Economic Quarterly—Volume 100, Number 2—Second Quarter 2014—Pages 87–111

Flows To and From Working Part Time for Economic Reasons and the Labor Market Aggregates During and After the 2007–09 Recession

Maria E. Canon, Marianna Kudlyak, Guannan Luo, and Marisa Reed

While the unemployment rate is one of the most cited economic indicators, economists and policymakers also examine a wide array of other indicators to gauge the health of the U.S. labor market. One such indicator is the U-6 index, an extended measure of the unemployment rate published by the Bureau of Labor Statistics (BLS). In addition to unemployed workers, the U-6 index includes individuals who are working part time for economic reasons and individuals who are out of the labor force but are marginally attached to the labor market. Individuals are classified as working part time for economic reasons (henceforth, PTER) if they work fewer than 35 hours per week, want to work full time, and cite "slack business conditions"[1]

Canon is an economist at the Federal Reserve Bank of St. Louis. Luo is an assistant professor at the City University of Hong Kong. Kudlyak is an economist and Reed is a research associate at the Federal Reserve Bank of Richmond. The authors are very grateful to Alex Wolman, Felipe Schwartzman, Christian Matthes, and Peter Debbaut for useful comments and suggestions. The views expressed here are those of the authors and do not reflect those of the Federal Reserve Bank of Richmond, the Federal Reserve Bank of St. Louis, the Federal Reserve System, or any other institution with which the authors are affiliated. Email: Marianna.Kudlyak@rich.frb.org.

[1] This is the term ("slack work/business conditions") used in the CPS questionnaire as opposed to the term "slack" used in recent policy discussions that typically describes a degree of labor utilization below a level of full resource utilization.

or an inability to find a full-time job as a reason for not working full time. On average, from 1994–2014, 2.4 percent of the civilian noninstitutionalized population 16 years and older are classified as PTER. In 2009, this share reached 3.8 percent.[2]

Part-time employment for economic reasons has become a concern since the 2007–09 recession because, even though the numbers of unemployed and marginally attached individuals have been decreasing since 2009, the number of individuals who are working part time for economic reasons has remained elevated.[3] During the 2014 Economic Symposium in Jackson Hole, Wyo., Fed Chair Janet Yellen noted that the elevated number of workers who are employed part time but desire full-time work might imply that the degree of resource underutilization in the labor market is greater than what is captured by the standard unemployment rate (Yellen 2014).

In this article, we first use cross-sectional data to evaluate whether part-time employment for economic reasons differs from full-time employment or part-time employment for noneconomic reasons such as childcare or other family reasons (henceforth, PTNER) along dimensions other than hours (i.e., observable characteristics of workers and wages). We then examine whether the changes in the labor market flows in and out of PTER during and in the aftermath of the 2007–09 recession can account for any of the changes in unemployment.

We find that PTER workers are typically less educated than full-time or other part-time workers and are typically employed in middle- or low-skill occupations. On average, PTER workers earn 19 percent less than full-time workers and 9 percent less (per hour) than PTNER workers, even after controlling for sociodemographic and occupational characteristics. The differences persist if we compare wages of PTER to wages of other workers within broad occupational categories. More research, however, is needed to understand whether PTER workers are workers who cannot find full-time jobs because of bad luck or because of structural reasons.

We now turn to the question of PTER and unemployment. Note that the number of PTER workers at any point in time (i.e., stock) is affected by the number of workers who worked PTER in the previous period and continue to do so, as well as the number of workers who transition (i.e., flow) into PTER from full-time employment, other part-time employment, unemployment, and out-of-the-labor-force (OLF)

[2] The data in this paragraph are from HAVER.

[3] See, for example, Kearns and Smialek (2014) for a summary of policy discussions about individuals working PTER. For research on working PTER, see Valetta and Bengali (2013) and Cajner et al. (2014). For alternative measures of resource utilization in the labor market that incorporate PTER, see Hornstein, Kudlyak, and Lange (2014).

and the number of workers who transition from PTER into these other labor market statuses. Similarly, the flows into and out of PTER impact other labor market aggregates—full- and part-time employment, unemployment, and OLF. In this article, we decompose the changes in stocks of full-time employed, PTNER, unemployed, and OLF due to the changes in the flows of workers to and from PTER in the aftermath of the 2007–09 recession. Of course, the flows are in turn determined by fundamental factors affecting households' and firms' behavior. Nevertheless, it can be instructive to look at such decomposition. To this end, we perform a counterfactual exercise by fixing the transition probabilities between PTER and other labor force statuses at their respective sample means, and constructing the counterfactual time series of the labor market aggregates. The exercise is similar in spirit to the exercise presented by Shimer (2012) for the contribution of different labor market flows to changes in the unemployment rate.

The accounting exercise shows that changes in the transition probabilities to and from PTER after 2009 were associated with changes in stocks of full-time employed, PTER, and PTNER, but had almost no impact on the changes in stocks of unemployed or OLF. In the counterfactual exercise, the main drivers of the changes in the stocks of full-time employed, PTER, and PTNER were transition probabilities between PTER and full-time work and between PTER and PTNER. If the transition probabilities to PTER from either full-time or PTNER had remained at their sample means throughout 1994–2014, the population share of PTER in 2014 would have been 0.47 percentage points (pp) lower at the expense of full-time work and PTNER. If the transition probabilities from PTER to full-time work and to PTNER had remained at their sample means throughout 1994–2014, the population share of PTER in 2014 would have been 0.43 pp lower at the expense of full-time work and, to a lesser extent, of PTNER. In contrast, this same exercise yields counterfactual unemployment that is essentially identical to the one actually observed.

Thus, our results show that changes in the transition probabilities to and from PTER in the aftermath of the 2007–09 recession mainly impact the composition of employment (full versus part time, and the reasons for working part time) instead of the distribution of individuals between employment and non-employment. Consequently, policymakers' attention to PTER potentially implies a broader definition of resource underutilization in the labor market than the one captured by the standard unemployment rate. In particular, in addition to working fewer-than-desired hours, underutilization in the labor market can take the form of workers being overqualified for their jobs. For example, Abel, Deitz, and Su (2014) provide evidence of an upward trend

in underemployment of recent college graduates whereby the graduates are employed in jobs that do not require a college degree. Importantly, the challenge for policymakers lies in determining how much of such changes in the quality of employment represent structural changes in the economy.

