## Director's Message

*Finn Kydland*

This issue of *From the Lab* is devoted primarily to summaries of the presentations and discussions that took place at two LAEF conferences. The goal of the first, International Trade and Development, was to understand better the quantitative implications of trade policy and openness for economic development. We were particularly interested in the roles that product innovation, process innovation, and knowledge flows play in this context. We addressed questions such as, how much, quantitatively, do trade-promoting policies (e.g., tariff reductions) contribute to productivity and output growth, and ultimately to citizens' welfare? What is the effect on trade and development because of distance between potential trading partners? Various empirical comparisons were brought to bear in answering these questions, involving countries such as India, China, Mexico, and Korea.

The conference organizers were Berthold Herrendorf, Associate Professor in the Department of Economics, W.P. Carey School of Business at Arizona State University, and Andrés Rodríguez-Clare, Professor of Economics, Penn State University. The conference participants were leading researchers who are working at the intersection of International Trade and Economic Development. Attendance was larger than usual as, unlike previous LAEF conferences, a formal discussant had been assigned to each paper.

Credit markets were at the heart of macroeconomic policy questions during the recent "Great Recession." Some of the policy questions address the following issues:

- whether credit markets function efficiently

- why bankruptcy and foreclosure rates are so high, and whether they are, in fact, too high

- if and how central banks should respond to credit-market conditions

The purpose of the LAEF conference on Credit, Default and Bankruptcy was to bring together leading researchers to present and discuss current work on the facts of credit markets, deep theories of the functioning of such markets, and quantitative assessments of models used to study them. Applications to consumer bankruptcy, foreclosure, and sovereign debt were among the topics covered.

The conference organizer was Eric Young, Associate Professor of Economics at the University of Virginia.

*In October 2011, LAEF hosted a conference entitled "Micro and Macro Labor Models." The proceedings will be summarized in the next issue of From the Lab. Look for the proceedings of our last 2010 conferences, "Advances in Macro Finance" (co-sponsored with the Tepper School at Carnegie Mellon University) and "Economic Growth and Development" in future newsletter issues. Our next conference, "Organization of Markets," takes place in March 2011.*

# International Trade and Economic Development
## APRIL 30 – MAY 1, 2010

### VISITING CONFERENCE PARTICIPANTS

**Andrew Atkeson** – *UCLA*

**Francisco Buera** – *UCLA*

**Ariel Burstein** – *UCLA*

**Arnaud Costinot** – *MIT*

**Kunal Dasgupta** – *University of Toronto*

**Jonathan Eaton** – *Penn State University*

**James Feyrer** – *Dartmouth*

**Berthold Herrendorf** – *Arizona State University*

**Hugo Hopenhayn** – *UCLA*

**Chang-Tai Hsieh** – *University of Chicago-Booth*

**Timpthy Kehoe** – *University of Minnesota*

**Sam Kortum** – *University of Chicago-Booth*

**David Lagakos** – *Arizona State University*

**Amartya Lahiri** – *University of British Columbia*

**Alex Monge-Naranjo** – *Penn State University*

**Edward Prescott** – *Arizona State University*

**Natalia Ramondo** – *University of Texas-Austin and Princeton*

**Andrés Rodríguez-Clare** – *Penn State University*

**Richard Rogerson** – *Arizona State University*

**Esteban Rossi-Hansberg** – *Princeton*

**Loris Rubini** – *Arizona State University*

**Kim Ruhl** – *New York University*

**Nancy Stokey** – *University of Chicago*

**Gustavo Ventura** – *University of Iowa*

**Stepehn Yeaple** – *Penn State University*

**Kei-Mu Yi** – *Federal Reserve Bank of Philadelphia*

## Distance, Trade and Income – The 1967 to 1975 Closing of the Suez Canal as a Natural Experiment
*by James Feyrer*
*Discussant: Stephen Yeaple*

The negative effect of distance on bilateral trade is one of the most robust findings in international trade. The Suez Canal provides the shortest sea route between Asia and Europe, and currently handles roughly 7.5% of the world's trade. Between 1967 and 1975, when the canal closed, a natural experiment occurred during which trading countries faced an exogenous time series shock to distance at the closure, and another shock in the opposite direction at the reopening. Feyrer uses a gravity model of trade and a panel of bilateral trade data surrounding this period to estimate the effect of distance on trade, and of trade on output. He finds that distance has a significant impact on trade, with an elasticity that is about half as large as estimates devised from typical cross sectional estimates, so that a 10% decrease in ocean distance leads to a 5% increase in trade. Feyrer also finds that output reacts to movement in trade, with an elasticity of about one quarter, so that a 10% increase in trade leads to a 2.5% increase in GDP.

The author explains that standard gravity model estimates from cross sectional data are subject to identification problems when trade is affected by tastes and cultural characteristics that diverge with an increase in distance. He argues that a panel of bilateral trade data from this period allows for a better identification of the effect of distance on trade because of the time series variation, as it allows for the use of time and bilateral-pair controls, and ensures that all identification comes from the change in distance due to the closure of the Suez Canal. Since the shock to trade is exogenous for most countries, Feyrer is also able to use the predicted trade volume from the shock to identify the effect of trade on income.

One conference participant inquired about the effect of endogenous responses such as the development of large ships designed to go around the canal. Feyrer noted that while the closure of the canal did correspond to the birth of the supertanker, this type of endogenous response could only mute and not accentuate the effect of distance on trade, and that it would not undermine the identification of the effect of trade on output. Another participant inquired whether the exclusion of countries that were not trading with each other before the closure could bias the estimates of the effect of trade on output. Feyrer explained that trade data from the countries included in the sample were used to construct an instrument for aggregate trade, and the instrumental variable estimates in this framework do not suffer from such bias. He chose not to include several neighboring countries such as Jordan, arguing that such countries would otherwise overrun the results. Another participant noted that extreme responses carry useful information that should not be discarded, and suggested incorporating them using a different statistical strategy.

Stephen Yeaple discussed some of the problems in Feyrer's estimation strategy, and proposed some ways to improve it. Regarding the estimation of the effect of distance on trade, Yeaple pointed out two weaknesses. First, the failure to include

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time varying country dummies yields an omitted variable bias because gravitational un-constants are correlated with trade costs. Furthermore, instability during this period is likely to be correlated with remoteness, which would exacerbate the problem. Second, trade flows are highly uneven, particularly between northern and southern countries, and using average bilateral flows rather than individual unilateral flows may fail to control for some of the effects captured by the Suez-shock. Regarding the effect of trade on output, Yeaple's main concern was that Feyrer's reduced form approach does not explicitly show the channels through which a decrease in trade leads to a decline in real income. First, Yeaple questioned the nature of the shock to be estimated: a terms-of-trade shock, a change in output due to low factor usage, or a panic in the streets? Second, the timing of the canal closing coincides with widespread political unrest in many South East Asian and East African countries, which is not controlled for, and makes the result less credible.

## A Global View of Productivity Growth in China and India
### *by Chang-Tei Hsieh and Ralph Ossa*
### *Discussant: Natalia Ramondo*

Hsieh and Ossa revisit a classic question of International Economics: How does a country's productivity growth affect worldwide real incomes through international trade? It is well-known that a widely used class of models in International Trade has isomorphic effects of trade barriers on welfare. The authors construct a model featuring inter-industry trade as in Ricardo (1817), intra-industry trade as in Krugman (1980), and firm heterogeneity as in Melitz (2003) to study the effect of changes in productivity on welfare. The second part of their paper quantifies the effect of productivity growth in China on Chinese welfare, as well as the welfare in the rest of the world.

