

Card, David

**Article**

## Labor studies

NBER Reporter

**Provided in Cooperation with:**

National Bureau of Economic Research (NBER), Cambridge, Mass.

*Suggested Citation:* Card, David (2013) : Labor studies, NBER Reporter, National Bureau of Economic Research (NBER), Cambridge, MA, Iss. 1, pp. 1-4

This Version is available at:

<https://hdl.handle.net/10419/103234>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

# NBER Reporter

NATIONAL BUREAU OF ECONOMIC RESEARCH

Reporter OnLine at: [www.nber.org/reporter](http://www.nber.org/reporter)

2013 Number 1

---

## Program Report

---

### IN THIS ISSUE

Program Report	
Labor Studies	1
Research Summaries	
“Understanding Financial Crises”	5
“The Age of Mass Migration”	9
Saving in Developing Countries	12
“Climate Change and Biofuel Mandates”	15
NBER Profiles	18
Conferences	20
NBER News	23
Program and Working Group Meetings	27
Bureau Books	31

## Labor Studies

### David Card\*

The Labor Studies (LS) Program is one of the largest and most active in the NBER, with almost 150 members producing nearly 200 Working Papers each year. The breadth of topics and expertise is stunning: it ranges from cutting edge research on aggregate labor market issues like unemployment and productivity to the effects of government programs like Disability Insurance, the differences in labor market outcomes among different educational, gender, and racial groups, and to many other topics in social science.

Reflecting their diversity, two-thirds of program members are affiliated with at least one other NBER program, and in the past few years the Labor Studies program has convened joint sessions at the NBER's Summer Institute with Public Economics, Economics of Education, Economics of Children, and with Working Groups in Personnel Economics and the Economics of Crime. This summer we will add a new joint session with Development Economics.

In this report I briefly summarize some of the main themes emerging from recent work by LS affiliates in three areas: immigration, gender, and unemployment. These topics barely scratch the surface of the vast body of work by LS affiliates, but give a flavor of some of the emerging ideas and latest techniques in the field.

### Immigration

Over the past three decades, Labor Studies researchers have produced a series of major NBER research volumes on the economics of immigration (Abowd and Freeman, 1991; Borjas and Freeman, 1992; Borjas, 2000; and Borjas 2007) as well as many influential articles.

---

\* Card directs the NBER's Program on Labor Studies and is the Class of 1950 Professor of Economics at the University of California, Berkeley. His Profile appears later in this issue. In this article, the numbers in parentheses refer to NBER Working Papers.

# NBER Reporter

The National Bureau of Economic Research is a private, nonprofit research organization founded in 1920 and devoted to objective quantitative analysis of the American economy. Its officers and board of directors are:

President and Chief Executive Officer — *James M. Poterba*  
Controller — *Kelly Horak*

## BOARD OF DIRECTORS

Chairman — *Kathleen B. Cooper*  
Vice Chairman — *Martin B. Zimmerman*  
Treasurer — *Robert Mednick*

## DIRECTORS AT LARGE

Peter Aldrich	Mohamed El-Erian	Michael H. Moskow
Elizabeth E. Bailey	Linda Ewing	Alicia H. Munnell
John Herron Biggs	Jacob A. Frenkel	Robert T. Parry
John S. Clarkeson	Judith M. Gueron	James M. Poterba
Don R. Conlan	Robert S. Hamada	John S. Reed
Kathleen B. Cooper	Peter Blair Henry	Marina v. N. Whitman
Charles H. Dallara	Karen N. Horn	Martin B. Zimmerman
George C. Eads	John Lipsky	
Jessica P. Einhorn	Laurence H. Meyer	

## DIRECTORS BY UNIVERSITY APPOINTMENT

George Akerlof, <i>California, Berkeley</i>	Mark Grinblatt, <i>California, Los Angeles</i>
Jagdish W. Bhagwati, <i>Columbia</i>	Bruce Hansen, <i>Wisconsin</i>
Timothy Bresnahan, <i>Stanford</i>	Marjorie B. McElroy, <i>Duke</i>
Alan V. Deardorff, <i>Michigan</i>	Joel Mokyr, <i>Northwestern</i>
Ray C. Fair, <i>Yale</i>	Andrew Postlewaite, <i>Pennsylvania</i>
Franklin Fisher, <i>MIT</i>	Uwe E. Reinhardt, <i>Princeton</i>
Edward Foster, <i>Minnesota</i>	David B. Yoffie, <i>Harvard</i>
John P. Gould, <i>Chicago</i>	

## DIRECTORS BY APPOINTMENT OF OTHER ORGANIZATIONS

Christopher Carroll, *American Statistical Association*  
Jean Paul Chavas, *Agricultural and Applied Economics Association*  
Martin Gruber, *American Finance Association*  
Ellen Hughes-Cromwick, *National Association for Business Economics*  
Thea Lee, *American Federation of Labor and Congress of Industrial Organizations*  
William W. Lewis, *Committee for Economic Development*  
Robert Mednick, *American Institute of Certified Public Accountants*  
Alan L. Olmstead, *Economic History Association*  
Peter L. Rousseau, *American Economic Association*  
Gregor W. Smith, *Canadian Economics Association*  
Bart van Ark, *The Conference Board*

The NBER depends on funding from individuals, corporations, and private foundations to maintain its independence and its flexibility in choosing its research activities. Inquiries concerning contributions may be addressed to James M. Poterba, President & CEO, NBER 1050 Massachusetts Avenue, Cambridge, MA 02138-5398. All contributions to the NBER are tax deductible.

The *Reporter* is issued for informational purposes and has not been reviewed by the Board of Directors of the NBER. It is not copyrighted and can be freely reproduced with appropriate attribution of source. Please provide the NBER's Public Information Department with copies of anything reproduced.

Requests for subscriptions, changes of address, and cancellations should be sent to *Reporter*, National Bureau of Economic Research, Inc., 1050 Massachusetts Avenue, Cambridge, MA 02138-5398. Please include the current mailing label.

This work continues with a focus on several new issues related to immigration.

One such issue relates to the growing importance of immigrants in the science and engineering workforce of the United States, particularly at the doctoral level, where immigrants now make up about one-half of all newly awarded Ph.D.s. John Bound, Sarah Turner, and Patrick Walsh (14792) point out that this has been driven in part by the rapid rise in the production of bachelors' degrees *outside* the United States, and they document its impact on the demand for advanced training inside the United States. Jeffrey Grogger and Gordon Hanson (18780) use data from the Survey of Earned Doctorates to study the determinants of which foreign-born students intend to stay in the United States. They find that the United States attracts the most talented foreign students, and they also show how changing economic conditions in sending countries affect the decision to stay. Using a unique survey of authors of recent scientific publications, Paula Stephan, Chiara Franzoni, and Giuseppe Scellato (18809) find that high prestige of the program or job and strong career prospects are the major factors driving the decisions of Ph.D. students and post-doctoral candidates to choose the United States over other potential host countries.

The impact of these foreign born scientists, engineers, and other highly trained workers is the subject of several recent studies. William Kerr and William Lincoln (15768) use data from the H-1B visa program to study the city-level and firm-level impacts of foreign-born science and engineering workers. While a traditional concern is that the foreign-born tend to crowd out natives, their analysis suggests that the opposite may be true, in part because of the direct employment contribution of foreign born inventors. George Borjas and Kirk Doran, who study the inflow of Russian mathematicians to U.S. universities following the collapse of the Soviet Union (17800), reach the opposite conclusion. Their analysis of publications and career mobility suggests that, in the case of advanced-level mathematics, the "pie" is essentially fixed, with no positive spillovers for native scholars.

Another emerging strand of research by LS members focuses on the broader impacts of immigration flows on local and national

economies. Frederic Docquier, Caglar Ozden, and Giovanni Peri (16646) use new data on labor force stocks and migration flows by education level for OECD countries, combined with detailed models of the labor markets in each country, to simulate impacts of population movements on a country-by-country basis. They conclude that immigration has been a net positive factor for workers in most countries. Francine Blau and Lawrence Kahn (18515) similarly review the effects of immigration on the overall distribution of incomes in the United States and other major countries. They conclude that the presence of immigrants has contributed to wage inequality, although the effect is small relative to other forces, such as technology and trade. Peri (17570) similarly concludes that immigration has had little effect on poverty rates in the United States.