Finally, regarding the future of PTER, an examination of the series of PTER over time reveals that the ratio of the number of PTER workers to the number of unemployed workers typically increases during economic recoveries. The increase is fueled by PTER workers who cite an inability to find full-time work as a reason for part-time employment (the number of PTER workers who cite "slack work" declines during economic recoveries). PTER workers' share is highest in nonroutine manual (typically low-wage) occupations. Given the recent work on job polarization (Autor [2010], among others), which shows that medium-wage jobs are disappearing but jobs on the high- and low-end of the wage distribution are growing, it thus becomes a challenging task to disentangle cyclical versus structural factors behind an increased number of PTER workers after the 2007–09 recession. Thus, the following questions might represent fertile ground for future research: (1) To what extent is PTER an important mechanism of labor market adjustment during recoveries from recessions? (2) What is the impact of trend-related developments like job polarization on such an adjustment, especially after deep recessions? (3) To what extent does the burden of adjustment fall more on certain demographic and socioeconomic groups than on the others?

The rest of the article is structured as follows. Section 1 describes the construction of the PTER series in the CPS data. Section 2 presents basic facts about PTER. Section 3 presents the main results. Finally, section 4 concludes.

1. MEASUREMENT OF PTER IN THE CPS

The data in the analysis are from the Current Population Survey (CPS) monthly microdata files from January 1994 to August 2014. The survey features a rotating panel structure in which households are surveyed for four months, taken out of the sample for eight months, and then surveyed for another four months to complete their participation. The CPS allows us to classify each individual into one of five labor force statuses: employed full time, employed part time for economic

reasons, employed part time for noneconomic reasons, unemployed, and OLF.[4]

The survey asks respondents about their hours worked during the reference week, their desire and availability for full-time work if they work part time, and their reason for working part time. The individuals who work fewer than 35 hours per week are considered part-time workers.[5] For the part-time work to be classified as "for economic reasons," the worker must desire full-time work and cite an economic reason as the primary reason for not working full time. Such economic reasons are "slack work or business conditions," "could only find part-time work," and seasonal work. Noneconomic reasons are child care problems, other family/personal obligations, health/medical limitations, school/training, retired/Social Security limit on earnings, full-time workweek is less than 35 hours, weather affected job, military/civic duty, labor dispute, holiday, own illness, vacations, and other (unspecified) reasons.

The 1994 CPS redesign affected the PTER series. Prior to 1994, the CPS did not specifically ask whether part-time workers wanted to or were available to work full time.[6] Additionally, the survey did not distinguish between respondents who usually worked full time and those who usually worked part time; it only asked about actual hours worked. The effect of the CPS redesign on the PTER series after 1994 is therefore twofold: (1) it decreased the number of part-time workers classified as PTER because it excludes those who do not want to work full time; and (2) it may have increased the total number of part-time workers because it includes those who usually, but not actually in the reference week, work fewer than 35 hours per week.[7] Consequently, caution needs to be exercised while constructing a longer

[4] We restrict the analysis to the civilian noninstitutionalized population 16 years and older (henceforth, population).

[5] We use actual hours worked in the reference week to differentiate full-time and part-time workers. We count those workers who are absent from work (and thus whose actual hours are not available in the survey) as full-time workers if they report that they usually work full-time hours. Workers who are absent from work and report that they usually work part-time hours are excluded from our analysis (for example, 0.62 percent of the population in 2013) because they are not asked to provide a reason for why they work part time.

[6] That is, after the 1994 redesign, if the respondents do not desire full-time work, they are asked to choose from only noneconomic reasons. If the respondents desire full-time work, they are asked for the primary reason for working part time, with the option to provide an economic or noneconomic reason. Therefore, in order to be considered working part time for economic reasons after 1994, workers must desire full-time work in addition to citing economic reasons. Prior to 1994, the survey does not separate those who do and those who do not want full-time jobs.

[7] See Polivka and Rothgeb (1993) for a thorough treatment of the effect of the redesign on part-time work calculations and for an explanation of how to adjust the series to be consistent over time.

Table 1 Average Weekly Hours and Real Hourly Wages, Full- and Part-Time Employment, 1994–2014

	Full Time	PTER	PTNER
Weekly hours	44.49	23.31	21.80
Hourly wage, $2013	17.02	11.81	13.66

Notes: The table shows mean of annual averages, 1994–2014. For 2014, the average is taken over the first eight months for which the data are available at the time of publication. To calculate hourly wage, we use hourly wages for hourly workers and compute hourly wages for salaried workers by dividing usual weekly earnings by usual weekly hours. Zero wages are dropped. All calculations employ the CPS outgoing rotation group sampling weights. Hourly wages are in 2013 dollars. Calculations are based on the CPS microdata basic files.

series of PTER that begins prior to 1994. Another change the redesign introduced was "seasonal work" as an economic reason for working part time.[8] Prior to 1994, only slack work, not being able to find a full-time job, and a job starting or ending during the reference week were considered economic reasons for working part time. Therefore, our analysis focuses on the 20-year period following the 1994 CPS redesign so that we can use the BLS U-6 definition of PTER.

2. BASIC FACTS ABOUT WORKING PART TIME FOR ECONOMIC REASONS

Wages, Hours, and Occupations

Table 1 shows average weekly hours and real hourly wages over the 1994–2014 period for three different groups of the employed: full-time, PTER, and PTNER workers.[9] During 1994–2014, a full-time worker's average real hourly wage is $17.02 (in 2013 U.S. dollars), while it is $13.66 for a PTNER worker and $11.81 for a PTER worker.