Hsieh and Ossa use a reduced form version of their model to measure the effect of Chinese productivity growth on the rest of the world using bilateral trade and firm level data. The authors find that the 12% and 17% Chinese productivity growth that took place in 1998 and 2002 increased world welfare by 0.9% in 1998, and 2.1% 2002, respectively. Furthermore, China experienced 75% to 85% of world welfare gains due to this increase in productivity growth.

Several conference participants questioned the assumption of a fixed composition of traded goods. The composition of traded goods from China is likely to have changed rapidly during the period of investigation, and the effect of imposing a constant composition of trade on the results is unclear. For instance, China could have produced more of the same goods in some markets which would have been matched by a decrease in prices. China also could have produced new products previously produced by another country at a cheaper cost driving this particular country out of the market, or both. Furthermore, relaxing the assumption of a fixed composition of trade implies firms may never run into diminishing returns, which in turn may alter the model's predictions. Some conference participants suggested that the results could be made more robust

if the model allowed for a formal analysis of changes in the terms of trade.

Natalia Ramondo noted that the main contribution of this paper was the quantitative analysis that sheds lights on the question of whether or not productivity growth in China (and India) increased the welfare of their trading partners and other exporters. Ramondo's main concern was with the local nature of the authors' analysis, which focuses on the infinitesimal change in productivity on welfare using rich firm-level data. Ramondo questioned the robustness of the results if the model were to allow for a global analysis in which the main mechanisms are terms-of-trade effects, and to incorporate dynamic aspects. Lastly, Ramondo suggested that the term spillover used in the paper is perhaps a misnomer, as the transmission mechanism of productivity across countries is achieved through prices.

## Learning, Knowledge Diffusion, and the Gains from Globalization
### *by Kunal Dasgupta*
### *Discussant: Alex Monge-Naranjo*

As a country integrates with the rest of the world, its distribution of knowledge changes, which in turn affects the country's welfare. Dasgupta studies the effect that multinational enterprises (MNEs) have on host economies in the presence of technology spillovers that come from workers mobility from MNEs to local firms. In the model, a worker chooses to be a manager or remains a worker. The managers and workers can form production teams at no cost. How much a worker learns depends on the skills of the manager he is matched with, and the matching depends on the skills of the worker. Globalization is then modeled as the international formation of teams, and in a world where the distribution of knowledge in some countries dominates the ones in other countries. Two forces determine welfare and inequality. First, there is a labor demand effect, standard in the literature, which is due to the difference in factor prices and tends to raise wages. Second, there is a learning effect, which is the novel mechanism of this model, and tends to reduce wages. Which effect dominates depends on the host country's individual's ability to absorb knowledge.

Dasgupta shows that in an economy without learning, a Pareto improvement never occurs when a host country has incumbent managers operating along side managers from MNEs. This result is standard, and follows from the fact that entry of MNEs generates an additional demand for workers, driving the domestic wage up, and hurting incumbent firms through the increase in factor prices. In contrast, for high values of the learning rate, entry of MNEs raises the continuation value of workers enough for Pareto gains to emerge. This is a case where the novel learning effect dominates the standard labor effect. Dasgupta quantifies the gains from integration by calibrating the model to key m oments of the U.S. wage distribution, and finds the model produces welfare gains that range from 2% for middle-income countries to 43% for low-income countries.

The central assumption in Dasgupta's model is that workers are able to learn from foreign managers who tend to be more

knowledgeable than domestic ones. When asked about empirical evidence supporting this assumption, the author granted that while anecdotal evidence abounds, formal empirical evidence is scarce. Another conference participant noted that in Argentina, the increase of FDI in the financial sector increased the demand for sophisticated managerial workers, and the financial sector increasingly demanded MBA graduates, and not workers trained in existing firms. Other participants commented on the absence of incentives for managers to train their workers, and suggested that this might be an important feature to include.

Alexander Monge-Naranjo noted that the main innovation of the paper was the formal model of learning that yields a new mechanism that determines prices. He argued, however, that the main economic point could be made using a simpler two-period model, and sketched it during his talk. He further noted that an important limitation was the assumption of endogenous matching together with exogenous transfer of knowledge, and went on to insist that the diffusion and absorption of knowledge ought to be endogenous and determine factor prices jointly, and in turn, inequality. He also questioned the empirical relevance of the paper. In particular, while anecdotal evidence of knowledge diffusion from MNEs is abundant, evidence that it leads to Pareto improvement is ambiguous. Lastly, Monge-Naranjo suggested that the assumption that the distribution of knowledge in one country stochastically dominates the distribution of knowledge of a host country makes the model a description of a bilateral North-South relationship, rather than that of a model of globalization.

## Spatial Development
### *by Esteban Rossi-Hansberg and Klaus Desmet*
### *Discussant: David Lagakos*

Economic development varies widely across locations, and is the best predictor of individual income. Nevertheless, the body of work incorporating space, and the economic structure implied by space, into modern endogenous growth theories is currently narrow. Rossi-Hansberg and Desmet address this shortcoming and present a dynamic theory of spatial development and contrast the predictions of the model with evidence from the spatial evolution of the United States between 1980 and 2005. By incorporating both a time and a space dimension, the model provides a link between the location decision of agents and their decision to innovate. When applied to U.S. data, Rossi-Hansberg and Desmet find that the model is able to account for the observed reduction in employment's share in manufacturing, the increase in service productivity from the mid-1990s, the increase in value and dispersion of land rents in the same period, the convergence in dispersion of employment in services and manufacturing, and declining manufacturing prices.

In the authors' model, firms operate on a continuum of locations and produce in one of two industries: manufacturing and services. Production requires labor and land. Firms can trade goods and services by incurring iceberg transport costs, and can invest to improve their technology. Technology diffuses spatially so that locations close to others with a more advanced technology get access to a spatially discounted version of that technology through diffusion. The novel mechanism comes from transport costs and the elasticity of substitution between a location decision and an innovation decision. In this mechanism, even though increases in transport costs lead to the standard static losses found in trade models, they also lead to dynamic gains by generating denser areas that, together with the scale effect in innovation, lead to faster growth.

A conference participant suggested that the model may account for certain important dimensions of the data for two reasons. First, the U.S. rust belt which once had a dense concentration of manufacturing has experienced no recent growth in productivity, and a decline in population. Second, there has been innovation in services, which is represented by many business models that, once developed, can be replicated across the country and essentially replace idiosyncratic businesses – Starbucks and Wal-Mart are two examples.

David Lagakos noted that retail and wholesale trade, and financial services generated roughly 60 percent of U.S. productivity growth in services since 1995. However, while the authors' model could account for productivity growth in retail and wholesale trade, Lagakos argued it was not adequate for financial services. The model is consistent with retail trade. For example, superstores need large markets and higher income, possibly from manufacturing productivity growth, and so a large manufacturing area may lead to the adoption of superstores. However, the model is inconsistent with financial services as many such firms are not located near customers. Lagakos noted Phoenix, AZ, as an example. Phoenix is a hub for financial services because of low land rents and good weather, not because it is near a manufacturing center. Lagakos suggested making the distinction between local and non-local services explicit, and discussing evidence from local services which seem to support the theory.