Language skills have long been recognized as a major factor in understanding differences between natives and immigrants, and several recent NBER Working Papers explore the impacts of language ability among immigrants. Jennifer Hunt (18696) finds that the lack of English language skills accounts for most of the pay gap between natives and immigrants with an undergraduate degree in engineering. Ethan Lewis (17609) shows that differences in language skills lead to a segmentation of the occupations held by immigrants and natives. The segmentation is most apparent in cities with large fractions of Spanish speakers. In the extreme case of Puerto Rico, Lewis finds that immigrants and natives are in much more direct labor market competition.

## Gender

Members of the LS program have played a preeminent role in research on gender-related issues for many decades. Though the wide disparities in the labor market status of men and women that characterized earlier generations have narrowed, many differences remain, and in some cases new gaps have opened up.

Much recent attention has focused on the dramatic *reversal* of the gender gap in educational attainment. As documented by Claudia Goldin, Lawrence Katz, and Ilyana Kuziemko (12139), female high school graduates had narrowed the differences with their male peers in achievement test scores, and were more likely to attend and graduate from college, by the early 1990s. Blau, Peter Brummund, and Albert Yung-Hsu Liu (17993) show that this sharp rise in relative education of women correlates with a decline in occupational segregation between male and female workers, as more educated women have entered traditionally male occupations.

While women are more likely to attend and complete college than men, there are still large differences in fields of study. Joseph Altonji, Erica Blom, and Costas Meghir (17985) use data on field of degree in the American Community Survey to document that women are under-represented in engineering, computer science, physics, economics, and business, but over-represented in communications, psychology, education, and English. The latter fields are associated with lower earnings for both men and women. These researchers show that differences in college major choices are an important contributor to the earnings disparities between college-educated men and women.

One factor that may explain some of the gender gap in education choices, career progression, and pay is a difference in “competitiveness.” Muriel Niederle and Lise Vesterlund (11474) conducted a series of laboratory experiments to gauge willingness to compete in tournament-like competitions, and found sharp differences between men and women that remain even after controlling for risk aversion and over-optimism. Thomas Buser, Niederle, and Hessel Oosternbeek (18576) correlate similar measures for students in the Netherlands, and show that differences in competitiveness help to explain the lower fraction of girls who choose the most prestigious (science-based) track at high school.

More recent cohorts of women also have narrowed the gap in cumulative labor market experience relative to men. Martha Bailey, Brad Hershbein, and Amalia Miller (17922) show that some of this increase in career attachment was due to easier access to birth control and lower early fertility. Raquel Fernandez and Joyce Cheng Wong (17508) highlight the effect of the rising risk of divorce on women’s decisions to acquire more education and stay attached to the labor market.

The rise in the relative success of women also may have been helped along by a decline in the demand for the manual skills traditionally supplied by less-educated men. Paul Beaudry and Lewis (18159) show that in cities where the college-high school wage gap has risen more quickly, the male-female wage gap has narrowed more quickly. They then show that both trends were correlated with more rapid local adoption of computer technology in the 1980s and 1990s, underscoring the role of changing relative skill demand. Similarly, Chinhui Juhn, Gergely Ujhelyi, and Carolina Villegas-Sanchez (18106) show that passage of NAFTA led Mexican firms to adopt new technologies that reduced the demand for physical skills and ultimately led to increased hiring of women relative to men.

Despite the progress made by recent cohorts, women still fall behind men, particularly in certain fields like science and engineering, and in high-profile careers in management and business. Marianne Bertrand, Goldin, and Katz (14681) study MBA graduates from a top U.S. school, and show that the male-female earnings gap widens steadily after initial completion of the degree, reaching 80 percentage points over 16 years. They find that the presence of children is a powerful predictor of career interruptions and lower hours for females, but not for men, and that these factors are highly related to earnings. Ty Wilde, Lily Batchelder, and David Ellwood (16582) reach a similar conclusion for a broader sample of women in the 1979 National

Longitudinal Survey of Youth: child-bearing has a strong negative effect on wage growth, particularly for higher-skilled women.

## Unemployment, Job Displacement, and the Great Recession

The Great Recession has brought renewed interest in the study of labor market fluctuations, unemployment, and job displacement. While research is still ongoing, prominent contributions by LS members already have shed light on the labor market impacts of the Great Recession and its likely consequences.

Michael Elsby, Bart Hobijn, and Aysegül Sahin (15979) provide an early analysis of the labor market consequences of the downturn that began in 2007. They note that the impact of the recession was particularly severe for men, who were disproportionately affected by job losses in construction and manufacturing. They also highlight the remarkable growth in long-term unemployment which is one of the hallmarks of the Great Recession. Henry Farber (17040) used data from the Displaced Worker Survey of January 2010 to show that nearly one in six U.S. workers reported having lost a job during 2007–9. Comparing recent job losers to those in earlier surveys, he noted a sharp decline in re-employment rates and a rise in measured earnings losses.

Hilary Hoynes, Douglas Miller, and Jessamyn Schaller (17951) pro-

vide a systematic analysis of the relative impact of the Great Recession across various demographic groups. Their research, based on monthly data from the Current Population Survey, shows that the relative responses to the most recent downturn were quite consistent with patterns in earlier recessions but larger in magnitude, reflecting the severity of the downturn. One of the least affected groups was older workers—a fact confirmed by Alan Gustmann, Thomas Steinmeier, and Nahid Tabatabai (17547) based on data from the Health and Retirement Survey.

Steven Davis and Till von Wachter (17638) evaluate the longer-run costs of the massive job losses during the Great Recession. Using data from Social Security earnings records for job losers in the 1970s, 1980s, and 1990s, they estimate that a “typical” displaced worker (a male with three or more years of job tenure, laid off from a firm experiencing a 30 percent or larger cut in employment) experienced about a 12 percent loss in the discounted present value of earnings over the next 20 or so years. The loss rises to 20 percent, however, when the overall unemployment rate is greater than 8 percent at displacement. These estimates suggest that the longer-run costs of the Great Recession will be very large, and that many job losers will never see their salaries rebound to their pre-job-loss levels.

One potential mechanism account-

ing for the high cost of long-term unemployment is that workers become less likely to find a new job, either because of real or perceived deterioration in their skills. Kory Kroft, Fabian Lange, and Mathew Notowidigdo (18387) conduct an ingenious field experiment to measure this effect. They submit fictitious job resumes to a large sample of job postings in different U.S. cities, randomly varying the length of time the (fictitious) applicant has been out of work. They find that applicants who have been out of work longer are less likely to be called for an interview, although the effects are moderated in cities with higher unemployment rates.

An important policy response to the Great Recession was a large increase in the potential duration of unemployment benefits—from the standard 26 weeks to as long as 99 weeks for job losers in some states. Jesse Rothstein (17534) uses month-to-month labor force transition data from the Current Population Survey to evaluate the impact of these longer benefits on re-employment rates and overall unemployment. Using a variety of approaches to control for unobserved variation in local labor market conditions, he concludes that the package of benefit extensions raised the unemployment rate in December 2010 by at most 0.5 percentage points—a smaller effect than would have been expected given existing estimates of the effect of longer benefits on the duration of unemployment claims in the literature.



# Understanding Financial Crises: Theory and Evidence from the Crisis of 2007–8

Viral Acharya\*

For those who study economic history, financial crises are recurring phenomena, not as rare as they are often perceived to be, but showing up in new guises each time. There are often common economic forces at work across different crises, and my current research uses the financial and economic crises that erupted in August of 2007 as a laboratory for theoretical and empirical analysis of those forces. In the past, I focused on *market failures*, which can arise due to externalities (“neighborhood” or “spillover” effects) from the distress of financial firms, and *regulatory failures*, which can arise due to time-inconsistency problems, cognitive capture, or capture that is rooted in political economy problems. This article summarizes my research on these two failures and their interactions. In the conclusion, I mention my ongoing work on *government failures*, which can arise due to myopia of decision-making in fiscal and debt policy, and in policy designed to bail out a distressed financial sector.