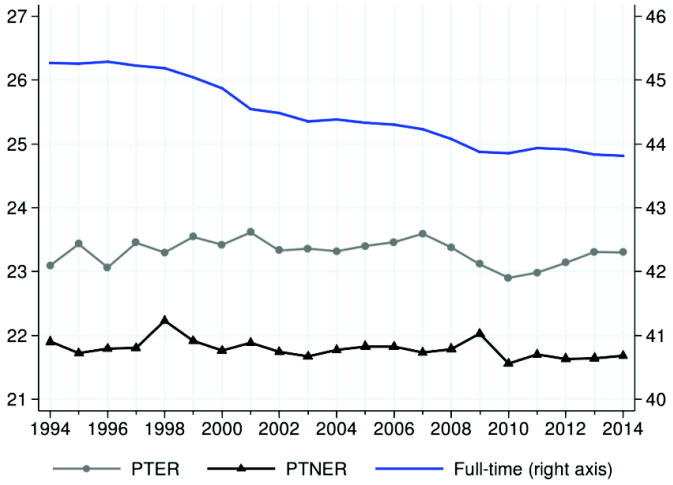
PTER workers report working 23 hours per week on average as compared to 45 hours reported by those working full time.[10] They also

[8] Seasonal work, however, does not constitute a large portion of PTER.

[9] To construct hourly wages, we use hourly earnings (if they are reported) or construct the wage by dividing weekly earnings by usual weekly hours. The reported wage statistics are based on non-imputed data. We also calculated the statistics incorporating imputed data and the results do not differ significantly. In the calculations we use outgoing rotation group weights.

[10] We take the mean of each year's average actual hours worked at all jobs in the reference week from 1994 to 2014. Usual hours, which are used to construct hourly earnings for non-hourly workers, are lower for full-time workers and higher for both voluntary and involuntary part-time workers.

Figure 1 Average Hours Worked per Week, Full- and Part-Time Employment



Notes: The figure shows yearly averages of monthly series. The data are from the basic monthly CPS files, all employed with nonnegative wages. The hours are total hours actually worked on all jobs in the reference week. The spikes in the working part time for noneconomic reasons series in 1998 and 2009 are due to Labor Day falling in the reference week, leading to a significantly higher than average number of workers working fewer than 35 hours for a noneconomic reason (specifically, most of them work 32 hours, increasing the average). No other reference weeks in the CPS contain national holidays. Authors' calculations using the CPS microdata.

work on average 1.5 hours more per week than PTNER workers. As can be seen from Figure 1, these gaps persist throughout 1994–2014.

Table 2 presents demographic characteristics of the three groups of employed workers, shedding some light on the difference in hourly wages between PTER workers and other employed persons. For example, full-time workers are more likely to have finished high school or college than part-time workers; among part-time workers, PTNER workers tend to be more highly educated than PTER workers (41.4 percent of full-time workers, 33.0 percent of PTNER workers, and 22.0 percent of PTER workers have a college degree or higher). PTER workers tend to be younger, with a comparatively large share of 20–24 year olds.

To further understand the differences between wages of PTER workers and the rest of the employed population, we tabulate the shares

Table 2 Education and Demographic Characteristics of Full- and Part-Time Employment, 1994–2014

		Group's Share In	
Group	**Full Time**	**PTER**	**PTNER**
Female	40.24	49.84	63.21
High school degree	91.71	79.88	85.14
Associate's, Bachelor's or higher degree	41.44	21.95	33.01
Master's, professional, or Doctorate degree	10.91	4.06	8.11
Average age	40.82	36.62	39.12
Under 20 y.o.	1.54	8.05	13.82
20–24 y.o.	8.18	17.52	13.26
25–34 y.o.	24.19	23.32	16.90
35–44 y.o.	26.80	21.15	18.54
45–54 y.o.	24.26	17.69	16.39
Over 55 y.o.	15.03	12.28	21.08

Notes: The table shows mean of annual averages, 1994–2014. For 2014, the average is taken over the first eight months for which the data are available at the time of publication. Authors' calculations using the CPS microdata basic files.

of different types of workers across different occupations. Following Jaimovich and Siu (2012) (see also Autor, Levy, and Murnane [2003] and Acemoglu and Autor [2011]), we classify the occupations into four different groups: non-routine cognitive, routine cognitive, routine manual, and non-routine manual occupations.[11] Routine occupations are typically middle-skill occupations.[12] As discussed in Autor (2010) and Jaimovich and Siu (2012), the U.S. labor market is experiencing a job polarization phenomenon where employment in routine occupations is shrinking while employment in non-routine cognitive and non-routine manual occupations is growing.

Table 3 shows the distribution of full-time, PTER, and PTNER work across four broad occupational groups with cognitive-manual and routine/non-routine classifications. Part-time workers represent a

[11] Non-routine cognitive occupations include management, business, and financial occupations and professional related. Routine cognitive occupations include sales and office occupations and office and administrative support occupations. Routine manual occupations include construction and extraction; installation, maintenance, and repair; production; and transportation and moving material occupations. Non-routine manual occupations include service occupations.

[12] Following Autor (2010), high-skill occupations include managers, professionals, and technicians. Middle-skill occupations include sales; office and administration; production, craft, and repair; and operators, fabricators, and laborers. Finally, low-skill occupations include protective services; food preparation; building and grounds cleaning; and personal care and personal services.