## How Much of South Korea's Growth Miracle Can be Explained by Trade Policy?
### *by Michelle Connolly and Kei-Mu Yi*
### *Discussant: Richard Rogerson*

South Korea went from being one of the world's poorest countries in the sixties to a member of the developed nations today. This quick growth of GDP was accompanied by a significant increase in trade, especially in manufactured goods. The government actively encouraged industries geared towards exports by tariff exemptions on imported goods which were used for producing exports. Furthermore, tariffs in general were reduced both in Korea itself and by its main trading partners of the G7. Exporters roughly enjoyed a barrier-free trade regime. Thus, if trade policy does not matter for Korea, it may not matter at all.

Connolly and Yi attempt to quantitatively assess how much these policies contributed towards Korea's catch-up in terms of GDP to the G7 countries. The model uses a neoclassical growth framework, where trade is motivated by comparative advantage.

There are two sectors, one producing the investment good and the other a consumption and an intermediate good. The second sector's production takes place in multiple stages. This feature permits the authors to investigate the possible effects of vertical specialization; it also magnifies the effects of trade costs. In each sector and stage, a continuum of goods is produced using capital, labor and the intermediate good, which are then reassembled to yield the final goods. Total factor productivity for each continuum is drawn from some distribution and thus determines comparative advantage.

Specialization thus occurs in areas where a country is most productive and induces higher total factor productivity. Trade in investment goods also makes investment relatively cheaper and hence spurs capital accumulation. These are the two channels through which trade affects productivity and GDP. For quantitative results, the model is calibrated to match data from 1963. The authors then compare steady states in 1963 and 1995 and run the counterfactual experiments of how the model performs when only one of the trade policies is enacted. There seem to be important nonlinearities, as each of the trade reforms had a relatively small impact on the catch-up, whereas all three together could explain roughly twenty percent of it. The most important single factor was the general Korean tariff reductions with about 6 percent, while tariff exemptions for exports and the G7 tariff reductions only contributed less than two percent each to the catch-up.

Richard Rogerson pointed out that the model overshoots the data significantly in terms of how much trade and vertical specialization increased between 1963 and 1995. This means that either something else is negatively affecting trade or the model does not correctly capture trade dynamics. Furthermore, comparing the two steady states hides the fact that most of the action in trade occurred before 1975, while most of the GDP growth took place after 1975. During the time span investigated, there was also a massive shift of labor from the agricultural to the manufacturing sector, whereas the model treats the labor supply as constant. It is also possible to imagine that the range of productivities increases as a country develops, which is an important parameter in the model. A conference participant raised the point that tariffs are not a dead-weight loss but actually an important source of revenue for less-developed countries.

## New Trade Models, Same Old Gains?
*by Costas Arkolakis, Arnaud Costinot and Andres Rodríguez-Clare*
*Discussant: Sam Kortum*

Recently developed models of trade have been successful in explaining trade patterns and matching micro-level data concerning the characteristics of firms that engage in exports. However, there remains the question of how large the gains to trade are for the economy as a whole. Although the models vary greatly in micro-level predictions and assumptions, for example in terms of returns to scale and perfect versus monopolistic competition, the authors of this paper show that they satisfy certain basic features that lead to the same gains from trade.

Most trade models based on and including those by Anderson (1979), Krugman (1980), Eaton and Kortum (2002), and Melitz (2003) satisfy common assumptions, notably Dixit-Stiglitz preferences, only labor as a production input (with one sector), constant marginal cost of production, complete specialization, and iceberg trade costs. They also share two rather restrictive aggregate assumptions: gravity and a constant elasticity of substitution (CES) import demand system. From these macro-level restrictions follow the aggregate consequences, i.e., gains from trade. Those can be consistently estimated from two sufficient statistics, estimates of trade elasticity and the share of expenditure spent on domestic goods.

The surprising feature of these models is that they are all represented by the same CES important demand system. That is, for any change in trade costs between the home country and another country, the impact on relative demand has to be the same across all countries. Furthermore, the relative demand for goods of one country depends only on the bilateral trade cost and not on trade costs to third countries. This represents aggregate effects, which can be affected by prices and/or the range of commodities traded. Therefore, while the different trade models create gains from trade through different channels, the aggregate gains only depend on the two aforementioned macro-level statistics. Even though some models of monopolistic competition predict larger gains from trade than other models relying on perfect competition, the overall gains from trade implied by these models are relatively small, much smaller in effect than those found in empirical research.

Samuel Kortum argued that the equivalence result presented in this paper justifies the use of the Armington specification for computable general equilibrium models. There are now micro-foundations, with the same aggregate implications, for this type of analysis, which can be used to evaluate trade, energy and carbon policy. Improvements are to be made on the empirical side, though. For example, a zero entry in the trade data at some date implies infinite trade costs and so in the model trade will never take place thereafter. One participant remarked that the reduction of the more sophisticated models to CES import demand systems is due to the choice of the functional forms of the utility function and the productivity distribution. He claimed that they are chosen for analytical convenience, but

reduce the potentially rich micro models to macro models. This point was also argued to explain the discrepancy between micro and macro estimates of trade elasticities.

## Innovation, Firm Dynamics, and International Trade
*by Andrew Atkeson and Ariel Burstein*
*Discussant: Jonathan Eaton*

The question addressed in the Atkeson and Burstein paper is how changes in trade costs affect aggregate productivity and welfare when firms decide endogenously on exit, exports, process innovation (increasing a firm's productivity) and product innovation (new firms enter that produce new products). In the presentation, the focus was shifted from analyzing the effects of trade to the authors' ongoing and related work on scrutinizing innovation policy. There is empirical evidence that firms react strongly in terms of innovation to changes in trade costs and incentives to innovate. The authors' work can replicate these findings in their model, but the computed aggregate effects are small to nonexistent.

In the model, a final good can be used either for consumption or as an input for the perfectly competitive production of a research good. The final good is assembled from differentiated intermediate goods, produced by firms engaging in monopolistic competition. Existing firms use the research good to invest in process innovation to increase their future productivity, to pay a fixed cost required to operate, and a fixed cost, determined stochastically and exogenously, if they choose to export (on top of standard variable iceberg costs). New firms can be created for a constant cost in terms of the research good, producing a new variety.

When the interest rate approaches zero, it can be analytically shown that a reduction in trade costs will substantially shift process innovation and export and exit decisions across firms, but that aggregate productivity and welfare gains across steady states are offset through the free entry condition. Similarly, for innovation policy, a subsidy to product innovation would have a sizable impact on firms' decisions to innovate. However, since it is assumed that a firm's profits decrease in other firms' productivity (otherwise a steady state does not exist), productivity gains due to process innovation will cancel out with less product innovation. The optimal allocation of labor between the research and the consumption good is usually not affected by trade or innovation costs. Numerical exercises confirm the analytical results for non-zero interest rates and show that welfare gains, including transition from one steady state to another, are very small. Hence, large responses by firms to trade costs and incentives to innovate may not be a good indicator for aggregate effects.

Jonathan Eaton pointed out the paradox that the interest rate for the borrower should be higher than for the lender, since there are trade costs for any tradable good. Therefore, a world interest rate can only be pinned down for symmetric countries. He also emphasized that the issue of economic growth needs to be addressed in future research. For example, if technological progress is embodied in capital goods, then trade might be important in spreading growth. Atkeson agreed and argued that if there are spillovers or if firm process innovation matters for growth of the economy, then the results should not go through. Another participant pointed out that most models treat all commodities the same. Since this is a crucial factor, it would be interesting to include heterogeneous goods.

