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Introduction

Charles R. Hulten and Marshall B. Reinsdorf

On the eve of the financial crisis of 2007–2008, few observers of the economy were pessimistic about the future, in part because the magnitude of the approaching financial crisis and Great Recession was not apparent in the data commonly used to inform economic policy. In retrospect, however, the data trails left by the crisis are all too apparent. For example, the Case-Shiller twenty-city index of housing prices rose from a base of 100 in 2000 to over 200 in mid-2006, stabilized for about a year, then plummeted to 140 in April 2009. Propelled in part by housing prices, household net worth rose by about $25 trillion between 2000 and mid-2007. Half of these gains then vanished over the next two years, a loss of wealth equivalent to a year's worth of pretax income. Meanwhile, in the real economy, eight million jobs were lost and the unemployment rate rose from 5 to 10 percent. These patterns invite the questions: How could the approach of an economic event of this magnitude have been so little noticed? And what, if anything, can be done so that our data will reveal a developing future problem of this magnitude?

These questions were the subject of a conference held in Washington, DC, on November 12–13, 2010, at the Board of Governors of the Federal Reserve System (FRB), organized by Charles Hulten, Michael Palumbo, and Marshall Reinsdorf. This volume contains a collection of eleven chapters from the conference, grouped into three sets. The first set of five chapters

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is organized around the measurement problems associated with the financial crisis and identification of changes in macro- and micro-based measurement procedures needed to deal with future crises. Next is a set of three chapters that advance the measurement of specific areas of financial activity, including pension plans and cross-border finance. A final set of chapters examines the effects of the financial crisis and the associated recession on households and on Main Street using microdata on consumers, companies, detailed industries, and stock market returns.

The chapters are summarized in detail in the following section. By way of an editorial overview, we note that the financial crisis originated in a relatively small segment of the housing mortgage market (e.g., Alt-A and subprime). When the housing bubble burst, the shock was transmitted from this segment to the market as a whole, and then to the real economy. To invoke the old saw about searching for the lost keys under the lamppost at night, the financial intermediation sector is the logical place to start looking for crisis-related metrics, though the search is inhibited by the dimness of the light in some parts of the sector, most notably in the shadow banking system.

Part of the visibility problem arises from the fact that the decades before the onset of the financial crisis were a period of significant innovation and structural change. The possibilities introduced by the information technology (IT) revolution transformed the way stocks were traded and financial markets were organized. They also facilitated innovations in the areas of securitized lending and financial derivatives, which grew dramatically. The organization of the financial intermediation industry also changed as some activities migrated to unregulated industries with few data-reporting requirements.

The rapid evolution of financial intermediation products and processes posed significant challenges to policy analysts and regulators, as well as to the statisticians who sought to measure them. New financial instruments and arrangements take time to understand and incorporate into existing frameworks. Furthermore, large-scale macrodata systems have requirements of consistency over time and among cross sections of interdependent variables, which can slow the introduction of the new measures needed to keep up with an evolving economy. Moreover, macroeconomic statistics have other inherent limitations as leading indicators of emerging risks to financial stability. Their economy-wide perspective means that *breadth of coverage* is emphasized over depth of detail, and this bias is reinforced by the need to suppress much of the underlying detail in order to keep the databases manageable. In the process, important crisis-related microeconomic information may be buried in the statistical aggregates. For example, a mean rate of return can be calculated for an aggregate, but not the sort of statistics that would give insight into the distribution of returns.

Important changes in the *composition* of a data aggregate may also be concealed by the aggregation process. The characteristics of the mortgage

assets held by financial intermediaries, for example, shifted to include more mortgage-backed securities and other asset-backed securities. The characteristics of the loans being bundled into mortgage-backed securities (MBS) and asset-backed securities (ABS), and each institutional sector's holdings of MBSs and ABSs, would have been valuable information before and during the crisis. Household debt service costs are another example. These costs were growing faster than household income and balance sheet leverage was rising, but the aggregate debt service ratio did not convey the growing concentration of debt in segments of the population that lacked the income to service it, nor did the aggregate leverage ratio convey the highly leveraged position of a growing subset of households who had bought or refinanced a home. The aggregate debt statistics thus gave, at best, a muted warning of the growing imbalances compared to what detailed distributional statistics would have revealed.