Table 3 Full-Time and Part-Time Employment Shares, by Occupation 1994–2014

	Non-routine cognitive			Routine cognitive			Routine manual			Non-routine manual		
Year	Full time	PTNER	PTER	Full time	PTNER	PTER	Full time	PTNER	PTER	Full time	PTNER	PTER
1994	0.781	0.196	0.024	0.713	0.251	0.036	0.811	0.142	0.047	0.606	0.321	0.073
1995	0.787	0.190	0.023	0.717	0.248	0.035	0.812	0.142	0.046	0.616	0.316	0.068
1996	0.786	0.192	0.022	0.715	0.251	0.033	0.814	0.145	0.042	0.624	0.311	0.065
1997	0.794	0.187	0.020	0.723	0.247	0.030	0.824	0.137	0.039	0.629	0.309	0.062
1998	0.775	0.207	0.018	0.706	0.267	0.027	0.806	0.159	0.036	0.628	0.318	0.054
1999	0.796	0.188	0.016	0.728	0.248	0.024	0.828	0.139	0.033	0.643	0.309	0.048
2000	0.811	0.175	0.014	0.742	0.236	0.022	0.840	0.129	0.032	0.654	0.300	0.045
2001	0.797	0.187	0.016	0.733	0.241	0.025	0.825	0.137	0.038	0.644	0.305	0.051
2002	0.802	0.180	0.018	0.735	0.236	0.029	0.827	0.130	0.042	0.641	0.301	0.057
2003	0.807	0.176	0.017	0.724	0.243	0.033	0.830	0.122	0.047	0.624	0.307	0.068
2004	0.805	0.179	0.017	0.719	0.249	0.032	0.834	0.121	0.045	0.625	0.308	0.067
2005	0.808	0.176	0.016	0.723	0.246	0.031	0.838	0.121	0.041	0.632	0.305	0.063
2006	0.809	0.176	0.015	0.727	0.245	0.028	0.839	0.120	0.040	0.642	0.301	0.057
2007	0.815	0.170	0.015	0.730	0.241	0.030	0.840	0.118	0.042	0.638	0.303	0.058
2008	0.815	0.167	0.019	0.726	0.235	0.040	0.820	0.119	0.061	0.631	0.294	0.075
2009	0.782	0.187	0.031	0.689	0.247	0.064	0.765	0.136	0.099	0.593	0.293	0.114
2010	0.799	0.169	0.031	0.701	0.229	0.070	0.793	0.119	0.088	0.600	0.280	0.119
2011	0.803	0.168	0.030	0.703	0.229	0.068	0.798	0.121	0.081	0.600	0.281	0.118
2012	0.809	0.162	0.029	0.707	0.228	0.065	0.814	0.117	0.069	0.606	0.280	0.114
2013	0.817	0.155	0.028	0.715	0.221	0.064	0.822	0.115	0.064	0.609	0.279	0.112
2014	0.814	0.160	0.025	0.710	0.230	0.061	0.824	0.118	0.058	0.607	0.288	0.106

Notes: The table shows shares of FT, PTER, and PTNER in each of the four occupational groups, annual averages of monthly series. Non-routine cognitive occupations include management, business, and financial occupations and professional related. Routine cognitive occupations include sales and office occupations and office and administrative support occupations. Routine manual occupations include construction and extraction; installation, maintenance, and repair; production; and transportation and moving material occupations. Non-routine manual occupations include service occupations. Authors' calculations using the CPS microdata basic files.

significantly higher fraction of low-skill and medium-skill occupations than of high-skill occupations. Interestingly, among the highest skill occupations, classified as non-routine cognitive, the share of PTER workers is only 0.03 while the share of PTNER workers is 0.16. The share of PTER workers is highest among non-routine manual occupations (0.11), which are typically low-skill occupations.

To understand whether the differences in wages between full-time, PTNER, and PTER workers can be explained by the differences in their sociodemographic characteristics and/or their occupations, we estimate a linear regression of the logarithm of the real hourly wage on educational level, occupation, race, gender, year, and employment type dummy variables. The omitted category for employment type is PTER. The coefficients for the type of employment show the difference in the (log of the) real hourly wage between PTER and working full time or PTNER, after controlling for sociodemographic and occupational characteristics. The results of this regression are presented in Table 4.[13] On average, full-time workers earn 19 percent more and PTNER workers earn 9 percent more (per hour) than PTER workers, taking into account education, age, and broadly defined occupational categories.

To further understand the wage differences, instead of occupational and employment dummy variables, we include a full set of interactions between seven occupational categories and the three types of employment (full time, PTER, and PTNER). If, for example, better workers (either employed full or part time) are employed in higher-paying occupations, then one should compare the wages of full- and part-time workers in these occupations in order to estimate the differences in earnings between full- and part-time workers. Table 5 contains the results of the regression with the interaction terms.[14] We then perform

[13] In Table 4, the dependent variable is the log of real hourly wage as described in the note to Table 1. The explanatory variables are type of employment dummies, occupation, education, age, race, gender, and a set of annual time dummies. The omitted categories are working part time for economic reasons, less than high school education, service occupations, male, and white. *** denotes statistical significance at the 1 percent level for a two-sided test. All data are from 1994 to August 2014 and include employed working age persons in months four and eight of the CPS sample except for those in the armed forces or farming, fishing, and forestry occupations. The regression is estimated by OLS with heteroscedasticity robust standard errors, with the CPS outgoing rotation group sampling weights. See footnote 14 for the details about the occupational classification.

[14] In Table 5, the dependent variable is the log of real hourly wage as described in the note to Table 1. The explanatory variables are type of employment interacted with occupation, education, age, race, gender, and a set of annual time dummies. The omitted categories are working part time for economic reasons interacted with service occupations, less than high school education, male, and white. See footnote 13. The occupational classification used in the regression is as follows (accounting for the change in coding in 2002): (1) Healthcare support occupations; protective service; food

Table 4 Hourly Wage, Demographic and Socioeconomic Characteristics, 1994–2014

Variable	Coefficient	Variable	Coefficient
Full time	.1915106***	Dummy_1996	-.0123845***
	(.000)		(.000)
Part time (PTNER)	.0914258***	Dummy_1997	-.0019732
	(.000)		(.348)
Construction/transportation	.2215752***	Dummy_1998	.0278192***
	(.000)		(.000)
Production and repair	.3131558***	Dummy_1999	.0382212***
	(.000)		(.000)
Sales and related	.0678285***	Dummy_2000	.0424516***
	(.000)		(.000)
Office/administrative	.2269783***	Dummy_2001	.0544279***
support	(.000)		(.000)
Professional specialty	.4906422***	Dummy_2002	.0624557***
	(.000)		(.000)
Management/executive	.3944512***	Dummy_2003	.0585759***
	(.000)		(.000)
High school	.1300564***	Dummy_2004	.0471874***
	(.000)		(.000)
Some college	.1753108***	Dummy_2005	.0319903***
	(.000)		(.000)
College	.3062498***	Dummy_2006	.0284528***
	(.000)		(.000)
Graduate degree	.2087941***	Dummy_2007	.0293244***
	(.000)		(.000)
Age	.0413028***	Dummy_2008	.0228746***
	(.000)		(.000)
Age^2	-.0004105***	Dummy_2009	.0470142***
	(.000)		(.000)
Black	-.057996***	Dummy_2010	.0310914***
	(.000)		(.000)
American Indian/Alaskan	-.0468621***	Dummy_2011	.0099154***
Native	(.000)		(.000)
Asian	-.0150465***	Dummy_2012	-.0020422
	(.000)		(.372)
Other race	-.0095699***	Dummy_2013	-.0093538***
	(.003)		(.000)
Female	-.1564769***	Dummy_2014	-.0136535***
	(.000)		(.000)
Dummy_1995	-.0093544***	Constant	1.260337***
	(.000)		(.000)
Mean(log real wages)	2.630377		
N	1,483,262		
R^2	.4109		