### Market Failure I: Short-term Debt, Default, and Externalities

Financial firms that lend to households and corporations (both banks and “shadow banks” that perform similar economic functions) have always featured short-term debt in their funding structures. The underlying economic rationale for this can be understood by

*\*Acharya is a Research Associate in the NBER’s Program on Corporate Finance and the C.V. Starr Professor of Economics at NYU’s Stern School of Business. His profile appears later in this issue.*

considering the problem of the financier who funds a bank but, because of information problems, lacks precise knowledge and contractibility over loans made by the bank. The financier responds to this problem by saving the option *not to roll over* — in other words, by providing only short-term debt to the bank.

Financial crises occur when the economy is hit by shocks that lead the financier to exercise the option not to roll over the short-term debt because the bank is undercapitalized — that is, because bank-owners have little equity capital left as “skin-in-the-game” to continue lending prudently. If shocks are idiosyncratic to a bank, then the under-capitalized banks can be acquired, or their activities re-intermediated, by better-capitalized banks. If shocks instead are aggregate in nature, and the entire banking sector is heavily short-term financed, then banks suffer a coincident loss of capital, and efficient re-intermediation cannot take place. There may be disorderly liquidations or allocation inefficiency. This induces financiers to not roll over the short-term debt, and a “crisis” materializes.<sup>1</sup> Indeed, absent a sufficient pool of long-term capital in the economy, even relatively small aggregate shocks and inefficiencies perceived by financiers can lead to complete short-term debt “freezes.”<sup>2</sup> Interestingly, losses to financiers are less likely in good economic times when the likelihood attached to aggregate shocks is small, leading to greater short-term leverage for the financial sector as a whole — including the entry of undercapitalized institutions. Therefore, somewhat counter-intuitively, crises can be more severe if an adverse aggregate shock materializes in good times than in bad times.

This *market failure* arises because of

the coincidence of short-term debt in the capital structures of banks and related financial firms and aggregate shocks to their asset portfolios. Regulation might attempt to address this market failure with a “tax” — for example, a requirement that a bank hold a minimum level of equity capital that is dependent not just on its own asset portfolio risk and short-term debt but also on “systemic risk” — that depends on the aggregate component of asset risk and the level of system-wide short-term debt.<sup>3</sup> Policies of this type would link regulations to *macro-prudential* concerns that are related to financial crises and externalities, rather than (or not just) *micro-prudential* concerns related to the health of individual financial institutions.

In modern financial systems, much leverage is “embedded” in derivative contracts rather than associated with traditional short-term debt. A related but subtler externality arises in the context of derivatives. When an insurer sells protection against a risk to a number of counterparties, each party’s position potentially affects the payoff on the other parties’ positions, in a state of the world where the insurer lacks capital to honor its contractual promises. To reflect this *counterparty risk externality* suitably in the price of insurance, market participants need to know more than the bilateral positions; they need to know “what else is being done.” When risks being hedged are aggregate in nature, private derivative contract terms in general will not internalize the counterparty risk externality, unless terms can be contracted upon the aggregate positions of the insurer. This suggests a potential role for creating transparency in derivatives markets, or requiring centralized

clearing of relatively large over-the-counter (OTC) derivatives markets, as part of *macro-prudential* regulation.<sup>4</sup>

### Regulatory Failures: Micro-prudential Capital and Liquidity Rules

Financial crises engulfed the Western economies beginning in 2007, and most prominently affected the United States during 2007–8. In the period leading up to the crisis, banks and related financial firms had extensive short-term debt and common exposure to residential mortgage assets. When an aggregate shock materialized by end of 2006, in the form of a secular housing price decline in the United States, short-term debt rollovers became increasingly difficult. There weren't adequate pools of capital to move mortgage assets off the balance-sheets of the financial sector and, eventually, short-term debt markets froze for many financial firms, leading to *en masse* failures in the fall of 2008.

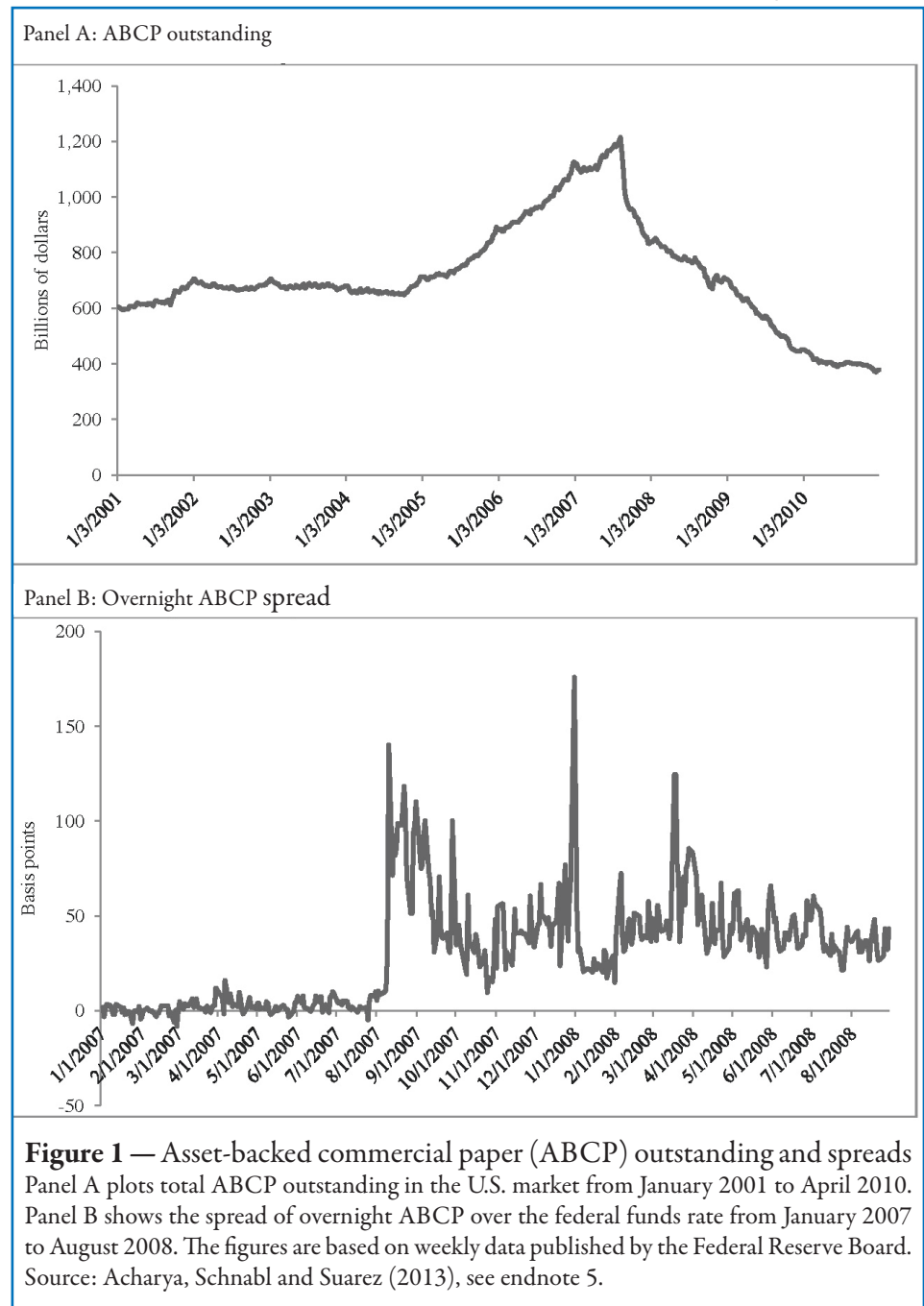
At a high level, these facts fit the theoretical narrative of financial crises presented above. It is interesting to note, though, that there was elaborate regulatory apparatus in place both before and during the crisis, in particular in the form of Basel capital requirements. It is thus useful to understand why the financial sector's health eroded so rapidly following the housing price shock. Three examples of *regulatory failures* stand out from my work addressing the exposure of the financial sector as a whole to short-term debt and aggregate risk.

