price implications of both. After accounting for omitted variable bias, I find that homes selling as short sales transact at 9.2% to 10.5% higher prices on average than those that sell after foreclosure. Short sales also exert smaller negative externalities than foreclosures, with one short sale decreasing nearby property values by 1 percentage point less than a foreclosure. So why weren't short sales more prevalent? These home price benefits did not increase the prevalence of short sales because free rents during foreclosures caused more borrowers to select foreclosures, even though higher advances led servicers to prefer more short sales. In states with longer foreclosure timelines, the benefits from foreclosures increased for borrowers, so short sales were less utilized. I find that one standard deviation increase in the average length of the foreclosure process decreased the short sale share by 0.35 to 0.45 standard deviation. My results suggest that policies that increase the relative attractiveness of short sales could help stabilize distressed housing markets.

Working Paper 19-13. Calvin Zhang, Federal Reserve Bank of Philadelphia.

## Banking Regulation with Risk of Sovereign Default

Banking regulation routinely designates some assets as safe and thus does not require banks to hold any additional capital to protect against losses from these assets. A typical such safe asset is domestic government debt. There are numerous examples of banking regulation treating domestic government bonds as "safe," even when there is clear risk of default on these bonds. We show, in a parsimonious model, that this failure to recognize the riskiness of government debt allows (and induces) domestic banks to "gamble" with depositors' funds by purchasing risky government bonds (and assets closely correlated with them). A sovereign default in this environment then results in a banking crisis. Critically, we show that permitting banks to gamble this way lowers the cost of borrowing for the government. Thus, if the borrower and the regulator are the same entity (the government), that entity has an incentive to ignore the riskiness of the sovereign bonds. We present empirical evidence in support of the key mechanism we are highlighting, drawing on the experience of Russia in the run-up to its 1998 default and on the recent Eurozone debt crisis.

Working Paper 19-15. Pablo D'Erasmus, Federal Reserve Bank of Philadelphia; Igor Livshits, Federal Reserve Bank of Philadelphia; and Koen Schoors.

## We Are All Behavioral, More or Less: Measuring and Using Consumer-Level Behavioral Sufficient Statistics

Can a behavioral sufficient statistic empirically capture cross-consumer variation in behavioral tendencies and help identify whether behavioral biases, taken together, are linked to material consumer welfare losses? Our answer is yes. We construct simple consumer-level behavioral sufficient statistics—"B-counts"—by eliciting 17 potential sources of behavioral biases per person, in a nationally representative panel, in two separate rounds nearly three years apart. B-counts aggregate information on behavioral biases within-person. Nearly all consumers exhibit multiple biases, in patterns assumed by behavioral sufficient statistic models (à la Chetty), and with substantial variation across people. B-counts are stable within-consumer over time, and that stability helps to address measurement error when using B-counts to model the relationship between biases, decision utility, and experienced utility. Conditional on classical inputs—risk aversion and patience, life-cycle factors and other demographics, cognitive and non-cognitive skills, and financial resources—B-counts strongly negatively correlate with both objective and subjective aspects of experienced utility. The results hold in much lower-dimensional models employing "Sparsity B-counts" based on bias subsets (à la Gabaix) and/or fewer covariates, illuminating lower-cost ways to use behavioral sufficient statistics to help capture the combined influence of multiple behavioral biases for a wide range of research questions and applications.

Working Paper 19-14. Victor Stango, University of California, Davis and Federal Reserve Bank of Philadelphia Visiting Scholar; Jonathan Zinman, Dartmouth College and Federal Reserve Bank of Philadelphia Visiting Scholar.