These considerations suggest that macrodata sets should not be regarded as the first line of defense in predicting emerging financial crises. Risk assessments by policy analysts and economic researchers based on macroeconomic statistics are ultimately a back-up system against emerging threats. It is the agencies responsible for regulating the financial sector that are the true front line. They are the ones in direct contact with the protagonists in an emerging crisis and are the best positioned to collect and interpret information that could reveal problems like rising risk taking in individual institutions and in the system as a whole. Much information is already obtained as part of the regulatory process, some of it quantitative and some qualitative, but one lesson from the financial crisis is that gaps exist in this information that need to be addressed. These gaps exist in a number of dimensions: in the scope of institutions included (e.g., systemically relevant unregulated financial entities), in the scope of instruments covered (e.g., derivatives and bilateral repurchase agreements), and in valuation (gross and net amounts of positions, and mark-to-market versus hold-to-maturity values where relevant). Improvements are underway, but confidentiality constraints limit their general use.

While the regulatory process and associated data are the front line of defense, existing macrodata sets do have a role to play in crisis detection and management. They connect the financial sector to the economy as a whole and may help reveal unsustainable imbalances as they emerge.[1] They are also publically available so that external policy analysts can provide inde-

1. For example, in the period before the crisis the integrated macroeconomic accounts for the household sector did show some troubling patterns. These included unprecedented highs in ratios of debt and debt service costs to income, nearly unprecedented lows in the saving rate, an anomalous reversal in the normal flow of net lending from households to businesses, and a breakdown in the normal relationship between households' net mortgage borrowing and their gross investment in new residential assets, with the household sector borrowing as much as $1.91 for every dollar it invested (Yamashita 2013).

pendent assessments. In order for the macrodata to play this role, however, an improvement in the organization and scope of the financial data would have to be translated into corresponding changes the macrodata. This is a major task, even apart from the confidentiality issue and the qualitative, even impressionistic, nature of some of the data. However, part of the process was underway before the financial crisis, with the introduction of the integrated macroeconomic accounts (IMAs) in 2007 based on research in Teplin et al. (2006). The IMAs bring together the BEA's National Income and Product Accounts with the Flow of Funds Accounts ([FFA]s, recently renamed the Financial Accounts of the United States), and contain data on lending net of borrowing, income, investment, and balance sheets for the major sectors of the US economy.

A further step in the direction established by the IMAs would be to organize publically available regulatory statistics, expanded in scope as indicated above, into a database that can be linked to the FFAs. Forging the link between a detailed financial database and aggregate macrodata presents many challenges. They include: breaking existing aggregates of asset holdings into finer categories (e.g., along such dimensions as issuer type and maturity); adjusting classifications to accommodate new instruments, new types of information (e.g., the collateral posted by derivatives traders [McDonald 2014]); and extending coverage to previously uncovered financial institutions. Positions might also be shown on a gross rather than a net basis. A more ambitious goal would be to construct a detailed financial input-output table for financial intermediaries. This might take the form of a "risk map" developed along the lines discussed by Cecchetti, Fender, and McGuire (2011), though some of the relevant microdata may not fit into this kind of framework because they concern developments that are too new to have a place in slowly adapting statistical databases, or because they are incomplete or qualitatively inferior. Such data might, however, be offered in a series of satellite accounts or supplementary tables.

Most of these points are discussed in greater detail in the chapters reviewed below. In sum, improvements in measurement practice in both financial and aggregate macrodata are possible and are a partial response to the question posed at the outset: How could the approach of the financial crisis have been so little noticed? Filling existing gaps and adding "dots" where needed are almost certainly necessary steps toward an information system capable of anticipating financial crises, but there is still the open question of whether they are sufficient. Answering the key question is not just a matter of a richer sets of dots, it also depends on the ability to see the right connections. How the data are used matters, and in this regard, the forecasting record of macroeconomic models and analysts has not been good, particularly in the run-up to the financial crisis and during the aftermath. Better data may help with this problem, but they are not a substitute for better analysis.