## Innovation and the Elasticity of Trade Volumes to Tariff Reductions
*by Loris Rubini*
*Discussant: Kim Ruhl*

The empirical estimates of the trade elasticities with respect to a tariff reduction in the wake of the North American Free Trade Agreement (NAFTA) have been in the range of 10%. Moreover, productivity in Canada significantly increased. Theoretical models based on the Melitz (2003) model of trade calibrated to the United States and Canada before and after the implementation of NAFTA have come up short of these estimates. Rubini introduces endogenous innovation choice to account for the rise in trade seen in the data and a productivity increase for firms starting to export. As there are large differences in elasticity estimates from fluctuations in, for example, the exchange rate compared to long-run tariff reductions, a model that amplifies trade elasticities is needed.

In Rubini's model, there are two sectors in each economy – one good is tradable and the other is not. Agents' utility over the two goods is quasi-linear. The non-tradable sector is competitive, with linear production, and is the numeraire. Monopolistic firms in the tradable sector produce a differentiated variety of the consumption good, differ in initial productivity, and can invest in innovation to increase productivity. Furthermore, the firms can choose to pay a fixed cost in order to be able to export to another country, and pay tariffs, which are rebated lump-sum to the consumers.

When tariffs are reduced, more firms will export and all exporting firms will export more at a lower price and will innovate more. As innovation costs are paid only once, the larger the market, the larger the incentive to innovate. Competition for the non-exporting firms increases, however, and thus reduces their innovation efforts. While these effects are sizable for Canada in the calibrated economy, they are very small for the U.S., in line with the data. Innovation increases the trade elasticity by about half to almost ten percent, and can thus replicate empirical estimates. Productivity gains in Canada are calibrated to be five percent, whereas for the U.S. are close to zero.

In Kim Ruhl's view, an important assumption is the complementarity of given productivity and innovation. Innovation cost is independent of firm size, creating economies of scale and leading to productivity gains in the smaller country. However, this might lead to problems in a dynamic framework, as firms could get bigger and bigger. Ruhl highlighted the differences and similarities to Atkeson and Burstein (2009)

(AB). Even when Rubini allows for free entry, the free trade agreement leads to significantly higher productivity in Canada, whereas in AB, the productivity remains almost entirely the same. Differences are in how real output is measured, and Rubini uses tariffs, whereas AB features trade costs that are lost. Lastly and maybe most importantly, in Rubini's model, labor can be freed up in the non-tradable sector with constant productivity to move to the tradable goods sector.

In the general discussion it was pointed out that the numbers of the productivity gains are actually somewhat similar across the two papers, as Rubini computes very small gains for the U.S., which is the much larger economy. On average, weighted for size, the productivity gains in Rubini are also small and more in line with the results in AB.

## Trade Liberalization, Growth, and Productivity

*by Claustre Bajona, Mark J. Gibson, Timothy J. Kehoe, and Kim J. Ruhl*
*Discussant: Francisco Buera*

Trade is widely regarded in economics as something positive. However, the relationship between trade and productivity (or economic growth) is ambiguous. Many empirical studies have documented a positive link, but some recent work has cast doubt on the link, and there are even studies that have found a negative relationship between trade and growth for developing countries. As a similarly ambiguous example, while China saw a tremendous simultaneous increase in trade and GDP in the decade from 1998 to 2008, Mexico's import absorption share saw a comparable rise in the decade of 1990 to 2000, but GDP remained stagnant. The question is thus how trade affects social welfare and growth both empirically and theoretically.

Bajona, Gibson, Kehoe, and Ruhl consider five theoretical models of trade: a static Heckscher-Ohlin model where countries differ in factor endowments of labor and capital; a Ricardian model of comparative advantage with a continuum of goods; monopolistic competition with homogeneous and, alternatively, heterogeneous firms; and a dynamic Heckscher-Ohlin model with growth. One unifying result is that trade unambiguously improves social welfare, but the effect on GDP is ambiguous once the theoretical results are translated into the way in which they would actually be measured. Trade liberalization mostly has no or a negative effect on measured output in the first four models. For example, in a model of monopolistic competition with heterogeneous firms, lower trade costs lead to higher productivity as labor is reallocated to more efficient firms, but as they produce goods with lower prices, the effects cancel out under common assumptions. In the dynamic model of different factor endowments, trade liberalization will lead to higher growth in the country rich in capital, and to lower growth in the capital-poor country.

In the empirical section of the author's paper, a rough analysis of the gains from trade in China and Mexico is undertaken. The authors use the gains measured by trade flows as laid out in

Arkolakis, et. al. (2010) for which only the import penetration ratio and the elasticity of substitution between different countries' goods count. As the share of imports in expenditure has increased by about the same amount in both China and Mexico, a similar elasticity will lead to similar gains from trade, even though China has seen much higher economic growth. Another method based on Broda and Weinstein (2006) which attempts to compute the gains from new varieties, also leads to small but comparable gains from trade.

Showing more evidence besides Mexico and China for different growth experiences despite large trade increases, Francisco Buera argued that these differences cannot be explained just by measurement issues. However, standard trade models as presented in the paper are also unable to account for the differences. Buera thus calls for the inclusion of heterogeneous producers and idiosyncratic distortions across countries, such as labor or credit market frictions or size-dependent policies, including differential tax treatment for small versus large companies. Buera illustrated his point with a simple example.

# Credit, Default and Bankruptcy
## JUNE 18 – 19, 2010

### VISITING CONFERENCE PARTICIPANTS

**Larry Ausubel** – *University of Maryland*

**Satyajit Chatterjee** – *Federal Reserve Bank of Philadelphia*

**Dean Corbae** – *University of Texas*

**Nobuhiro Kiyotaki** – *Princeton*

**Geng Li** – *Federal Reserve Board of Governors*

**Wenli Li** – *Federal Reserve Bank of Philadelphia*

**Igor Livshits** – *University of Western Ontario*

**Xavier Mateos-Planas** – *University of Southampton*

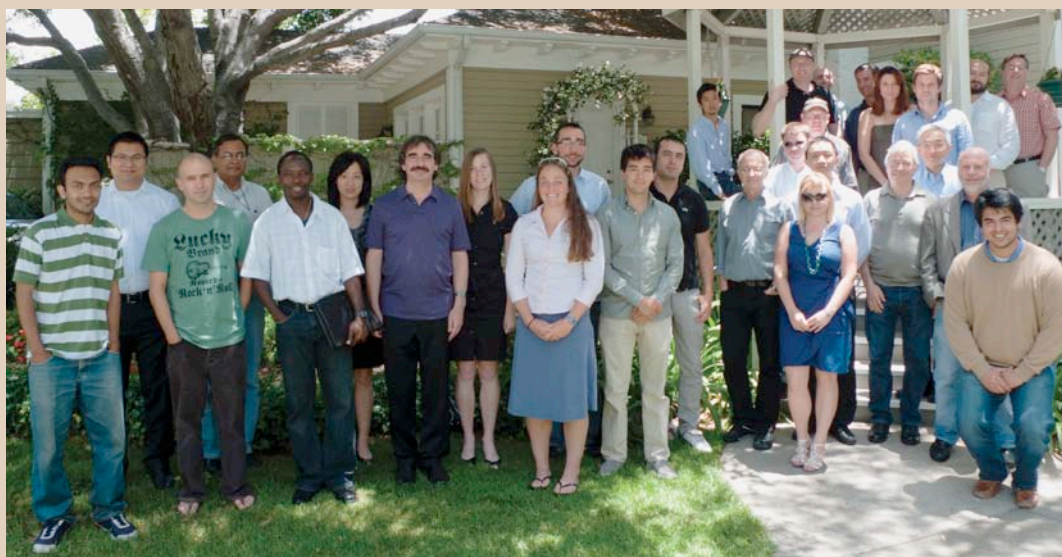**Makoto Nakajima** – *Federal Reserve Bank of Philadelphia*

**Xuan S. Tam** – *University of Virginia*

**Mark Wright** – *UCLA*

**Eric Young** – *University of Virginia*

**Howard Wall** – *Federal Reserve Bank of St. Louis*

**Bill Zame** – *UCLA*



Summaries of each of the presentations follow. Note: speakers are highlighted in author listings.