Notes: See footnote 13.

preparation and serving related; building and grounds cleaning and maintenance; personal care and service occupations (post-2002) and service occupations (pre-2002); (2) Construction trades, extraction workers; transportation and material moving occupations (post-2002); and operators, fabricators, and laborers (pre-2002); (3) Installation, maintenance, and repair workers and production occupations (post-2002) and production occupations (pre-2002); (4) Sales and related occupations (post-2002) and sales occupations (pre-2002); (5) Office and administrative support occupations (post-2002) and administrative support occupations, including clerical (pre-2002); (6) Computer and mathematical; architecture and engineering; life, physical, and social science; community and social services; legal occupations; education, training, and library; arts, design, entertainment, sports, and media; healthcare practitioners and technical occupations (post-2002);

Table 5 Hourly Wage, Demographic and Socioeconomic Characteristics with Occupation-Employment Type Interactions, 1994–2014

Variable	Coefficient	Variable	Coefficient
Full time X Service	.1823325***	Black	-.0578995***
	(.000)		(.003)
Full time X	.398573***	American	-.046481***
Construction/transportation	(.000)	Indian/Alaskan Native	(.000)
Full time X Production and	.4920935***	Asian	-.01469***
repair	(.000)		(.000)
Full time X Sales and related	.2403244***	Other race	-.0098147***
	(.000)		(.000)
Full time X	.410917***	Female	-.1569275***
Office/administrative support	(.000)		(.000)
Full time X Professional	.6591924***	Dummy_1995	-.0092787***
specialty	(.000)		(.000)
Full time X	.5672558***	Dummy_1996	-.0123659***
Management/executive	(.000)		(.000)
Part time non-economic	.0716929***	Dummy_1997	-.0019273
(PTNER) X Service	(.000)		(.359)
PTNER X	.2472299***	Dummy_1998	.0279902***
Construction/transportation	(.000)		(.000)
PTNER X Production and	.4085932***	Dummy_1999	.0381384***
repair	(.000)		(.000)
PTNER X Sales and related	.1543721***	Dummy_2000	.0425298***
	(.000)		(.000)
PTNER X	.3011755***	Dummy_2001	.0545344***
Office/administrative support	(.000)		(.000)
PTNER X Professional	.5966031***	Dummy_2002	.0623247***
specialty	(.000)		(.000)
PTNER X	.5108225***	Dummy_2003	.0584042***
Management/executive	(.000)		(.000)
PTER X	.2226177***	Dummy_2004	.0470143***
Construction/transportation	(.000)		(.000)
PTER X Production and repair	.2740908***	Dummy_2005	.0318157***
	(.000)		(.000)
PTER X Sales and related	.060803***	Dummy_2006	.028199***
	(.000)		(.000)
PTER X Office/administrative	.1890605***	Dummy_2007	.0291946***
support	(.000)		(.000)
PTER X Professional	.4600883***	Dummy_2008	.0227143***
specialty	(.000)		(.000)
PTER X	.3030132***	Dummy_2009	.0469685***
Management/executive	(.000)		(.000)
High school	.1296502***	Dummy_2010	.0310504***
	(.000)		(.000)
Some college	.1751928***	Dummy_2011	.009801***
	(.000)		(.000)
College	.3063701***	Dummy_2012	-.0020417
	(.000)		(.371)
Graduate degree	.2079177***	Dummy_2013	-.0093253***
	(.000)		(.000)
Age	.0409877***	Dummy_2014	-.0135823***
	(.000)		(.000)
Age^2	-.0004068***	Constant	1.278611***
	(.000)		(.000)
Mean(log real wages)	2.630377		
N	1,483,262		
R^2	.4115		

Notes: See footnote 14.

and professional specialty and technicians and related support occupations (pre-2002);

a series of pairwise t-tests comparing the coefficient for the interaction term of full-time work (and similarly PTNER) to the coefficient for the interaction term of PTER with each of the seven occupational categories. In each of the seven occupational categories, we find that PTER workers receive lower wages than full-time or PTNER workers. For example, on average, PTER workers in service occupations are paid 18 percent less than full-time workers and 7 percent less than PTNER workers in service occupations.[15]

The regression results in Tables 4 and 5 also show that the year dummies are positive during the 2008–11 recession years and turn negative in the post-recession years, 2012–14, which points to a somewhat lagged response of wages during the 2007–09 recession.[16]

Working Part Time for Economic Reasons Over the Years

Figure 2 shows the population shares of full-time, PTNER, and PTER workers. As can be seen, there is a notable drop in the share of full-time workers and an increase in PTER workers during the 2007–09 recession. Figure 3 shows a close-up of the PTER series. The PTER population share was higher in the 2007–09 recession than in the 2001 recession. In 2009, the series reached 3.8 percent. In 2014, the PTER population share stands at 3.0 percent.[17]

Figure 4 examines PTER by reason: slack work, could only find part-time work, and "other," which includes a job starting/ending during the reference week (such that hours add up to less than 35) and seasonal work. The first two reasons account for the majority of the PTER workers. Notably, during the 2007–09 recession the share of workers who reported slack work/business conditions increased to a much higher level than during the previous recession. While the share of workers reporting "slack work" has declined substantially since 2009, the share of workers who are working part time because they could only