The Chapters in This Volume

The chapters in this volume identify areas in which technical improvements in measurement procedures are needed in order to better understand developments in finance and their effects on households, Main Street businesses, and the international financial situation of the US economy. They also use new methods to measure and analyze defined-benefit pension plans and international financial flows. Finally, they use specialized microdata sets to examine how households and businesses fared in the financial crisis. Among their themes are the data gaps revealed by the financial crisis, the development of financial and economic data and statistics, and approaches to data collection and analysis that will help us to see, understand, and manage potential sources of systemic risk, disequilibria, and poor economic performance.

Advancing Economic and Financial Measurement Practice: Lessons from the Financial Crisis

The first of the chapters that focus on statistics for monitoring macroeconomic and financial stability is "Integrating the Economic Accounts: Lessons from the Crisis" by Barry Bosworth. Bosworth observes that the emergence and subsequent collapse of the subprime mortgage industry is a major lesson about the failure to document and analyze large innovations within the financial system. He also identifies some important gaps in the data needed to assess risks to financial stability and to understand economic conditions during recoveries that became evident in the financial crisis and its aftermath. The modern view of financial intermediaries emphasizes their role in transforming financial claims in the dimensions of liquidity, maturity, and credit risk, but these transformations are not well captured by the IMAs and Flow of Funds Accounts. This helped to obscure the emergence of a shadow banking sector characterized by maturity mismatches and excessive leverage as a major provider of financial intermediation. Furthermore, the rise of the subprime mortgage industry on the back of financing made possible by new types of asset-backed securities and credit derivatives was not visible in the FFAs. The FFAs do not distinguish subprime from prime mortgages, nor do they distinguish asset-backed securities from standard corporate bonds when looking at the holders of these securities, nor do they have information on derivatives. Finally, turning to our macrostatistics on the real economy, Bosworth finds that our understanding of the behavior of employment and of the current account deficit after the crisis was hindered by weaknesses in GDP and employment data.

Besides filling these data gaps, Bosworth suggests that the IMAs might also include balance sheets for subsectors of financial business, along with the net worth measures needed for conventional measures of their leverage.

Data on the roles of prices and quantities in value changes would also help to improve the usefulness of the FFAs and IMAs for monitoring financial stability. Finally, the financial crisis highlighted the need for better analysis of financial stability and showed that the financial regulators cannot themselves be relied upon to identify emerging risks, so Bosworth sees an important role for academics and other independent researchers. To promote independent research on systemic risk and financial developments, outside researchers should have as much access to detailed data as can be arranged without violating confidentiality constraints.

Another perspective on the performance of the IMAs and on changes in data and methods needed for monitoring financial stability is provided by "Financial Statistics for the United States and the Crisis: What Did They Get Right, What Did They Miss, and How Could They Change?" by Matthew Eichner, Donald L. Kohn, and Michael G. Palumbo. Eichner, Kohn, and Palumbo identify some patterns that could be seen in the IMAs that might have warned of growing risk or unsustainability. Financial intermediaries normally channel funds made available through household saving to finance the investment needs of businesses, but as households' saving began to fall short of their housing investment this flow reversed direction and business saving began to be used for lending to households. Also, the proportion of disposable income needed to service households' debts rose over the decade preceding the crisis. Nevertheless, major developments that raised systemic risk in the middle of the first decade of the twenty-first century, such as the deterioration in underwriting standards for mortgage debt and the growth of maturity transformation outside of the traditional banking sector, were invisible to the statistical system.

Looking at the longer historical record, some elements of financial crises that remain the same can be identified. Among these are excessive leverage and risk taking and heavy reliance on short-term sources of funding to finance long-term illiquid positions. Yet the particulars of the instruments and institutions tend to evolve in ways that require constant updating of risk metrics. Eichner, Kohn, and Palumbo therefore emphasize that the organization of finance and the instruments that it trades are too dynamic for any static or predefined set of measures of risk to maintain their relevance. An illustration of this point comes from the failure in 1990 of Drexel Burnham Lambert, whose unsecured short-term funding could not be rolled over when funders lost confidence. Secured funding was not affected by the loss of confidence, so the episode suggested that secured funding could be regarded as safe and collateralization became the norm. Yet, as securitized lending grew, the assets used as collateral changed from being predominantly Treasury bonds to include many asset-backed securities whose value would be quite uncertain in a crisis. The risk metric that treated secured funding as not vulnerable to crises of confidence therefore began to be misleading.