First, the financial crisis erupted in the form of rollover problems for short-term asset-backed commercial paper (ABCP) issued by special purpose vehicles (called "conduits" and structured investment vehicles, or SIVs). Many of these vehicles were sponsored by commercial banks and effectively guaranteed by them. These guarantees implied that the perceived risk transfer from special purpose vehicles was, in effect, non-existent. Adequate treatment for sponsoring such conduits *with guarantees* was, however, absent in regulatory capital requirements.<sup>5</sup>

The importance of this regulatory policy can be seen by examining the international data: they show that countries such as the United States, the United Kingdom, and Germany, which adopted lax capital treatment of ABCP vehicles, had significant presence of their commercial banking sectors in the ABCP market, whereas their counterparts in Spain and Portugal, which adopted more prudent capital treatment of ABCP vehicles, had virtually no pres-

ence in this market.<sup>6</sup> In effect, while the commercial banking sector looked well-capitalized on the regulatory capital front during 2003–7, it had in fact built up significant short-term debt in shadow banks without an economic transfer of risks. This short-term debt experienced rollover problems beginning on August 8, 2007, precipitating the crisis (see Figure 1).

Second, as the rollover problems of short-term debt persisted, given the lack



**Figure 1** — Asset-backed commercial paper (ABCP) outstanding and spreads. Panel A plots total ABCP outstanding in the U.S. market from January 2001 to April 2010. Panel B shows the spread of overnight ABCP over the federal funds rate from January 2007 to August 2008. The figures are based on weekly data published by the Federal Reserve Board. Source: Acharya, Schnabl and Suarez (2013), see endnote 5.

of housing market recovery during 2007–8, banks and shadow banks sustained severe losses. The market value of their equity collapsed. A *macro-prudential* or system-wide approach to capital requirement of the financial sector necessitated a prompt response at the early stage of the crisis in order to get banks to reduce their reliance on short-term debt by issuing equity capital to redeem the debt that was coming due. And, further erosion of equity capital through payouts to employees and shareholders would have made the financial sector even more fragile. Nevertheless, not only did the distressed financial firms not reduce reliance on short-term debt, but they in fact paid out significant dividends—in some cases, increasing the payouts—in spite of mounting losses.<sup>7</sup> Throughout this period, banks were deemed to be well-capitalized by (micro-prudential) regulatory capital standards. This contributed to the lack of any significant regulatory action for addressing the worsening rollover risk of banks. In the end, this led to failure or near-failure of most of the largest financial firms in the United States and Western Europe, captured saliently by Lehman Brothers filing for bankruptcy on September 15, 2008.

Third, markets as well as regulators were caught off-guard by the case of AIG Financial Products, which had over \$500 billion in notional outstanding insurance (“credit protection”) sold to counterparties which were themselves large banks and financial firms. AIG FP was essentially deemed to be safe based on its *current* rating, but in effect it had significant leverage *conditional* on a future downgrade, and especially so if such downgrade coincided with system-wide stress: such stress would lead to recognition of losses in market prices of its assets and a demand for immediate collateral by its counterparties. The public disclosures provided by AIG FP show that the rollover risk it faced was never stated with adequate granularity with respect to significant downgrades, nor did it take account of the underlying aggregate risk exposure of the insurance it had sold to counterparties. Such disclosure or transparency was also not required by

AIG FP’s regulators, allowing the build-up of its significant derivatives book in an unchecked manner.<sup>8</sup>

Why did these “regulatory failures” arise? While potential explanations abound, a leading candidate is that regulation was focused on ensuring the safety and soundness of individual financial institutions. The rules and tools were in many cases inappropriate for assessing the buildup of aggregate risk of assets and of rollover risk from short-term debt of the financial sector.

## Market Failures II: Transmission from Distressed Financial Firms to the Economy

The market failures arising from failures of large banks, or of banking systems at large, have received substantial attention in the literature. The focus is typically on the contraction of lending from banks to small and medium-sized enterprises—information-sensitive borrowers—and thus bank lending to those not easily re-intermediated by other lenders. My recent empirical work, exploiting as a “laboratory” the period immediately following August 2007 when banks faced rollover risk in the ABCP market, shows that effects of such failures are more far-reaching and multi-faceted than has been traditionally documented.

First, unlike the market stress episodes of the prior decade (notably the 1998 episode surrounding the near-collapse of Long Term Capital Management), the banking sector in the 2007–8 crisis did not experience an immediate net inflow of deposits. From early 2007 until the government bailout package was put in place, depositors appeared concerned about the banking sector’s health and moved to prime money-market funds which invested only in government securities. Indeed, several banks with significant exposure to ABCP vehicles and undrawn lines of credit experienced significant rollover risk in the form of withdrawals of uninsured deposits. These banks responded by offering higher deposit rates in order to maintain their deposit base; up until a month before their fail-

ure, they succeeded in doing so by luring insured deposits even as their uninsured deposit base shrunk. Focusing *jointly* on deposit flows and rates helps us understand that rather than banks being *passive* liquidity backstops or preferred “safe havens” for investors in a crisis, banks are in fact *active* seekers of funding liquidity. Importantly, the fact that banks in trouble sought funding at aggressive rates imposed a deposit-rate externality on the funding costs other banks.<sup>9</sup>

Second, the effect of aggregate risk on bank intermediation activity is not limited to spot or term lending as is the focus of current literature. Banks provide liquidity insurance in the form of lines of credit to corporations, enabling corporations to free up cash holdings for profitable investments. As aggregate risk rises, the ability of the banking sector to smooth fees across firms and to honor the lines of credit declines, limiting the extent of liquidity insurance provided to corporations (fewer initiations of lines of credit, as well as higher fees, smaller amounts, and shorter maturities on initiations.) This, in turn, induces greater cash holdings and lower investment, even by relatively large corporations of the economy.<sup>10</sup>

Third, these effects were not limited to banks in the United States. Foreign banks provide a significant proportion of intermediation in the form of lines of credit in the United States. While the U.S. banks struggled for deposit funding too, as explained above, their funding was eased in part by the provision of public funding (starting in the fall of 2007) by the Federal Reserve and Federal Home Loan Banks. In contrast, many foreign banks without a depository base in the United States lacked access to public funding and faced “dollar shortages”—that is, rollover risk in dollars. As a result, the terms on lines of credit provided by foreign (European) banks to U.S. corporations relative to foreign borrowers worsened until December 2007 (when dollar swap lines were put in place by the Federal Reserve for foreign central banks), relative to such a differential effect in terms of lines of credit provided by U.S. banks.<sup>11</sup>



Fourth, inter-bank markets were significantly impaired because of the precautionary demand for liquidity of banks exposed to rollover risks. Using data from the United Kingdom, where large settlement banks indicate to the Bank of England each month their desired liquidity in the form of requested reserves, it can be seen that (exposed) banks raised their liquidity demands (more) following the ABCP freeze in August 2007 and the failure of Bear Stearns in March 2008. This liquidity demand was coincident with a rise in spreads charged in the inter-bank market, over and above the Bank of England policy rate, in both secured and unsecured markets. Furthermore, using data on bilateral inter-bank transactions, this rise in spreads can be attributed to the funding problems faced by lending banks rather than to the condition of borrowing banks. This suggests that the inter-bank market stress during 2007–8 was at least in part attributable to precautionary hoarding of liquidity by a significant part of the banking sector that faced rollover risk, and not just to an increase in the counterparty risk of borrowers.<sup>12</sup>

Finally, besides the precautionary demand for liquidity by banks facing rollover risk, relatively healthier banks can have strategic demand for liquidity for acquiring troubled banks, especially as the crisis gets deeper and bank failures become imminent. This can lead to further reduction in liquidity that is available in the aggregate for funding the financial system, households, and corporations. Evidence suggests that such a motive for holding cash took hold, especially around the failure of Lehman Brothers in September 2008.<sup>13</sup>

## Conclusion

To summarize, existing theories and evidence on banking crises based on *market failures* (namely, the reliance of financial firms on short-term debt and the externalities from *en masse* failures of financial firms to roll over short-term debt) and *regulatory failures* (imperfect, incomplete, and sometimes misguided regulation) help us to understand both

the regular incidence of crises in modern financial systems and their adverse consequences. Financial crises in the Western economies that started in 2007 bear testimony to the usefulness of this existing paradigm. Indeed, the paradigm appears to be a good starting point for thinking about the role of *macro-prudential* regulation, which considers the financial system at large, as well as *micro-prudential* regulation that is narrowly focused on the health of individual financial firms.