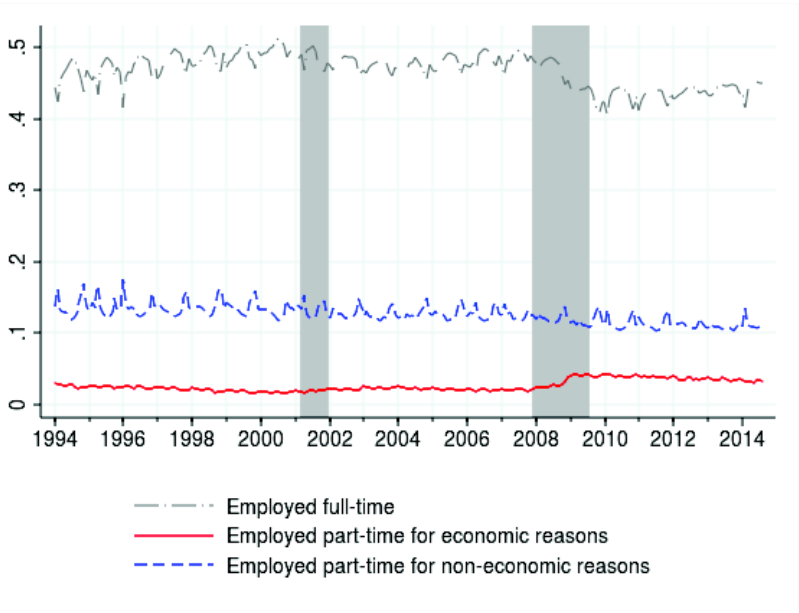
(7) Management; business and financial operations occupations (post-2002); and executive, administrative, and managerial occupations (pre-2002). Occupation 1 is non-routine manual; occupations 2–3 are routine manual; occupations 4–5 are routine cognitive; and occupations 6–7 are non-routine cognitive.

[15] However, more analysis is needed to examine how much of the wage difference can be attributed to worker fixed effect. Such analysis is beyond the scope of the article.

[16] See Elsby, Shin, and Solon (2014) for a detailed exploration of wage adjustment in the 2007–09 recession.

[17] This figure is calculated using January 1994–August 2014 data.

Figure 2 Full- and Part-Time Work, Population Shares, Monthly, NSA (Jan 1994–Aug 2014)



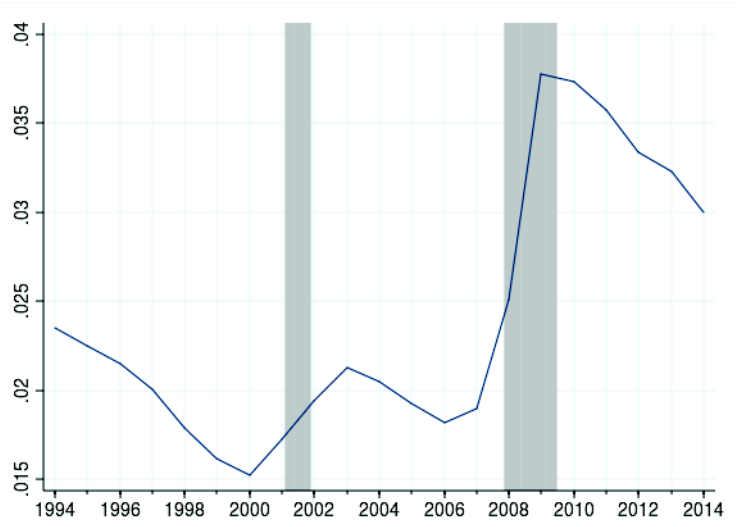
Notes: The figure shows the shares of the civilian noninstitutional working-age population. Workers who were absent from work in the reference week but usually work part time are excluded (see footnote 3 in the text for details). Authors' calculations using the CPS microdata.

find part-time work has remained elevated since 2009. A similar cyclical pattern is observed during previous downturns.[18]

Figure 5 shows the ratio of PTER workers to the number of unemployed workers in the economy. Interestingly, the ratio was about 10 percentage points higher at the trough of the 2007–09 recession than at the trough of the 2001 recession. The ratio appears procyclical, indicating that during recessions PTER grows at a slower rate than unemployment. The most recent growth started in 2010, increasing from 0.60 in 2010 to 0.74 in 2014.

[18] However, due to the changes to the CPS described in section 1, most of these observed downturns are not strictly comparable.

Figure 3 Employed Part Time for Economic Reasons, Population Share



Notes: The figure shows the number of PTER workers as the share of the civilian noninstitutionalized working-age population, the annual averages of the monthly NSA series, 1994–2014. The series are from BLS/HAVER Analytics.

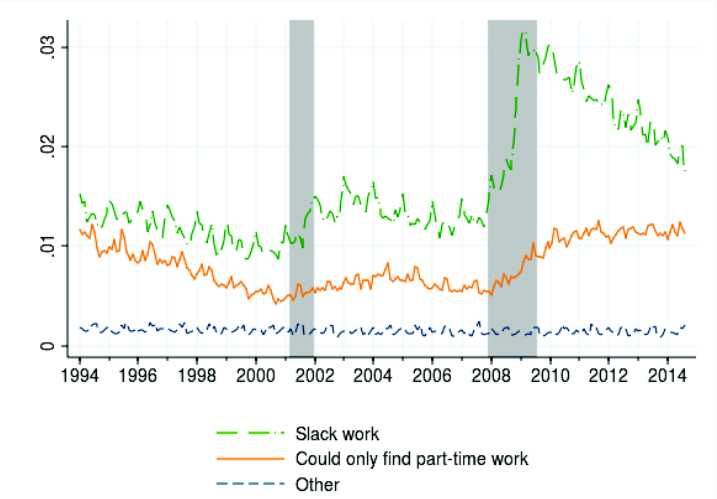
3. THE TRANSITION PROBABILITIES OF PTER FLOWS DURING 2007–09 AND EFFECTS ON EMPLOYMENT, UNEMPLOYMENT, AND OLF

In this section, we focus on the transition probabilities to and from the stock of PTER and other states of the labor market. We decompose changes in the stocks of the labor market aggregates—full- and part-time employment, unemployment, and out-of-the-labor-force (OLF)—into the changes in these transition probabilities during the 2007–09 recession. The counterfactual exercises show that these changes were not associated with the changes in the stocks of unemployment or OLF, but they were associated with the decrease of the stocks of full-time and PTNER employment.