In light of the constant evolution and complexity of financial markets,

the authors conclude that work on expanding the public-use data and work on frameworks for analysis of more specialized data will be most effective if they proceed in tandem. More complete macroeconomic and financial data are only part of the process of developing an early warning system. More fundamental is the need to use data in a way that integrates analyses to identify areas of special interest with the development of specialized information to illuminate those areas.

The next chapter, "Durable Financial Regulation: Monitoring Financial Instruments as a Counterpart to Regulating Financial Institutions" by Leonard Nakamura, proposes a strategy that would help to facilitate the sort of detailed analytical research advocated by Eichner, Kohn, and Palumbo and that would fill in some key data gaps. Of particular note, it would reveal changes in the characteristics of instruments that affect their riskiness and allow risks to be tracked as they migrate to parts of the shadow banking system that would otherwise be obscure. The strategy features a linked macro-micro database that would be available to government agencies involved in systemic financial regulation, but Nakamura recommends that a mechanism be developed to give visiting researchers access as well, subject to confidentiality restrictions.

The underlying framework for the macro-micro database is an extended version of the Flow of Funds Accounts, with satellite accounts showing the details of the stocks and flows shown in the core FFAs. One of these satellite accounts provides a decomposition of the net change in mortgage liabilities of households into gross flows by tracking originations, repayments, defaults, and revaluations.[2] Some others provide information on prices, including mark-to-market prices of exchange-traded instruments.

The next step in the database design is to link key macroaggregates in the extended FFAs to microdata containing samples of the instruments that they comprise. The variables in the data sets will provide detailed characteristics of these instruments. Such a sample of mortgages that were securitized might, for example, have revealed the deteriorating lending standards and inflated appraisals that emerged in the period before the financial crisis. Furthermore, when particular instruments migrate out of the heavily regulated parts of the financial system to special purpose entities, hedge funds, insurance companies, or other unregulated entities, they become indistinguishable from other kinds of assets, making them effectively invisible in the existing macrostatistical system. By tracking instruments by ownership, the database will be able to illuminate those parts of the financial system and to provide a good picture of the holders of risky assets.

In the next chapter the topic turns from identifying data gaps that helped to hide the activities of the shadow banking system to asking what kind of

2. This bears a striking similarity to an idea discussed by Mendelson (1962) and Denison (1962) at an earlier CRIW conference on the Flow of Funds Accounts.

picture of this system can be constructed from the data that are already available. In "Shadow Banking and the Funding of the Nonfinancial Sector," Joshua Gallin constructs measures of the size of the shadow banking system and its importance to the real economy by synthesizing data from different tables of the FFAs. The process involves tracing the long-term financing used by households and nonfinancial businesses along intermediation chains to terminal funders outside of the traditional banking and shadow banking systems. Gallin's measure of the shadow banking system adds up the short-term liabilities to terminal funders that directly or indirectly support illiquid long-term lending to households and nonfinancial business. The reason to focus on these liabilities is their vulnerability to runs in the event of a loss of confidence; indeed, many of them did experience a run during the financial crisis. One direct kind of terminal funder is money market mutual funds; in 2006, they held 2.4 percent of the outstanding debt of nonfinancial sectors. The funding routed through intermediaries such as government-sponsored enterprises (GSEs) and issuers of private-label ABS was larger. In 2006, they provided 28 percent of the funding for the nonfinancial sector debt and they obtained 16.4 percent of their funding from runnable short-term sources. These short-term liabilities therefore supported an additional 4.6 percent of the nonfinancial sector's long-term borrowing.

Gallin's definition based on runnable liabilities to terminal funders results in a smaller measure of the size of the shadow banking system than other definitions in the literature. Although the shadow banking system seems too small for its activities to have mattered, its volatile growth means that it was, in fact, quite important for credit availability to the real economy. Over the two years ending in the fourth quarter of 2008, the shadow banking system contributed +4.3 percentage points to the two-year growth rate of nonfinancial sector debt, but over the next years it contributed –3.7 percentage points. Overall, the growth rate of nonfinancial sector debt fell by 8 percentage points between these periods, so the change in the growth contribution of the shadow banking system was on a par with the change in the overall growth rate of nonfinancial sector debt.