My current research explores a third failure, *government failure*, which arises because of myopic decision making in fiscal policy as well as policy aimed at bailing out a distressed financial sector. These government failures have the dramatic implication that financial sector and sovereign credit risks are intimately tied. Bank failures can trigger sovereign credit risk if bailouts lead the sovereign to sacrifice its creditworthiness; conversely, deterioration of sovereign credit risk can impose “collateral damage” on the financial sector directly through its holdings of government bonds and indirectly through the implicit government guarantees of the financial sector.<sup>14</sup> Perversely, this bank-sovereign two-way feedback may in fact be preferred by myopic governments that are reluctant to cut back on populist spending: entanglement of the financial sector with the sovereign is perceived by investors as a sign that the sovereign will find it too costly to default, boosting the sovereign’s ex-ante ability to raise debt and spend, but resulting in a worse sovereign and financial crisis ex post.<sup>15</sup> Integrating governments and public policy into the existing models of banking crises remains an important topic for further work, as suggested by the ongoing banking and sovereign crises in the Eurozone.

<sup>1</sup> For a formal model capturing both the private desirability of short-term debt and how it can lead to aggregate crises (especially in times of good fundamentals), see V. V. Acharya and S. Viswanathan, “Leverage, Moral Hazard and Liquidity,” NBER Working Paper No. 15837, March 2010, published in the *Journal of Finance*,

66, (2011), pp.99–138.

<sup>2</sup> Such rollover risk and short-term debt freeze is modeled in V. V. Acharya, D. Gale, and T. Yorulmazer, “Rollover Risk and Market Freezes,” NBER Working Paper No. 15674, January 2010, published in the *Journal of Finance*, 66, (2011), pp.1175–1207.

<sup>3</sup> An implementable tax calculation based on systemic risk assessment of the financial sector can be found in V. V. Acharya, L. H. Pedersen, T. Philippon, and M. Richardson, “How to Calculate Systemic Risk Surcharges,” published in *Quantifying Systemic Risk*, J. G. Haubrich and A.W. Lo, eds. Chicago, IL: University of Chicago Press, 2012.

<sup>4</sup> Counterparty risk externality arising in opaque over-the-counter derivatives markets is formalized in V. V. Acharya and A. Bisin, “Counterparty Risk Externality: Centralized versus Over-the-counter Markets,” NBER Working Paper No. 17000, April 2011.

<sup>5</sup> Description of the ABCP conduits, their guarantees from commercial banks, and their eventual “runs,” can be found in V. V. Acharya, P. Schnabl, and G. Suarez, “Securitization without Risk Transfer,” NBER Working Paper No. 15730, February 2010, published in the *Journal of Financial Economics*, 107, (2013), pp. 515–36.

<sup>6</sup> V. V. Acharya and P. Schnabl, “Do Global Banks Spread Global Imbalances? The Case of Asset-Backed Commercial Paper During the Financial Crisis of 2007–09,” NBER Working Paper No. 16079, June 2010, published in *IMF Economic Review*, 58, (2010), pp.37–73.

<sup>7</sup> V. V. Acharya, I. Gujral, N. Kulkarni, and H. S. Shin, “Dividends and Bank Capital in the Financial Crisis of 2007–09,” NBER Working Paper No. 16896, March 2011.

<sup>8</sup> See a discussion of current disclosure practices of large financial institutions with regard to derivatives-linked collateral or margin liabilities, in V. V. Acharya, “A Transparency Standard for Derivatives,” NBER Working Paper No. 17558, November 2011, published in *Risk Topography: Systemic Risk and Macro Modeling*, M.K. Brunnermeier and A.

Krishnamurthy, eds., forthcoming from the University of Chicago Press.

<sup>9</sup> These results are contained in V. V. Acharya and N. Mora, "Are Banks Passive Liquidity Backstops? Deposit Rates and Flows during the 2007–09 Crisis," NBER Working Paper No. 17838, February 2012.

<sup>10</sup> V. V. Acharya, H. Almeida, and M. Campello, "Aggregate Risk and the Choice between Cash and Lines of Credit," NBER Working Paper No. 16122, June 2010, forthcoming in the *Journal of Finance*.

<sup>11</sup> V. V. Acharya, G. Afonso, and A. Kovner, "How do Global Banks Scramble

for Liquidity? Evidence from the Asset-Backed Commercial Paper Freeze of 2007," forthcoming as an NBER Working Paper.

<sup>12</sup> V. V. Acharya and O. Merrouche, "Precautionary Hoarding of Liquidity and Inter-Bank Markets: Evidence from the Sub-prime Crisis," NBER Working Paper No. 16395, September 2010, published in *Review of Finance*, 17(1), (2013), pp.107–60.

<sup>13</sup> See theory and empirical evidence for strategic demand for cash in a crisis in V. V. Acharya, H. S. Shin, and T. Yorulmazer, "Crisis Resolution and Bank Liquidity," NBER Working Paper No. 15567,

December 2009, published in *Review of Financial Studies*, 24(6), (2011), pp. 2166–2205.

<sup>14</sup> For theoretical and empirical treatment of this bank-sovereign nexus, see V. V. Acharya, I. Drechsler, and P. Schnabl, "A Pyrrhic Victory? Bank Bailouts and Sovereign Credit Risk," NBER Working Paper No. 17136, June 2011.

<sup>15</sup> V. V. Acharya and R. G. Rajan, "Sovereign Debt, Government Myopia and the Financial Sector," NBER Working Paper No. 17542, October 2011, forthcoming in *Review of Financial Studies*.

## Immigrant Selection and Assimilation during the Age of Mass Migration

Leah Boustan\*

The Age of Mass Migration from Europe to the New World (1850–1913) was one of the largest such episodes in human history. By 1910, 22 percent of the U.S. labor force was foreign born, compared to "only" 17 percent today. In a joint research program with Ran Abramitzky and Katherine Eriksson, I ask three related questions about this large and formative migrant flow: Were migrants who settled in the United States in the late nineteenth century positively or negatively selected from the European population? What was the economic return to this migration? And, how did these new migrants fare in the U.S. labor market, both upon first arrival and after spending some time in the country?

A better understanding of the Age of

Mass migration can inform our views of the past and the present. During this era, the United States maintained an open border for European migrants, which allows us to observe the immigration process in the absence of government constraints. Furthermore, beliefs about (the lack of) immigrant assimilation at the time have contributed to the formation and passage of the more restrictive migration policies of today.

Our project greatly expands our knowledge of this era by creating and analyzing two large panel datasets of trans-Atlantic migrants from historical Census records. Our first dataset links 50,000 men from their birthplace in the 1865 Norwegian Census to their adult residence in 1900 in either the United States or Norway. We focus on Norway because it is a large sending country and has two complete digitized historical Censuses (1865 and 1900).<sup>1</sup> Our second dataset follows 24,000 men, including immigrants from 16 European sending countries and a comparison group of U.S.

natives, in the U.S. labor market from 1900 to 1910 to 1920. Assembling this data has been made possible by the public release of Census manuscripts 70 or more years after the initial survey. We match individuals across Census waves by first name, last name, age, and place of birth.