Transition Probabilities to and from PTER

As mentioned above, each individual in the population can be classified into one of the following five labor force statuses: employed full time

Figure 4 Employed Part Time for Economic Reasons, by Reason, Monthly, NSA (Jan 1994–Aug 2014)



Notes: The figure shows PTER workers by reason as share of civilian noninstitutional working-age population, monthly NSA. The shaded areas show the NBER-dated recessions. "Other" includes job started/ended during the survey week, as well as seasonal work. Authors' calculations using the CPS microdata.

(FT), PTER, PTNER, unemployed (U), and OLF. The labor market is characterized by the flows of individuals among these statuses. The stocks and the transition probabilities among them are linked via the following equation

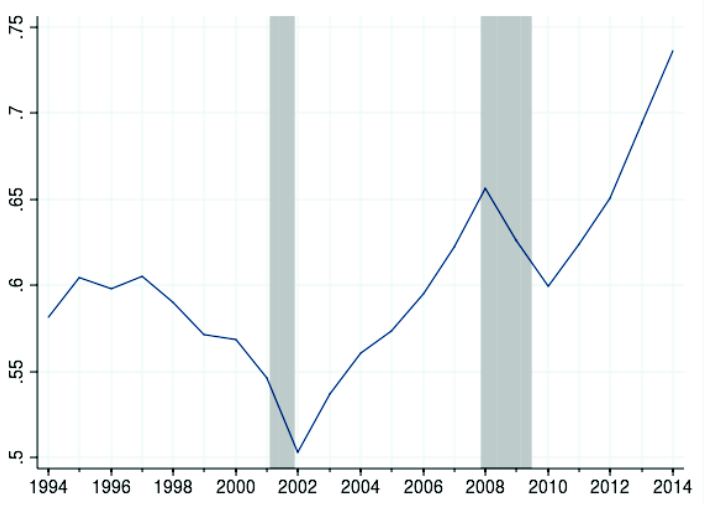
$$S(t) = P(t)S(t-1), \tag{1}$$

where $S(t)$ is the vector of stocks (expressed in population shares), and $P(t)$ is the matrix of discrete transition probabilities.[19]

The change in the stock of PTER can be decomposed into components representing changes in the probabilities of entering and exiting PTER as well as components representing changes in the transition probabilities between the remaining labor force statuses.

[19] In the analysis, we also include inflows and outflows into the population.

Figure 5 Ratio of Employed Part Time for Economic Reasons to Unemployed, Annual, (Jan 1994–Aug 2014)



Notes: The figure shows the ratio of workers employed part time for economic reasons to unemployed workers. All data points are the annual averages of the monthly NSA series. The shaded areas show the NBER-dated recessions. Authors' calculations using data from HAVER.

Likewise, changes in entry and exit to/from PTER are associated with the changes in the stocks of FT, PTNER, U, and OLF.

To construct the transition probabilities matrix we match individuals between consecutive months in the CPS following the matching procedure described in Shimer (2012). Because the unit of observation is the physical address, we use sex, age, and race in addition to the household identification number to produce matches. The transition probability from state i in month $t-1$ to state j in month t is the flow of individuals moving from state i to state j divided by the total number of individuals in state i in month $t-1$ (out of those that can be matched). We call this the "exit probability from" state i to state j, or the "entry probability to" state j from state i.

Table 6 shows the mean of annual average transition probabilities among the five labor market statuses during 1994–2014. A PTER worker has probability 0.31 of transitioning to full-time employment next month. This probability is 0.30 for a PTNER worker and 0.13 for an average unemployed worker. Thus, in their propensity to join

Table 6 Average Transition Probabilities, 1994–2014

	To PTER	To PTNER	To FT	To U	To OLF
From PTER	.3702	.2146	.3092	.0614	.0447
From PTNER	.0437	.5744	.2995	.0179	.0645
From FT	.0156	.0797	.8795	.0094	.0158
From U	.0482	.0705	.1263	.5185	.2364
From OLF	.0033	.0218	.0175	.0260	.9314

Notes: We take the mean of each yearly average, 1994–2014.

full-time work, PTER workers are closer to PTNER than to unemployed workers. The data reveal the substantial flows between PTER and PTNER. An unemployed worker and a PTNER worker have similar probabilities of transitioning into PTER, 0.048 and 0.044, respectively.

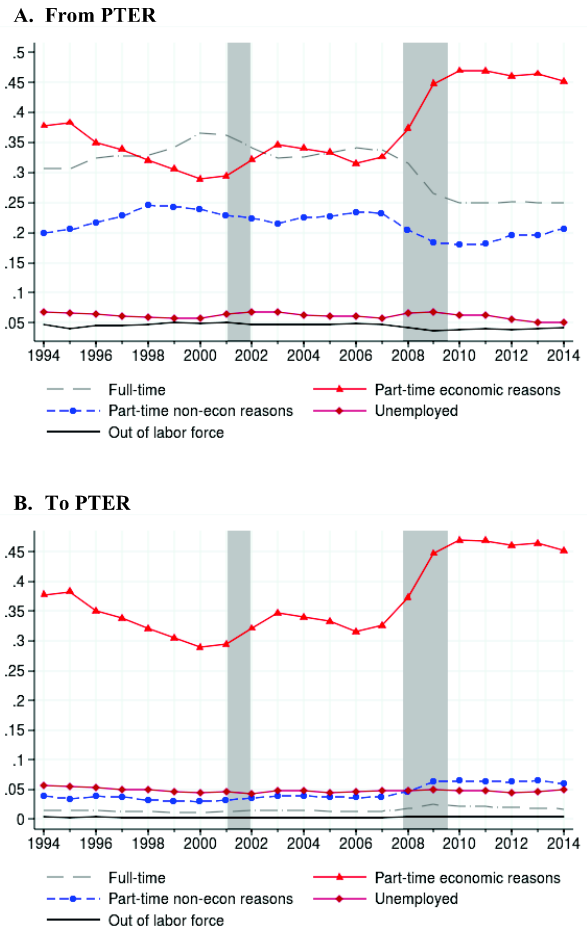
Panels A and B of Figure 6 show the transition probabilities from and to PTER, respectively, by labor force status. The observations from the figure can be summarized as follows. First, the transition probability from PTER to FT declined during 2007–09 and has remained low since then. Second, the transition probability from PTER to PTNER declined during 2007–09 and has only slightly increased since then. Third, the transition probability from FT to PTER increased during 2007–09 and has decreased since then. Fourth, the transition probability from PTNER to PTER increased during 2007–09 and has remained elevated since 2009.