The final chapter focusing on macroeconomic accounts and the financial crisis is "Financial Intermediation in the National Accounts: Asset Valuation, Intermediation, and Tobin's *q*," by Carol A. Corrado and Charles R. Hulten. The chapter argues that the centrality of financial intermediation for the functioning of the economy has not been properly recognized in our macroeconomic accounting framework. To illuminate the role of financial intermediaries in linking nonfinancial businesses and households, the authors amend the familiar circular flow diagram to include a capital market. In this market, funds saved by households are transformed into financing for investment needs of businesses in exchange for claims on the income generated by the businesses. The pricing of the financial assets created in this process has the potential to imply a value for the capital stock that differs

from the present value of the income stream that the capital stock earns as an input into production or the cost of replacing the capital stock. Complex intermediation chains increase the chances of such valuation inconsistencies.

To measure the relationship between the value of the capital stock implied by financial markets and the value implied by the investment needed to replace the capital stock, the authors construct aggregate measures of Tobin's *q*. Although influences from cyclical factors could potentially make these measures a weak statistic for detecting asset-pricing bubbles, they do seem to perform well in practice. The estimates of Tobin's *q* diverge from the theoretical equilibrium value of 1 on three occasions. In first episode of divergence, from 1974 to 1985, the capital stock was valued at less than its replacement cost, but in the run-up to the dot-com crash of the stock market and again in the run-up to the financial crisis, the estimates of Tobin's *q* are above 1.

The authors also construct leverage ratios for major sectors based on the data in the IMAs. For financial business, this ratio provides no indication of rising risk before the financial crisis, but in the cases of homeowners and noncorporate, nonfinancial business, the leverage ratio does exhibit a rising trend before the crisis.

Advances in Measuring Wealth and Financial Flows

The next group of chapters presents some practical advances in measuring and analyzing wealth and financial flows in the areas of defined-benefit pension plans and cross-border investment. In "Adding Actuarial Estimates of Defined-Benefit Pension Plans to National Accounts," Dominique Durant, David Lenze, and Marshall B. Reinsdorf develop new actuarial measures of the income and wealth accrued by households through participation in defined-benefit (DB) pension plans. The DB plans set benefit levels based on a formula involving factors like career length and final pay. Until now, national accounts have measured these plans on a cash basis. Although this approach avoids the need for assumptions, employers may not time their cash contributions to DB plans to correspond to when claims to benefits are accrued, and a plan's assets may differ greatly from amount needed to cover the benefits due to the plan participants. Another impetus for this change in methods is that the international guidelines for national accounts set forth in the 2008 System of National Accounts (SNA) contained a new recommendation that households' pension wealth from DB plans be measured by the actuarial value of benefit entitlements.

Durant, Lenze, and Reinsdorf modify the framework that is recommended in the 2008 SNA to include an imputed interest expense for employers that have underfunded their plans and to recognize that holding gains on plan assets can reduce the amount of funding that must come from employers. The results on the DB plans of the United States help to explain why the measured personal saving rate has been so low—the cash measures of DB

pension plans underestimated the personal saving rate by an average of 1.7 percentage points in the period from 2000 to 2007. The higher estimates of income received by households also imply higher estimates of expenses for employers. Notably, the newly recognized pension expenses for state and local government exceed $100 billion in each of the years after 2002, changing the picture of the fiscal situation of state and local governments from one of balanced budgets to one of significant deficits.

The new treatment of pensions in the 2008 SNA also addresses the problem of institutional differences between countries in trying to construct meaningful international comparisons of retirement saving and wealth. In the core national accounts, government-sponsored pension plans, which predominate in most countries, are grouped with social security and accounted for in a different way from employer-sponsored DB plans. The new SNA has a supplementary table where actuarial measures of government-sponsored plans and social security that are comparable to the measures for employer-sponsored plans are reported alongside the figures for employer-sponsored plans.