## Costly Contracts and Consumer Credit
### *by Igor Livshits, James MacGee and Michele Tertilt*

The market for unsecured consumer borrowing has undergone dramatic changes over the past thirty years. The rise in consumer bankruptcies was accompanied by a significant increase in both the outstanding volume of unsecured credit and charge-off rates. These aggregate changes were accompanied by the diffusion and increased use of credit cards, which have been argued to play an important role in the rise in unsecured consumer borrowing and bankruptcy. Furthermore, it has been argued that the increase in credit card usage is driven by technological change in credit markets, changing the ability of lenders to price risk accurately and offer contracts more closely tailored to the risk characteristics of different groups of creditors. Livshits, MacGee and Tertilt explore the implications of technological progress in consumer lending, and develop an incomplete markets model of bankruptcy to analyze the qualitative implications of improved credit technology on the equilibrium set of lending contracts.

The model features households whose endowment risk is private information, and intermediaries who observe a noisy signal of each borrower's default risk. An intermediary must incur a fixed cost in order to offer a lending contract. Each lending contract is comprised of an interest rate, a borrowing limit, and a set of eligible borrowers. The fixed cost of creating contracts implies that pooling of different observable risk types is optimal, and generates a finite number of contracts in equilibrium serving different subsets of the population. Technological improvements, which lead to more accurate signals of a borrower's type, or lower the cost of offering a contract, yield in equilibrium a larger number of contracts offered, more borrowing, an expansion of credit to riskier borrowers, and more defaults. Furthermore, each contract serves a smaller subset of the population, and its risk-based price is more accurate. Livshits, MacGee and Tertilt assemble an extensive dataset on the number of unsecured consumer credit contracts targeted at specific groups of borrowers to show that these predictions are consistent with the empirical regularities. In particular, they measure the number and distribution of credit contracts across consumers using interest rates and credit limits, and document a large increase in the number of different credit card interest rates reported by households and that the empirical density of credit card interest rates has become much flatter since 1983. Moreover, they show that the aforementioned shifts in the distribution of interest rates were also accompanied by increased lending to lower income households.

A conference participant conjectured that for the top high earners of the population, debt as well as the bankruptcy rate may have increased, which is not captured by this model. Lishvits granted that debt did increase for this portion of the population, and that the model only allowed for changes on the extensive margin. However, Lishvits argued that while both changes in the extensive and intensive margin must be present, the importance of one relative to the other is unclear. Another participant pointed out that instead of a decline in fixed cost, one could argue that the main changes that occurred in the last twenty years were a usury ceiling that gradually stopped binding because of deregulation, and a decline in other costs associated with issuing credit cards. Lishvits explained that usury law alone cannot lead to the increase in the volume of unsecured debt and consumer bankruptcies observed in the data. He noted that the pattern in the United States was also present in Canada where there are no usury laws. Furthermore, while the extensive margin would still be affected under this scenario, fixed cost yields pools of contracts consistent with data, which would not emerge otherwise as each individual contract would be perfectly priced.

## Did Bankruptcy Reform Cause Mortgage Default Rates to Rise?
### *by Wenli Li, Michelle J. White and Ning Zhu*

The financial crisis and the subsequent recession of 2008 and 2009 are often argued to have been triggered by the bursting of the housing bubble and the subprime mortgage crisis that began in late 2006. However, prior to 2005, financially distressed homeowners could gain from filing for bankruptcy, regardless of whether or not they were planning on saving their homes. For instance, financially distressed homeowners wishing to save their homes were likely first to default on their debt obligation, and to then file for bankruptcy, while those not planning on saving their home could gain from doing either. The reform of the United States bankruptcy law that took effect in 2005 raised the cost of filing for bankruptcy and reduced the amount of debt discharged, thus causing bankruptcy filings to fall sharply. Li, White, and Zhu argue that an unintended consequence of the 2005 bankruptcy reform was to increase the number of mortgage defaults by closing off a popular procedure that previously helped many financially distressed homeowners pay their mortgages.

The reform made several important changes in bankruptcy law. First, it raised homeowners' costs of filing, which is expected to reduce homeowners' probability of filing for bankruptcy, and to raise default rates for homeowners who previously would have used bankruptcy to help pay their mortgages. Second, the reform introduced a new "means test", forcing some high-income homeowners to file bankruptcy under Chapter 13, and to repay some of their unsecured debt by borrowing against their future income. Third, prior to the reform, homeowners who had both non-exempt income and non-exempt assets were obliged to use their non-exempt home equity, plus a token amount of future income, to repay unsecured debt under Chapter 13 bankruptcy. After the reform, their obligation to repay became the maximum of their non-exempt assets, or their non-exempt income over five years. Finally, the reform imposed a new cap on the homestead exemption that applies to recent homeowners who live in states with homestead exemptions exceeding a certain level. The cap makes bankruptcy much less attractive because homeowners would now be forced to give up their homes under bankruptcy, which is expected to increase mortgage default by these homeowners. Using a large dataset of individual mortgages, Li, White and Zhu find that mortgage defaults rose by around 15% after the reform went into effect, and that the default rates of homeowners with high incomes or high assets rose even more. The authors estimate that the 2005 bankruptcy reform caused

about two hundred thousand additional mortgage defaults to occur each year, thus adding to the severity of the mortgage crisis when it hit the economy.

A conference participant pointed out that the results are to be expected given the writing of the bill was influenced by lobbyist-supporting lenders, thus adding credibility to the results. However, the same participant argued that there might be an issue of selection bias because a fraction of individuals who would have filed later in normal time without the bill accelerated its filing to beat the implementation of the bill, while others did not; and it is unclear what this effect would have on the overall results. Li granted that it is not possible to address this issue by lengthening the sample because of the start of the crisis in 2006, but argued that the effect found in their paper cannot be solely driven by the rush to default by this fraction of individuals.

## Mortgage Innovation and the Foreclosure Boom
### *by Dean Corbae and Erwan Quintin*

The composition of the stock of outstanding residential mortgages in the United States changed in several important ways between 2003 and 2006. Relative to all mortgages, the fraction of mortgages with variable payments increased from 15% to over 25%, while the fraction of subprime mortgages increased from 5% to nearly 15%. Furthermore, recent empirical studies have shown that many of these subprime loans are characterized by high leverage at origination and non-traditional amortization schedules. Low down payments and delayed amortization cause payments from the borrowers to the lender to be backloaded compared to loans with standard mortgages. Lower payments at the beginning of a contract in turn allow more households to obtain the financing necessary to purchase a home, and have been associated with the rise in homeownership. However, these contracts imply little accumulation of home equity in the early life of the loan, making them prone to default when home prices fall. Recent studies have shown that mortgages issued between 2005 and 2006 with high leverage and non-traditional amortization schedules have defaulted at much higher rates than other loans when home prices began their collapse in late 2006.