For all of its advantages, the historical data also have two limitations. First, match rates across Censuses tend to be low, mainly because men with common names cannot be uniquely linked; our match rates range from 20 to 30 percent, which is standard in this literature.<sup>2</sup> Despite low match rates, our matched sample is roughly representative of the population. Second, we are only able to collect information about individual occupations, rather than individual earnings, which the Census first recorded only in 1940. Our standard approach is then to assign individuals the mean earnings in their occupation cell, which we refer to as "occupation-based earnings." This measure cannot capture aspects of the return to migration and of labor market assimila-

\* Leah Platt Boustan is a Research Associate in the NBER's Programs on the Development of the American Economy and Education and an associate professor of Economics at the University of California, Los Angeles. Her profile appears later in this issue.

tion that occurs by attaining higher earnings *within* occupation cells.

## Economic Return to Migration

A simple measure of the return to migration contrasts the earnings of migrants to the United States with the earnings of men who stayed in Europe. This basic approach can be confounded by migrant selection. For example, if the brightest people—those who would have earned more regardless of location—were the most likely to move to the United States, then a naïve estimate of the return to migration will be biased upward; likewise, the return to migration will be biased downward in the case of negative selection. We thus compare the earnings of migrants to the earnings of their brother(s) who remained in Europe, an approach that eliminates the across-household component of migrant selection. Such selection will be present if households that were financially constrained or that faced poor economic opportunities in Europe experienced different propensities to migrate.

We estimate a return to migration within brother pairs of around 70 percent.<sup>3</sup> These returns are lower than contemporary estimates for the return to migration from Mexico to the United States, as would be expected given the relatively unconstrained supply of migrant labor in this era.<sup>4</sup> In addition, our estimation method reveals evidence of negative occupational selection for migrants leaving urban areas. In particular, we find that the population estimate of the return to migration in the urban sample is 20 to 30 percent lower than the within-brother estimate, a pattern that we attribute to negative selection of migrant households.

## Migrant Selection

We provide more direct evidence of negative selection in this migrant flow by comparing the socio-economic status of the fathers of migrants and non-migrants.<sup>5</sup> We find that the fathers of migrants in both rural and urban areas have lower occupation-based earnings; are

less likely to own assets, including land, an owner-occupied home, or a business; and, conditional on owning some land, have property of lesser value as proxied by their property tax bills. A similar pattern holds for both migration to the United States and internal migration within Norway. Taken together, this evidence suggests that men with poorer economic prospects were more likely to migrate in the late nineteenth century.

We further demonstrate that men with a higher likelihood of inheriting land are less likely to migrate. Inheritance varied both by birth order and by the gender composition of one's siblings. On Norway's western coast and in the far North, two areas where primogeniture was particularly strong, oldest sons could expect to inherit the family farm. In these regions, oldest brothers in households with land were less likely to migrate than were their younger brothers. In the rest of the country, household assets were more likely to be divided between sons. In these regions, men with more brothers, as opposed to sisters, from households with land were more likely to migrate. In both cases, the lower a man's expected wealth, the more likely he was to leave his municipality of birth for destinations both internal and international. Neither birth order nor gender composition of siblings influence migration among sons in landless households.

## Migrant Assimilation

We then turn to the success of these newcomers in the U.S. labor market, asking how immigrants from Norway and 15 other sending countries fared upon arrival.<sup>6</sup> The consensus from prior studies, all of which have been based on cross-sectional data, is that these immigrants held substantially lower-paid occupations than natives upon first arrival but experienced rapid convergence with natives over time.<sup>7</sup> Yet inferring assimilation from a cross section is subject to well-known biases caused by changes in the skill levels of immigrant arrival cohorts over time and to the potentially selective return migration to source countries.<sup>8</sup> Over a quarter of migrants returned to Europe

during this period. In some cases, return migrants used a deliberate strategy of temporary migration to the New World. These temporary migrants will appear negatively selected in our data if they remained in low-paid occupations during their short sojourn in the United States.

Ideally, one could follow the career trajectories of individual immigrants as they spend time in the United States. Our panel dataset approximates these ideal conditions. Contrary to the existing literature, we find that the typical immigrant in the panel did not face a large initial earnings penalty upon first arrival in the United States and moved up the occupational ladder at the same rate as the native born. We conclude that the large earnings gap and subsequent convergence observed in a single cross-section is driven by a combination of declining skill levels across immigrant arrival cohorts, both between and within countries-of-origin, and by the departure of negatively-selected return migrants.

Our study is the first to document the substantial heterogeneity in the assimilation patterns of migrants from different countries of origin. Immigrants from France, Russia, and the English-speaking countries of the United Kingdom held significantly higher-paid occupations than U.S. natives upon first arrival, while immigrants from other countries started out in equivalent or lower-paid occupations. Regardless of starting position, immigrants from almost every country moved up the occupational ladder at the same rate as natives, rather than progressing faster to converge with natives. As a result, any initial occupation-based gaps between immigrants and natives were preserved over time.

## Broader Conclusions

Our work on the Age of Mass Migration contains three important lessons for our understanding of the economics of immigration.

### *Roy model*

The Roy model predicts that migrants will be negatively selected if the send-



ing country has a higher return to skill or more unequal income distribution than the destination.<sup>9</sup> Unlike today, Norway was more unequal than the United States in the nineteenth century. Therefore, our finding of negative migrant selection from Norway to the United States is consistent with the standard Roy model.

In contrast, most work on contemporary immigrant flows finds little empirical support for the Roy model.<sup>10</sup> One explanation for positive migrant selection today is that the high cost of migration, including fees for entering the United States illegally, prevents the poor from engaging in migration.<sup>11</sup> The cost of migration was lower in the past, which may have allowed the negative selection predicted by the Roy model to be manifest.

### **Financial constraints**

Hanson (2010) and Clemens (2011) forcefully argue that one of the most effective international development policies would be easing national migration restrictions in developed countries.<sup>12</sup> Yet, even if explicit barriers to migration were lowered, high migration costs and credit constraints might prevent the world's poor from moving to rich countries. Our finding of negative selection during the Age of Mass Migration suggests that a lack of household (or individual) wealth did not pose a barrier to migration at a time when U.S. borders were open to European migrants and migration costs were relatively low. These findings suggest that lifting migration restrictions may be sufficient to facilitate migration among the world's poor.

### **Assimilation**

Contemporaries questioned the ability of European immigrants to assimilate into the U.S. economy and called for strict migration restrictions that favored countries with highly-skilled residents. Our results indicate that these concerns were unfounded: the average permanent immigrant in this era arrived with skills similar to those of natives and experienced identical rates of occupational upgrading over their lifecycle. These successful outcomes suggest that migration restric-

tions are not necessary to ensure migrant assimilation. At the same time, we also note that migrants who arrived with low skill levels did not manage to close their skill gap with natives over time. This finding undercuts the commonly-held view that, unlike today's migrants, past waves of European immigrants, even those who arrived without the ability to read or to speak English, were able to quickly catch up with natives.

---

<sup>1</sup> U.S. data is taken from the Integrated Public-Use Microdata Series (IPUMS) and the genealogy website, Ancestry.com. For similar analyses for migrants from Great Britain or the U.S. South, see J. Ferrie and J. Long, "British, American, and British-American Social Mobility: Intergenerational Occupational Change Among Migrants and Non-Migrants in the Late 19th Century," manuscript, 2012, and W. Collins and M. Wanamaker, "Selection and Earnings Gains in the Great Migration of African Americans: New Evidence from Linked Census Data," manuscript, 2012.

<sup>2</sup> An introduction to modern linking methods can be found in J. Ferrie, "A New Sample of Americans Linked from the 1850 Public Use Micro Sample of the Federal Census of Population to the 1860 Federal Census Manuscript Schedule," NBER Historical Working Paper No. 71, August 1995, and Historical Methods, 29 (1996), pp. 141–56.

<sup>3</sup> R. Abramitzky, L. Boustan, and K. Eriksson, "Europe's Tired, Poor, Huddled Masses: Self-Selection and Economic Outcomes in the Age of Mass Migration," NBER Working Paper No. 15684, January 2010, and American Economic Review, 102 (2012), pp. 1832–56.

<sup>4</sup> G. Hanson, "Illegal Migration from Mexico to the United States," NBER Working Paper No. 12141, April 2006, and Journal of Economic Literature, 44 (2006), pp. 869–924.