In France, DB pension plans are largely government sponsored, while in the United States—leaving aside railroad retirement—they are employer sponsored. A comparison of these countries is therefore a good test of the usefulness of the supplementary table. Durant, Lenze, and Reinsdorf find that substituting actuarial measures for cash measures of employer-sponsored pension plans raises the estimate of saving by US households by enough to narrow the large gap between the official household saving rates of the United States and France substantially. Yet the size of the gap returns to almost its original level once accruals of benefit entitlements in government-sponsored plans and social security are added. These benefit entitlements are much larger in France, even after deducting the funding gap of social security. Taking social security wealth into account, French households have net wealth equal to 8.6 years' worth of disposable income compared to 6.5 years for American ones.

The group of chapters on recent measurement advances is rounded out with two chapters on cross-border financial flows and investment positions. A longstanding puzzle in the US balance of payments is how the United States can enjoy persistently positive net cross-border receipts of investment income while having a negative net international investment position. In "The Return on US Direct Investment at Home and Abroad," Stephanie E. Curcuru and Charles P. Thomas attempt to solve this mystery and to answer the related question of whether the US balance of payments is sustainable. Their first step is to locate the source of the investment income surplus. The average rate of return on US direct investment abroad (USDIA) turns out to be far above the rate of return on foreign direct investment in the United States (FDIUS). Next, the authors use a benchmark rate of return for domestic operations of US firms (USIUS) to analyze the gap between rates

of return, and find that USDIA has a much higher rate of return than USIUS, while FDIUS has a lower rate of return.

The gap between the average return on USDIA and the average return on tangible assets for USIUS over the entire sample from 1983 to 2010 is 330 basis points. Over half of this gap disappears, however, once allowance is made for the taxes that US parents must pay on their foreign direct investment (FDI) income. Curcuru and Thomas estimate the risk premium needed to compensate investors for the greater riskiness of the investments in the countries receiving US FDI and find that it can explain much of the remaining gap between returns on USDIA and tangible asset returns on USIUS. The rest of the gap is, they argue, explained by the risk premium needed to compensate the investors in USDIA for the higher amounts of sunk costs.

The low rate of return on FDIUS compared to USIUS also needs to be explained. To do this, Curcuru and Thomas construct measures of the average age of FDIUS compared with USIUS, and fit models of how age of investment affects returns. They find that younger investments earn lower returns and that the average age of FDIUS was comparatively young over much of the time period covered by their data. Young ages of FDIUS investments account for 150 of the 230 basis points separating the average rate of return on tangible assets for USIUS and the average rate of return on FDIUS over 1983–2010. This effect comes mostly from the years before 2002, however. The age gap between FDIUS and USIUS closes after 2002, and if the rate of return denominator for USIUS is changed from just tangible assets to tangible and financial assets (with the interest from the financial assets included in returns), it vanishes.

The implications for the sustainability on the US balance of payments are generally optimistic. The net income paradox is not caused by errors in the data, but by differences in rates of return between USDIA and FDIUS that are mostly due to stable factors such taxes and risk premia. Nevertheless, the favorable gap in investment returns between USDIA and USIUS is likely to become smaller in the future because of the maturing of FDIUS.

Further evidence on US receipts international investment income and rates of return on USDIA and FDIUS is provided in Christopher A. Gohrband and Kristy L. Howell's chapter on "US International Financial Flows and the US Net Investment Position: New Perspectives Arising from New International Standards." The chapter begins by presenting a new way to organize the financial account in the US balance of payments (BOP) tables and in the US international investment position (IIP) tables to classify international flows and positions by purpose (such as FDI) rather than by sector. Gohrband and Howell also develop more detailed estimates of the composition of the flows shown in the primary income and financial account sections of the main BOP table. The portfolio investment detail reveals that net foreign purchases of long-term debt issued by GSEs and of mortgage-backed securities were very large in the years leading up to the financial crisis,

amounting to almost $800 billion in 2006. Foreign portfolio investment seems, therefore, to have helped to fuel the housing price bubble. When the bubble burst and the crisis began, foreigners became net sellers of mortgage-related securities and turned instead to short-term and long-term Treasury securities, buying $712 billion worth of them in 2008.