Corbae and Quintin quantitatively investigate how much of the rise in foreclosures can be attributed to the increased originations of non-traditional mortgages between 2003 and 2006. To this end, they construct an economy where households value both consumption and housing services. Agents are identical at birth and can only rent housing service while accumulating liquid assets when the agents are young. Idiosyncratic earnings shocks yield a distribution of assets among the set of middle-aged agents who have the option to purchase a small house or a large house, and to finance it with a standard fixed-rate mortgage that requires a 20% down-payment and fixed payments until maturity, or a mortgage with no down-payment and delayed amortization. Mortgage holders can terminate their contracts before maturity, and a foreclosure occurs in a state where the house value is below the mortgage's balance, or where the agent's income realization

is such that he cannot make the mortgage payment he would owe for the period. The model predicts that when they become available, non-traditional mortgages are selected by a third of home-owners, which is a consistent estimate of the fraction in originations of mortgages with non-traditional features between 2003 and 2006. An unexpected 25% collapse in home prices, followed by a period where nonstandard mortgage options are not available, cause foreclosure rates to increase about 150% during the first two years, which is consistent with the overall increase in foreclosure rates observed between the first quarter of 2007 and the first quarter of 2009. When non-standard mortgages are not offered, the authors find that the increase in foreclosure rates caused by the price shock falls to 86%. Thus, mortgage innovation makes the economy much more sensitive to price shocks, and, in particular, lower down payments account for most of the contribution of non-traditional mortgages to the increase in foreclosure rates, while delayed amortization and payment spikes play a limited role.

One conference participant inquired about the contribution of the change in the back payment on the overall effect. Corbae showed that in a counterfactual exercise with zero down-payment, the model over-predicts the amount of foreclosures, implying that the level of down payment is indeed very important for foreclosure. Another participant asked about the welfare effect of mortgages with recourse versus mortgages without recourse. Corbae granted that while this was a valid question, the model would have to be augmented to answer it.

## Financial Intermediation and Credit Policy in Business Cycle Analysis
### *by Nobuhiro Kiyotaki and Mark Gertler*

Kiyotaki and Gertler propose a framework with credit market frictions to study their effect on aggregate economic activity in the context of the current crisis. Their framework aims at characterizing how earlier literature may be relevant to the new issues that have arisen, and how very recent literature is incorporating insights from the crisis. The baseline model incorporates financial intermediation into an otherwise frictionless business cycle framework to illustrate how disruptions in financial intermediation can induce a crisis that affects real activity, and how various credit market interventions by the central bank and the Treasury might work to mitigate the crisis.

Financial market frictions are modeled as the outcome of an agency problem between borrowers and lenders, which introduces a wedge between the cost of external finance and the opportunity cost of internal finance, thus adding to the overall cost of credit faced by borrowers. The size of the external finance premium depends on the condition of a borrower's balance sheets; inasmuch as a borrower's percentage stake in the outcome of an investment project increases, his incentive to deviate from the interests of lenders' decreases, thus lowering the external finance premium. In general equilibrium, balance sheets strengthen with improved economic conditions, reducing the external finance problem and enhancing borrowers' spending, thus amplifying the boom. During a crisis, the balance

sheets of borrowers deteriorate sharply, possibly because of a sharp decrease in asset prices, causing the external finance premium to rise. The impact of the financial distress on the cost of credit then depresses real activity. Kiyotaki and Gertler consider three broad types of credit policy: direct lending in the spirit of the facilities the Fed set up for direct acquisition of high quality private securities, a discount window to lend funds to banks that in turn lend them out to non-financial borrowers, and direct equity injections, where the fiscal authority coordinates with the monetary authority to acquire ownership positions in banks. Consistent with the Federal Reserve Act, these interventions are meant to be used only during crises and not during normal times, and within the logic of the model, the net benefits from credit policy are increasing in the distortion of credit markets that the crisis induces, as measured by the excess return on capital.

## An Equilibrium Model of the Timing of Bankruptcy Filings
### by Satyajit Chatterjee

Recent empirical studies have shown that default always precedes bankruptcy and is typically, but not necessarily, followed by bankruptcy filing in the following months. However, current quantitative models of bankruptcy do not differentiate between default and bankruptcy, and thus are not able to account for the timing of bankruptcy decisions. The timing of bankruptcy may be affected by regulatory changes and thus may have important implications for the real cost of a change in regulation. Chatterjee proposes an equilibrium theory for the timing of bankruptcy filings that is able to account for three features found in the data: the time delinquent debtors take to file for bankruptcy, delinquent debtors' decisions to enter a state of informal bankruptcy in which they cease to make repayments to the lenders while not filing for bankruptcy, and the creditors' decision not to force delinquent debtors to repay their debts. Chatterjee's model helps account for the rush of debtors to file for bankruptcy in the third quarter of 2005 while others did not, and how persistent cross-state differences in filing rates can be accounted for by state-level variation in the strength of creditor rights.

In the model, lenders must incur a fixed cost to make a collection attempt, and borrowers must incur a fixed cost to file for bankruptcy. Debtors differ by the utility cost they incur when filing for bankruptcy, which depends on their idiosyncratic income and the amount of debt they have accumulated, but this cost is not observed by the creditors. The amount owed to a creditor by a delinquent debtor increases with the length of delinquency because of the accrual of penalty interest payments and various other fees. A debtor can either file for bankruptcy, repay his debt, or do neither, the last option corresponding to informal bankruptcy. A creditor must make assessment of the likelihood that a delinquent debtor is a repayer or a filer, and choose optimally the number of collection efforts needed to get a repayer to pay, or a filer to file. A debtor is less likely to file for bankruptcy the higher his or her income and the greater the filing cost. Furthermore, the higher the cost of filing or repaying, the longer the delinquency, and debtors who are not pursued do not

repay or file and effectively enter a state of informal bankruptcy. In the author's model, the effects of an announcement of a tightening of bankruptcy law is associated with a surge in filings just prior to the new law taking effect, which is consistent with data. The surge arises from changes in the behavior of both debtors who are being pursued by creditors – some of whom may choose to file right before the change in the law – and from changes in the behavior of creditors who may choose to pursue debtors they previously ignored. The model had yet to be calibrated to the U.S. economy at the time of the conference.

A conference participant asked whether the harassment variable could be used to extract information about the debtor. Chatterjee clarified that this version of the model did not allow for different intensities of harassment, and thus no such information about the creditors could be extracted by debtors. Another participant anticipated some possible issue with the calibration of the model. If one period in the model is taken to be a day, one might be worried about any seasonality associated to filing for bankruptcy. Seasonality, if present in the data, could be associated to some degree of predictability, and thus could have an influence on the best responses from both debtor and creditor which would not be captured by the model in its present formulation. Last, a participant commented that the model does not allow for creditors to make partial re-payments during their informal bankruptcy. If this behavior were indeed present in the data, it would suggest an additional channel through which creditors can smooth their consumption by entering informal bankruptcy in bad time while making partial repayment with the hope of exiting this state once their income state improves.