<sup>5</sup> R. Abramitzky, L. Boustan, and K. Eriksson, "Have the Poor Always Been Less Likely to Migrate? Evidence From Inheritance Practices During the Age of Mass Migration," NBER Working Paper

No. 18298, August 2012, and Journal of Development Economics, forthcoming.

<sup>6</sup> R. Abramitzky, L. Boustan, and K. Eriksson, "A Nation of Immigrants: Assimilation and Economic Outcomes in the Age of Mass Migration," NBER Working Paper No. 18011, April 2012.

<sup>7</sup> Most recently, see T. Hatton, "The Immigrant Assimilation Puzzle in Late Nineteenth-Century America," Journal of Economic History, 57 (1997), pp. 34–62, and C. Minns, "Income, Cohort Effects and Occupational Mobility: A New Look at Immigration to the United States at the Turn of the 20th Century," Explorations in Economic History, 37 (2000), pp. 326–50.

<sup>8</sup> G. Borjas, "The Impact of Assimilation on the Earnings of Immigrants: A Reexamination of the Evidence," NBER Working Paper No. 1515, February 1986, and Journal of Labor Economics, 3 (1985), pp. 463–89 (under the title "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants"), and D. Lubotsky, "Chutes or Ladders? A Longitudinal Analysis of Immigrant Earnings," Journal of Political Economy, 115 (2007), pp. 820–67.

<sup>9</sup> A. Roy, "Some Thoughts on the Distribution of Earnings," Oxford Economic Papers, 3 (1951), pp. 135–46, and G. Borjas, "Self-Selection and the Earnings of Immigrants," NBER Working Paper No. 2248, issued in 1988, and American Economic Review, 77 (1987), pp. 531–53.

<sup>10</sup> D. Chiquiar and G. Hanson, "International Migration, Self-Selection, and the Distribution of Wages: Evidence from Mexico and the United States," NBER Working Paper No. 9242, September 2002, and Journal of Political Economy, 113 (2005), pp. 239–81; C. Feliciano, "Educational Selectivity in U.S. Immigration: How Do Immigrants Compare to Those Left Behind?" Demography, 42 (2005), pp. 131–52; and J. Grogger and G. Hanson, "Income Maximization and the Selection and Sorting of International Migrants," NBER Working Paper No. 13821, February 2008, and Journal of Development Economics, 95 (2011), pp. 42–57. For a



contrary view of the selection of Mexican migrants, see J. Fernández-Huertas Moraga, "New Evidence on Emigrant Selection," *Review of Economics and Statistics*, 93(2011), pp. 72–96.

<sup>11</sup> D. McKenzie and H. Rapoport, "Network Effects and the Dynamics of Migration and Inequality: Theory

and Evidence from Mexico," *Journal of Development Economics*, 84 (2007), pp. 1–24, and "Self-Selection Patterns in Mexico-US Migration: The Role of Migration Networks," *Review of Economics and Statistics*, 92 (2010), pp. 811–21.

<sup>12</sup> G. Hanson, "Why Isn't Mexico Rich?"

*NBER Working Paper No. 16470*, October 2010, and *Journal of Economic Literature*, 48(2010), pp. 987–1004, and M. Clemens, "Economics and Emigration: Trillion-Dollar Bills on the Sidewalk?" *Journal of Economic Perspectives*, 25 (2011), pp. 83–106.

## Saving in Developing Countries

Eswar S. Prasad\*

The evolution of national savings in developing countries (a broad term that I use here to refer to middle-income emerging markets, as well as less developed low-income economies) has received considerable attention in discussions of global current account imbalances. In the run-up to the global financial crisis, these imbalances were characterized by large and rising current account deficits in the United States, United Kingdom, and a few other advanced economies, matched by corresponding surpluses in many emerging markets and a few oil-exporting economies. Rising saving rates in China and many other Asian economies began to receive increased attention from researchers around this period, and Federal Reserve Chairman Ben Bernanke's 2005 speech arguing that the "savings glut" in emerging markets was a proximate cause of the imbalances gave further impetus to that research.<sup>1</sup>

Economists have been more successful in explaining changes in saving rates within specific countries over time than

in explaining differences in saving levels across countries.<sup>2</sup> The fact that Asian economies traditionally have had higher saving rates than developing and industrialized economies in other regions has received some attention, but there is no persuasive explanation for this phenomenon. Economists have had to rely on weak non-economic explanations, such as the argument that Asians are culturally predisposed towards saving. This hypothesis has been formally tested using data from the U.S. Census to examine whether immigrants to the United States from high-saving countries tend to save more than immigrants from low-saving countries. The results show that there are significant differences in immigrants' saving behavior by country of origin, but those differences do not match up with the differences in national saving rates. In particular, immigrants from high-saving Asian countries do not save more than other immigrants.<sup>3</sup>

### Saving in Asia

Given their high and rising saving rates, Asian economies have been the subject of considerable research. In an early contribution focusing on the region, Susan Collins looks at rising national saving rates in nine Asian developing econo-

mies (plus Turkey) over the period 1960–84. She concludes that high growth rates, a low dependency ratio, and high income levels are all positively associated with saving rates. She argues further that there are structural differences between low-income and middle-income countries in the determinants of savings.<sup>4</sup>

Charles Horioka and Akiko Terada-Hagiwara find that domestic saving rates in developing Asia rose during the period 1966–2007. They conclude that the main determinants of those trends were the age structure of the population (especially the elderly dependency ratio), income levels, and the level of financial sector development.<sup>5</sup> They forecast that over the next two decades the domestic saving rate in developing Asia as a whole will remain roughly constant, despite rapid population aging in most of those economies, in part because the negative impact of population aging on the domestic saving rate will be largely offset by the positive impact of higher income levels.

National saving comprises saving by households, corporations, and the government. Household savings typically has attracted most of the attention of researchers because it is more amenable to theoretical modeling than the other components of national saving, and because its determinants can be analyzed using

---

\*Eswar S. Prasad is a Research Associate in the NBER's International Finance and Macroeconomics Program and the Tolani Senior Professor of Trade Policy and Professor at Economics at Cornell University. His profile appears later in this issue.

household-level survey data. Corporate saving (retained earnings) has received less attention, but in fact has been the key driver behind the surge in national savings in major Asian emerging markets during the latter half of the last decade.<sup>6</sup>

While household saving rates have also trended up in most major Asian economies, one prominent Asian economy where the household saving rate has fallen quite significantly over the last two decades is Korea. Young Jun Chun evaluates the effects of population aging and fiscal policies on national saving in Korea.<sup>7</sup> Using a life-cycle model that incorporates a generational accounting approach, he argues that rapid population aging and the long-term budgetary imbalance have and will continue to drive down the national saving rate in Korea.

## China

The sheer scale of China's saving, which now exceeds 50 percent of GDP, has drawn considerable research attention. Dennis Yang, Junsen Zhang, and Shaojie Zhou look at determinants of all three components of saving in China and conclude that economic, demographic, and policy trends in the internal and external environments of the Chinese economy are likely to lead to a decline in national saving in the foreseeable future.<sup>8</sup>

With greater access to household-level datasets, there has been an intense focus on explaining the rise in China's household saving rate. From 1995 to 2005, the average urban household saving rate in China rose steadily by 7 percentage points, to about one quarter of disposable income. The urban saving rate has continued to rise since then, driving the national household saving rate higher as well. Marcos Chamon and I use data from China's Urban Household Surveys to explain why households are postponing consumption despite rapid income growth.<sup>9</sup> Tracing cohorts over time indicates a virtual absence of consumption smoothing over the life cycle. Saving rates have increased across all demographic groups, although the age profile of savings has an unusual pat-

tern in recent years, with younger and older households having relatively high saving rates. We argue that these patterns are best explained by the rising private burden of expenditures on housing, education, and health care. These effects and precautionary motives may have been amplified by financial underdevelopment, as reflected in constraints on borrowing against future income and low returns on financial assets.