The chapter also provides for the first time a detailed decomposition of the sources of change in the value of international investment positions into income flows, price changes, exchange rate movements, and other changes. The "other changes" component reflects statistical discontinuities and should not be included in a measure of investment returns, so this new decomposition allows returns to be measured more accurately than was possible before. For the period 1990–2005, excluding the other changes from investment returns makes the gap between the average rate of return on USDIA and the average rate of return on FDIUS even bigger than it is using the measure in Curcuru and Thomas (chapter 7, this volume). Nevertheless, Curcuru and Thomas's result that the excess return earned by US investors abroad compared to foreign investors in the United States comes from the direct investment component holds up in this more detailed analysis.

How Did the Financial Crisis Affect Households and Businesses?

Two chapters from the conference develop empirical evidence on how households fared during the financial crisis and subsequent recession, while a third develops evidence of whether gaining access to external sources of the funding and liquidity was a serious problem for nonfinancial businesses. The first chapter on households' experiences is "Household Debt and Saving during the 2007 Recession," by Rajashri Chakrabarti, Donghoon Lee, Wilbert van der Klaauw, and Basit Zafar. These authors had access to some unique microdata, including the Federal Reserve Bank of New York (FRBNY) Consumer Credit Panel sample of credit report records, a household survey collected by RAND in November 2008 to assess the impact of the financial crisis, and an FRBNY household survey on saving conducted from October 2009 to January 2010. These data can be used to analyze changes in households' financial position and behavior in the recession that began in 2007.

The RAND and FRBNY surveys show that about a third of households experienced some type of financial distress, and the effects of the financial crisis were felt by all segments of the population. Different age, income, and education groups suffered in different ways, however. When labor market conditions deteriorated, younger and less educated households were relatively more likely to lose their jobs or suffer a reduction in pay or benefits. Older and more educated households were less affected by bad labor market conditions, but they lost substantial fractions of their wealth as their home equity and retirement savings fell. Looking at all households combined, in the FRBNY survey 7 percent of respondents were unemployed at the

time of survey, 8 percent reported that their spouse had lost a job in the past 12 months, 15 percent reported that they had incurred a pay cut, and 19 percent reported that their household's pretax income had declined by 10 percent or more. Over 9 percent of households had negative equity in their home.

Along with falling income or wealth, the recession also brought about a tightening of credit conditions. Low down payments, defined as under 10 percent, fell to a share of just 7 percent of new mortgage originations. In the FRBNY survey, 13 percent of respondents had had a credit card account closed by the bank, and 19 percent had had their credit limit cut.

Yet the contraction in the supply of credit was not the only driver of declines in debt and open lines of credit: a more conservative approach to borrowing on the part of households also meant that there was less demand for credit. For example, over a postcrisis period in which the number of open credit card accounts fell by over 20 percent, credit card accounts were closed more frequently by consumers than by banks. The microdata from the FRBNY household survey also suggest that this changed attitude toward credit was behind the rise in personal saving that started in 2008 in the macroeconomic data of the national accounts. In particular, households did not, on balance, start to put more money into retirement accounts and savings accounts. Instead, they reduced borrowing and began to pay down loan balances. This is further confirmed by data from the FRBNY Consumer Credit Panel. The authors use those data to estimate the change in household debt, excluding the effects of write-offs by banks and home purchase transactions. Before 2008, cash-out refinancing, second mortgages, and home equity lines of credit gave rise to more new debt than was extinguished by principal repayments on existing mortgages, so that the household sector's net pay-down of mortgage debt was negative. It became positive in 2008, however, and in 2009 a net amount of 140 billion dollars of mortgage debt was retired.

Finally, the RAND survey of November 2008 provides some insight into the strong increase in personal saving in the fourth quarter of 2008. In this survey, 75 percent of respondents reported that they had reduced their spending between October 1 and the interview date, with a median cut of about $200 per month. This seems to be a response to a very uncertain economic environment: the period from mid-September to mid-November 2008 saw the Lehman Brothers bankruptcy, failures of some major commercial banks and thrifts, a run on money market funds, and a large drop in the stock market.