## Long-Term Contracts in Unsecured Credit Markets
### by Xuan Tam

Creditors are increasingly able to keep track of the evolution of household income and household default risk, thus increasing creditors' incentive to alter the terms of credit cards and other forms of unsecured lending. The Credit Card Accountability Responsibility and Disclosure (CARD) Act of 2009 states that lenders cannot raise interest rates in the first year after a credit card account is opened unless the account is assessed to be at least sixty days delinquent. The act also prohibits lenders from raising credit card interest rates on existing balances, requires lenders to give cardholders a longer notice period for rate increases applicable to any future borrowing on the account, and proposes interest rate ceilings. The effect of this reform is meant effectively to force lenders to commit to long-term contracts with creditors. Previous work on consumer debt contracts with limited commitment assumes debt contracts are optimally re-priced with the arrival of income shocks. Tam extends the literature on incomplete contracts with limited commitment by allowing for both long-term and short-term debt contracts and the possibility of interest rate ceilings to study quantitatively the effect of the reform on lending behavior and welfare.

In the model, markets are perfectly competitive and there is no informational asymmetry between lenders and borrowers. Households can save part of their income at a fixed interest rate, and can borrow by signing a financial contract with a financial intermediary to smooth their consumption. The terms of the contract depend on an individual's characteristics, and there is no commitment problem from the lender's side. Each period, a household first decides whether or not to default on its debt obligation. In order to default and unload all debts, a household must pay fixed default costs and will subsequently be excluded from the credit market for one period. Households who do not default must decide whether to continue with the current contract if it has not expired, or switch to a new contract. Tam first calibrates a model economy with one-period contracts only, and another one with long-term contracts only, and uses the difference between the implied equilibrium allocations as a quantitative measure of the effect of lengthening contracts. He finds that a lengthening of contracts results in a higher average interest rate and less frequent but larger bankruptcy. However, he finds that the net effect on consumption smoothing is negligible, and does not significantly lower ex-ante welfare. Tam then considers a model economy in which households have access to both short- and long-term contracts but can only hold one type in every period. He finds that long-term contracts are not attractive to financially healthy households who need to borrow when short-term contracts are available. The author also finds that having the choice between two types of contract does not significantly improve welfare. Last, he shows that imposing a modest usury ceiling on long-term contracts makes borrowing available to a fraction of the population that could not commit otherwise and thus did not have access to credit, but resulted only in a modest ex-ante welfare improvement.

Regarding the last results, a conference participant argued that nothing prevented lenders to offer this type of contract – one with a cap on the amount of borrowing – before the passing of the act, and thus questioned the logic of the model's prediction that offering such contracts becomes optimal only after a usury ceiling is imposed.

## Household Borrowing after Personal Bankruptcy
### by Song Han, Benjamin Keys and Geng Li

Since the 1990s, the rate of households filing for personal bankruptcy has increased significantly. Han, Keys and Li investigate how filing for bankruptcy can affect subsequent access to credit. In a previous paper, Han and Li showed that filers make greater use of secured credit and less use of unsecured credit in relation to comparable non-filing households. Furthermore, filers pay higher interest rates. This is an equilibrium outcome though, possibly due to different demand for credit from households and supply by lenders.

The paper presented exploits access to a new dataset to look at the supply of unsecured credit to filers, specifically via credit cards. Households participating in the survey send in their credit card offers and these data are then combined with the participants' credit history from a credit bureau. While the resulting sample features the problem that people are richer and more likely to be white on average than in the general population, filers are actually very similar across the sample and general population. The sample is also influenced by the recession and subprime crisis, but this likely understates the results because access to unsecured credit should be more difficult during a financial crisis.

The expected profits of a contract to lenders are the product of the probability that the consumer signs up for the contract times the average profitability of the offer given that it is accepted. In order to increase the probability of take-up, credit card companies often use teaser rates and rewards programs. Profitability is affected by interest rates and the risk of default and subsequent recovery rates, as well as by fees. For filers, bankruptcy could reveal some idiosyncratic risk about the household which is otherwise not observable by the lender. However, at the same time, bankruptcy also improves a filer's balance sheet, as unsecured debt is erased. Furthermore, there are legal restrictions on how often one can file for bankruptcy.

The authors find that to mitigate risks by filers, credit card companies offer lower credit limits, higher interest rates and higher fees in relation to offers to comparable non-filers. Teaser rates and reward programs are rarer, which is interpreted as evidence that households with a bankruptcy history still have a high demand for unsecured credit. Filers also receive fewer credit offers, except for people with a very low credit score, where the relationship is reversed. Despite all this, households which have filed for bankruptcy still have access to unsecured credit and, on average, their access to it improves over time. Lending to filers is a niche market, in which some firms seem to have specialized. However, two major credit card lenders also send a sizeable proportion of their offers to households which have filed before.

## Security Pools and Efficiency
### by John Geanakoplos and William Zame

Collateralized lending has been a fairly recent feature of financial markets, having been preceded up until the 19th century by extra-economic penalties, including indentured servitude, debtor's prison and execution. These penalties cause dead-weight losses in the case of default, whereas collateral is simply a transfer from the debtor to the lender. The importance of collateral has risen sharply in recent years, with enormous markets for mortgages and collateralized debt obligations, on the order of an estimated 10 and 50 billion dollars, respectively.

Geanakoplos and Zame develop a two-period general equilibrium model in which durable goods are used to collateralize loans and there is no other means of recourse. Collateralized loans may then be pooled and sold as security pools. In addition, these pools can then be tranched. The tranches are ordered hierarchically, that is, the first tranche gets serviced first, the second tranche pays off the minimum of what is promised and whatever is left over after the first tranche is paid, and so forth. The payoffs depend on the payoffs of the underlying securities, and the value of the collateral also depends on the state-dependent price.

Unlike primary securities, only one pool of securities is needed to collateralize all tranches. Importantly, it is possible to borrow without holding collateral in the form of durables – which a household may not want. For instance, one agent can lend in the form of housing mortgages to another (using the house as collateral) and then borrow from others using the mortgage as collateral. Without security pools, borrowing and lending at the same time do not simply cancel each other out since it still requires holding some collateral for the loan.

The authors prove that an equilibrium of security pools exists, as short sales are limited endogenously by the requirement to hold collateral. Such a collateral equilibrium is generally inefficient as compared to a Walrasian (or Arrow-Debreu) equilibrium: there exists an open set of endowment profiles for which this is true. Responding to a conference participant question about whether the collateral equilibrium is second-best efficient, Zame argued that it is probably not the case. However, if the Walrasian equilibrium is such that it could be implemented as a collateral equilibrium, then this allocation can be supported by an equilibrium of security pools, if all basic securities are traded and perfect tranches of a pool of all these securities are traded. The pooling and tranching is thus important for efficiency. Even though there can be a positive probability of default, this is ex ante efficient.

## Credit Lines
### by Xavier Mateos-Planas and José-Victor Ríos-Rull

Unsecured revolving credit card debt represents a large portion of total consumer credit – approximately 900 billion dollars as of June 2009. Recent regulation such as the Unfair or Deceptive Acts or Practices (AA) has aimed at protecting consumers who have credit card debt. To analyze the impact of such regulatory reform, Mateos-Planas and Ríos-Rull develop a model that lets all contract details be determined endogenously save for the legal framework. For instance, there is no commitment for borrowers who can default, while banks do not commit to contract terms.

In the model, each bank can offer a contract to consumers based on observable characteristics, which are employment status, bankruptcy history, asset position, and the current contract. Private information to the borrower is the employment-dependent income and the cost of defaulting and contracting, leading to equilibrium default. A contract consists of initial loans and interest rates and continuation plans based on the observables, notably credit limits and future interest rates. While banks are allowed to change these contract features, they cannot force their clients to repay any of the debt, i.e., there is no minimum payment. Banks borrow at a constant interest rate and face a fixed cost of issuing a contract. Perfect competition leads to zero expected profits for each contract.