In subsequent work, Chamon, Kai Liu, and I examine the role of precautionary saving motives in explaining both the increase in China's household saving rate since the mid-1990s and the interesting fact that the age-savings profile has become U-shaped during the 2000s.<sup>10</sup> We find that, in addition to the factors identified in our earlier research, rising income uncertainty and pension reforms help to explain both of these phenomena. Using a panel of Chinese households covering the period 1989–2006, we document that strong average income growth has been accompanied by a substantial increase in income uncertainty. Interestingly, the permanent variance of household income remains stable while it is the transitory variance that rises sharply. A calibration of a buffer-stock savings model indicates that rising savings rates among younger households are consistent with rising income uncertainty and that higher saving rates among older households are consistent with a decline in the pension replacement ratio for those retiring after 1997. We conclude that rising income uncertainty and pension reforms can explain more than half of the increase in the urban household savings rate in China since the mid-1990s, as well as the U-shaped age-saving profile.

Other researchers have used less disaggregated data to provide complementary perspectives on household saving behavior. Horioka and Junmin Wan conduct a dynamic panel analysis of the determinants of the household saving rate in China using a life-cycle model and panel data on Chinese provinces for the period 1995–2004.<sup>11</sup> They find that the main determinants of variations over time and

over space are the lagged saving rate, the income growth rate, (in many cases) the real interest rate, and (in some cases) the inflation rate. They find little evidence that variables relating to the age structure of the population have the expected impact on the household saving rate. Their results provide mixed support for the life-cycle hypothesis and the permanent income hypothesis, and are consistent with the existence of inertia or persistence in household saving behavior.

Other research on China has emphasized demographic factors as one of the main determinants of the rising household saving rate. Chadwick Curtis, Steven Lugauer, and Nelson Mark undertake a quantitative investigation using an overlapping-generations model.<sup>12</sup> In their model, dependent children's utility enters into parents' utility so that parents choose the consumption level of the young until they leave the household. Working agents give a portion of their labor income to their retired parents and save for their own retirement, while the aged live on their accumulated assets and on support from their children. These researchers take future demographic changes, labor income, and interest rates as exogenously given. They argue that their calibrated model accounts for much of observed increase in the household saving rate from 1963 to 2009.

While evidence of conventional demographic factors, such as an aging population, in driving household saving rates has been mixed, there are other aspects of changing demographics in China that have been the subject of research as well. Shan-Jin Wei and Xiaobo Zhang propose a novel and unorthodox explanation based on competitive saving resulting from unbalanced sex ratios (tilted in favor of males) in China.<sup>13</sup> As the sex ratio rises, Chinese parents with a son raise their savings in a competitive manner in order to improve their son's relative attractiveness for marriage. The pressure on savings spills over to other households. Both cross-regional and household-level evidence supports this hypothesis. They conclude that this motive potentially can account for about half of the actual

increase in the household savings rate during 1990–2007.

Abhijit Banerjee, Xin Meng, and Nancy Qian exploit the changes in China's demographics caused by its family planning policies to study the effects of changes in the demographic structure on savings and wealth.<sup>14</sup> They find that children provide a substantial amount of support for elderly parents and that sons provide more support than daughters. Their empirical estimates support the predictions of a simple life-cycle model, based on which they conclude that the exogenous reduction in fertility because of family planning policy caused a significant increase in household savings, and that all of the increase is driven by parents who have a daughter as their only child.

## Corporate Savings

As in other Asian economies, corporate saving was a principal driver of the rising national saving rate in China.<sup>15</sup> During 2003–7, the share of household saving in GDP actually declined, even though the household saving rate (saving as a share of disposable income) continued to rise. This apparent anomaly is the consequence of a greater share of national income going to capital than to labor. If households effectively own the firms in an economy, either directly or indirectly, this should not matter because firms' profits will increase household disposable income. However, in China, a majority of firms are still state-owned and most of them don't pay dividends to the state.

China's high corporate saving rate has received attention in policy circles, but has been the subject of only limited research so far. Tamim Bayoumi, Hui Tong, and Wei examine firm-level data and conclude that it indicates a global trend of rising corporate saving over the period 2002–7.<sup>16</sup> Chinese state-owned firms only recently were required to pay out dividends to the state, and these payments are still quite low relative to profits. However, these authors conclude that there is no significant difference in the savings behavior and dividend patterns

between Chinese majority state-owned and private listed firms. Other evidence reported by Loukas Karabarbounis and Brent Neiman suggests that China is not special and that declining labor shares and the rise of corporate saving are global phenomena.<sup>17</sup> One factor behind these phenomena is the global decline in the cost of capital beginning in the 1980s, which has led firms around the world to shift away from labor and towards capital, financed in part with an increase in corporate saving.

## More Work Ahead

With developing economies playing an increasingly important role in the global economy, there is growing interest in explaining saving behavior in these economies from both micro and macro perspectives. Increase in access to household and firm-level datasets in China and other developing economies has set off an exciting research program, although a number of questions have not yet been conclusively answered. For instance, the micro evidence suggests a range of plausible explanations for the rise in China's household saving rate, although there is no easy way to distinguish among these different hypotheses in a unified framework. Integrating the micro and macro perspectives to explain the determinants of saving-investment balances in these countries is likely to remain a fertile area of research.

*Behavior? Evidence from Immigrants,” NBER Working Paper No. 6568, May 1998, and Economic Development and Cultural Change, Vol. 48, no. 1 (1999), pp. 33–50.*

<sup>4</sup> S.M. Collins, “Saving Behavior in Ten Developing Countries,” in *National Saving and Economic Performance*, B. D. Bernheim and J. B. Shoven, eds., January 1991, pp. 349–76. Also see S. Edwards, “Why are Saving Rates So Different Across Countries? An International Comparative Analysis,” *NBER Working Paper No. 5097, April 1995*, and *Journal of Development Economics, Vol. 51, no. 1 (October 1996)*, pp. 5–44.

<sup>5</sup> C.Y. Horioka and A. Terada-Hagiwara, “The Determinants and Long-term Projections of Saving Rates in Developing Asia,” *NBER Working Paper No. 17581, November 2011*, and in *Japan and the World Economy, Vol. 24, no. 2 (March 2012)*, pp. 128–37.

<sup>6</sup> See E.S. Prasad, “Rebalancing Growth in Asia,” *NBER Working Paper No. 15169, July 2009*, and *International Finance, Vol. 14, Issue 1, pp. 27–66, Spring 2011*.

<sup>7</sup> Y.J. Chun, “Population Aging, Fiscal Policies, and National Saving: Predictions for Korean Economy,” *NBER Working Paper No. 12265, May 2006*.

<sup>8</sup> D.T. Yang, J. Zhang, and S. Zhou, “Why Are Saving Rates so High in China?,” *NBER Working Paper No. 16771, February 2011*, and in *Capitalizing China*, J. Fan and R. Morck, eds., forthcoming from the University of Chicago Press.

<sup>9</sup> M. Chamon and E.S. Prasad, “Why Are Saving Rates of Urban Households in China Rising?,” *NBER Working Paper No. 14546, December 2008*, and *American Economic Journal: Macroeconomics, January 2010, Vol. 2(1)*, pp. 93–130.

<sup>10</sup> M. Chamon, K. Liu, and E.S. Prasad, “Income Uncertainty and Household Savings in China,” *NBER Working Paper No. 16565, December 2010*.

<sup>11</sup> C.Y. Horioka and J. Wan, “The Determinants of Household Saving in China: A Dynamic Panel Analysis of Provincial Data,” *NBER Working Paper No. 12723, December 2006*, and *Journal*

---

<sup>1</sup> B. Bernanke, “The Global Saving Glut and the U.S. Current Account Deficit,” *Sandridge Lecture, Virginia Association of Economists, Richmond, VA, March 10, 2005*.

<sup>2</sup> See S. Edwards, “Why are Saving Rates so Different Across Countries? An International Comparative Analysis,” *NBER Working Paper No. 5097, April 1995*, and *Journal of Development Economics, Vol. 51, no. 1 (October 1996)*, pp. 5–44. That paper also has a good survey of the literature that preceded it.

<sup>3</sup> C.D. Carroll, B. Rhee, and C. Rhee, “Does Cultural Origin Affect Saving