Microdata on households during the recession are also analyzed in "Drowning or Weathering the Storm? Changes in Family Finances from 2007 to 2009" by Jesse Bricker, Brian Bucks, Arthur Kennickell, Traci Mach, and Kevin Moore. These data were available to the authors because participants in the 2007 FRB Survey of Consumer Finances (SCF) were reinter-

viewed in the last half of 2009 to find out how they were coping in a time when the unemployment rate was nearing 10 percent.

Consistent with the macrodata for these years, mean family wealth was down by 20 percent in the 2009 wave of the panel. Nonetheless, the macrodata could not reveal how much variation there really was in how families were faring. Analyzing the data from the SCF panel, the authors find that a quarter of families had *increases* in wealth of 25 percent or more. Some of the variation can be related to families' income, debt, or employment circumstances. Over 70 percent of the families in the top income decile in 2007 had a fall in wealth, but for families in the lower three income quintiles the probability of a decline in wealth was only around 60 percent. Also, families with high debt payments relative to their income in 2007 were more likely than average to move far down in the wealth distribution, while families with high debt balances relative to assets were unusually likely to have a large move up in the distribution. Wealth declines were much more common among families where the respondent or spouse became unemployed, while large upward moves in the wealth distribution were more likely in families where the respondent or spouse had exited unemployment.

The responses from the SCF panel also suggested that aggregate spending by consumers was going to remain depressed. Families' desired levels of precautionary savings were higher in 2009 than in 2007, and their reported willingness to take risks was lower. Also, about 60 percent of households reported that they would curtail spending if they experienced a decline in the value of their assets, whereas only around 20 percent said that they would increase spending if their assets were to go up in value. If households actually responded in such an asymmetric way, very little of the cuts in spending by families that had falls in the value of their assets would have been offset by increases in spending by families with rising asset values.[3]

In the closing chapter in the volume, "The Misfortune of Nonfinancial Firms in a Financial Crisis: Disentangling Finance and Demand Shocks" by Hui Tong and Shang-Jin Wei, the focus changes to how businesses fared in the crisis period. The prospect of falling customer spending was not the only problem that businesses had to cope with as the subprime mortgage problems began to reach a crisis stage in mid-2007. They also faced more restricted access to external finance as lenders became weakened and investors became less tolerant of risk. Nevertheless, whether the loss of access to financing would have serious effects was not obvious because nonfinancial businesses held record amounts of cash. Indeed, they even had negative average net debt (debt minus cash on hand).

A challenge in measuring the effect of access to external finance is dis-

3. On the other hand, many older households may have buffered their cuts spending by changing their retirement plans—a significant number of respondents said that they were planning to delay retirement.

entangling it from the effect of falling demand. To identify financing constraint effects separately from demand destruction effects, Tong and Wei take advantage of heterogeneity across nonfinancial firms in their ex ante vulnerability to these two types of shock. The terrorist attack of 2001 caused a demand shock but not a financing access shock, so they use stock price behavior just after the terrorist attack to construct a demand shock sensitivity variable. They also use a model fitted by previous researchers to construct a financial constraint (or liquidity constraint) index for firms that reflects their ease of access to outside finance. Finally, as an alternative to this financial constraint index, they also construct a measure of the intrinsic dependence on external finance of about 400 detailed (four-digit SIC) industries. (Airlines, defense, and finance sectors are excluded because these industries were directly affected by the terrorist attack or the subprime crisis.)

The results show that both the firms that were sensitive to a demand contraction and the firms that were liquidity constrained had greater than average declines in their stock price during the subprime crisis. Yet the impact of the liquidity constraint was larger than the demand contraction effect, and was discounted more quickly into stock prices. Intrinsic dependence on external finance is also associated with an above average decline in stock price during the crisis, and the combination of a high financial constraint index and dependence on external finance measures is associated with an even larger stock price decline than either of these variables on its own. As a robustness check, Tong and Wei test a number of alternative specifications of the model and confirm their main findings.

In assessing the implications of their results, Tong and Wei conclude that policy measures aimed at relaxing liquidity and financing constraints faced by nonfinancial firms were essential if the goal was to help the real economy to recover from the financial crisis; policies aimed only at increasing demand would be insufficient. In the case of the recovery from the financial crisis, the financial market in the center of Corrado and Hulten's amended circular flow diagram seems to be more critical for economic stability than the product markets of the traditional circular flow diagram.

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