In a parameterized example, the authors analyze the consequences of Regulation AA, which prohibits credit card companies from increasing the interest rate on current debt. It is not a price cap, but a rule on commitment. Overall, banks reduce credit limits and charge lower interest rates. Initial rates are higher, though, since banks can decrease but not increase the rates thereafter. The number and volume of defaults as well as the switch rate decrease and average

consumption rise. Highly indebted unemployed households gain from the regulation, as these households use unsecured credit card debt the most, notably for consumption smoothing.

A conference participant asked how these contracts are different from one-period contracts, since banks can renegotiate the terms. However, banks commit not to require repayment in any given time period. There is also a cost to switching contracts for consumers and for offering a new contract for banks. These long-term contracts enable banks to offer more competitive terms than one-period contracts of the same size and households borrow more and carry larger balances. Concerning the possibility of Ponzi schemes, Mateos-Planas argued that households have an incentive to repay their debts and build up assets in order to insure against future bad times.

## Penalty Interest Rates, Universal Default, and the Common Pool Problem of Credit Card Debt
### by Larry Ausubel and Amanda Dawsey

Until recently, many banks introduced penalty interest rates on consumers who do not repay at least some minimum amount. Furthermore, lenders also raised rates of customers who had failed the minimum payment requirement of any other company, which is known as universal default. Under the Credit Card Accountability Responsibility and Disclosure Act of 2009, retroactive interest rate hikes are mostly prohibited and universal default is forbidden. Ausubel, Baranov and Dawsey aim to evaluate the effects of such legislation.

The authors' model has three periods. In the first period, consumers have a zero endowment and thus wish to borrow money. In the two subsequent periods, consumers' earnings are positively correlated. The consumer has access to two credit cards with exogenous credit limits which he exploits fully in the first period. In the second period, the consumer has to repay an exogenous fraction of each debt, otherwise a penalty interest rate is charged. In the third period, the consumer decides whether to repay the rest of the debt or face some disutility of declaring bankruptcy. The banks face perfect competition in issuing credit cards and decide upon the regular and penalty interest rate, which is exogenously bounded. Ausubel and several conference participants discussed how an endogenous limit for interest rates could be implemented to ward off default when interest rates are too high.

An externality arises in this context – the common pool problem. It can be interpreted as the inverse of a bank run, where the creditors want to be the first to collect their money in the event of a bad income realization. This leads to high penalty interest rates which in turn increase the likelihood of default, causing a dead-weight loss. Universal default aggravates this problem. If one allowed for more than two lenders per consumer, the common-pool problem would be exacerbated further. The policy experiment is to outlaw a universal default clause and to impose a ceiling for the penalty interest rate. Simulations show that regular interest rates increase, default rates decrease, and ex ante utility increases when either or both of these policies is implemented.

## Home Equity Withdrawal in Retirement
### *by Makoto Nakajima and Irina Telyukova*

In traditional life cycle models, the retirees are either abstracted from or play no significant role. In the words of one conference participant, "they are just there." Nakajima and Telyukova take a deeper look at retirees' behavior, notably their savings and housing decisions. The questions they aim to answer are threefold: (1) how mortgage market innovation affects savings and housing decisions; (1) how important housing and home equity borrowing is to solve the retirement savings puzzle (standard life-cycle models over-predict the dissaving of elderly people that is observed in the data); and (3) the effect of house prices on the savings decision of retirees.

In the partial equilibrium model, the retired households face the decision of consumption and savings and whether to stay in their houses or become renters. Renters also choose housing size, whereas the model abstracts from moving to a new house (which is a choice rarely observed in the data anyway). Households differ in their exogenous and constant income per member. They face shocks to their health, which in turn influence the probability of shocks to household size (i.e., the spouse dies), mortality and out-of-pocket medical expenditures. Households prefer to stay in their own homes rather than renting, face the cost of selling their homes, and incur a charge every time they take on a reverse mortgage; i.e., a household borrows additional funds against its property. Retirees value bequests. House prices vary exogenously and the shocks to these prices come as a surprise to households.

The data for the authors' model are taken from the Health and Retirement Study. The study contains a rich set of variables which is used to estimate, for instance, transition probabilities and the size of the shock for medical expenditures. The remaining parameter values of the model are selected in a second step using simulated method of moments – simulated moments of the model's population are compared to selected criteria in the data. This part was still in progress at the time of the presentation, so most parameters were chosen preliminarily. When the cost of reverse mortgages is reduced, home ownership and home equity borrowing increase. There is only little impact on total assets though, which suggests that the cost of home equity borrowing can only explain a small part of the retirement savings puzzle. Declining future house prices also lead to higher home ownership, but to less home equity borrowing.

One of the questions asked concerned the effect of medical expenses on mortality and health. Nakajima agreed that medical spending as a choice variable would be interesting, but is abstracted from in the model. The expenditures for the death of a spouse are not included, either. Although these costs can be quite substantial, many people own a life insurance policy to cover these costs. A conference participant suggested that health risks are underestimated since the spouse might become sick, which is not accounted for in the model.

## Recovery before Redemption: A Theory of Delay in Sovereign Debt Renegotiations
### *by David Benjamin and Mark Wright*

In many bargaining situations there seem to be difficulties in agreeing on a mutually beneficial outcome. This applies especially to negotiations between countries and international lenders in the case of sovereign default. Using a new database, Benjamin and Wright derive a series of facts about these defaults. For instance, they show that the mean time to settle on an agreement after default is more than seven years. After restructuring debt, lenders take an average 40% loss but at the same time defaulting countries emerge with a higher debt-to-GDP ratio than before. The question is what could explain these delays and the ineffectiveness of debt renegotiations.

In the model, risk-averse countries receive some stochastic endowment and borrow from international lenders to smooth their consumption. The debtor countries are not able to commit to repaying their debt; there is no collateral. The cost of default is twofold – a direct negative effect on the endowment process and the inability to access credit markets until a settlement with debtors has been reached. Once in default, a stochastic process determines which of the parties can make an offer in each period. Offers consist of a direct payment and new debt issues. Since the defaulting country cannot credibly commit to honor the new debt, a settlement will be reached only when the probability of default is low – otherwise the new debt is not worth much.

Even though the standard requirements of dynamic programming are not met, the authors prove that an equilibrium bargain exists and derive conditions under which it is also unique. Then there also exists an equilibrium for the entire problem of borrowing and bargaining. In the calibration, the model can reproduce the key facts found in the data. Even though there is complete information and no collective action problem among creditors (possibly leading to a hold-up problem), debtors' lack of commitment thus leads to delays and high costs of settlements. In a policy experiment, the authors examine the effects of stochastic bailouts. The length of an average default and the time spent in default increases, with negative benefits and substantial costs, resulting in clearly negative welfare effects. However, if bailouts were conditional on settlement, they might encourage a faster resolution of a debt crisis.

A conference participant asked whether lenders were losing out on lending to countries with previous defaults. In the model, investors make zero average profits and lose out on some defaults but gain on other lending contracts. Wright stated that in other long-term studies lending to defaulting countries yields returns close to those on U.S. government bonds, even when taking into account the losses of defaults. Another question concerned the possibility of multiple equilibria. For instance, when debtors believe that there will be constant default, they will not lend. Wright replied that they can show existence but not uniqueness of the overall equilibrium. In the computations, however, this did not prove to be a problem.

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