Counterfactual Exercises with the Transition Probabilities to and from PTER

To separately examine the effects of exit and entry, we perform a series of counterfactual exercises using equation (1). The exercises are as follows:

1. fix all transition probabilities from PTER (to FT, to PTNER, to U, and to OLF);
2. fix transition probabilities from PTER to FT;
3. fix transition probabilities from PTER to PTNER;
4. fix transition probabilities from PTER to U;
5. fix transition probabilities from PTER to OLF;
6. fix all transition probabilities to PTER (from FT, from PTNER, from U, and from OLF);

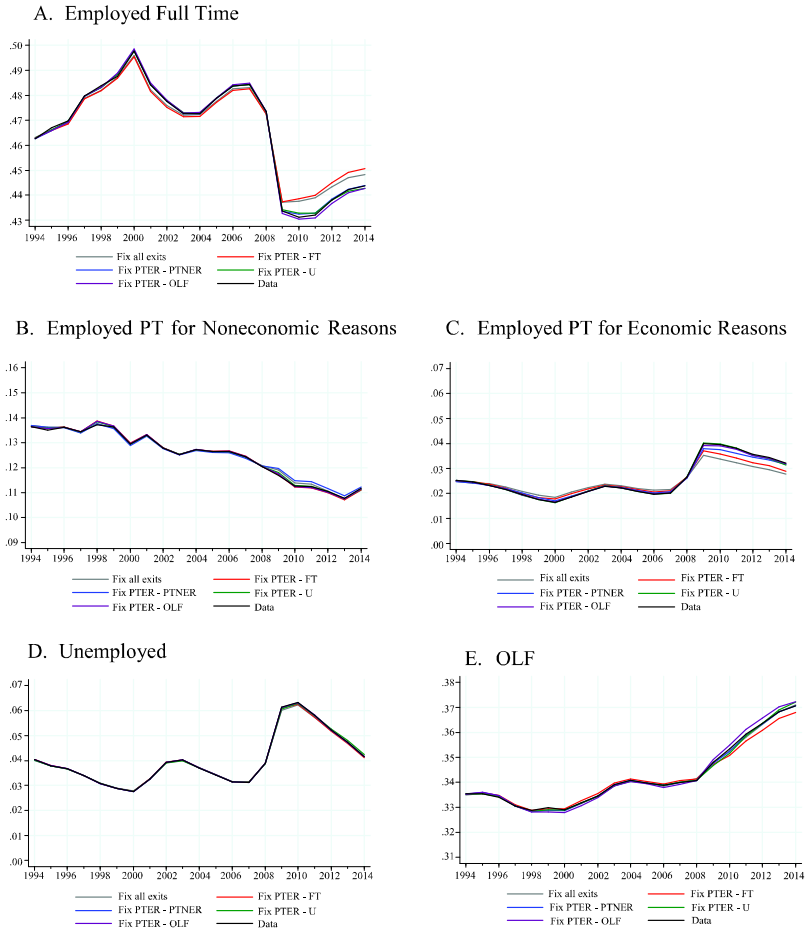
Figure 6 Transition Probabilities from Month t-1 to Month t



Notes: The figure shows annual averages of monthly series. Authors' calculations using the CPS microdata.

7. fix transition probability from FT to PTER;
8. fix transition probability from PTNER to PTER;
9. fix transition probability from U to PTER; and
10. fix transition probability from OLF to PTER.

Figure 7 Counterfactual Exercises with Exit Rates from PTER



Notes: The figure shows the stocks as shares of the civilian noninstitutionalized population (16+). The black solid lines (labeled "Data") show the actual series. The remaining five lines show the counterfactual series. The dashed gray line (labeled "Fix all exits") shows the counterfactual with the four exit rates fixed (except exit from PTER to PTER). In the counterfactuals, the exit rates are fixed at their respective 1994–2014 sample means.

To perform these exercises, we fix the respective probabilities at their 1994–2014 sample means and construct the monthly counterfactual time series of the fixed labor force status stocks using equation (1) recursively, setting $t_0 = 1994$.[20]

We start in 1994 because of the changes in the series after the 1994 CPS redesign (mainly PTNER and FT). In the exercises, the diagonal elements of the transition matrix (i.e., the probability of remaining in the same status) are adjusted accordingly so that the column elements add to 1. Figures 7 and 8 show the resulting counterfactuals using annual averages of monthly series.[21] Figure 7 shows the counterfactuals with fixed exit rates from PTER. All stocks are expressed as shares of the population. The effect of the counterfactual transition probabilities of exiting PTER on the aggregate stocks is as follows:

1. PTER (Figure 7, Panel C): If all exits from PTER are fixed at their sample means, the counterfactual share of PTER in 2014 is 0.43 pp lower than the actual share. PTER is primarily affected by exits from PTER to FT and from PTER to PTNER.

2. FT (Figure 7, Panel A): If the exit from PTER to FT is fixed at its 1994–2014 sample mean, the population share of FT in 2014 increases by 0.69 pp (as compared to its 44.4 pp level in 2014). Other exits from PTER do not have a substantial impact on the share of FT workers.

3. PTNER, U, and OLF (Figure 7, Panels B, D, and E): The relative magnitudes of the effect of the fixed exits on PTNER, U, and OLF are much smaller than the effect of the counterfactual exits on the share of FT workers.

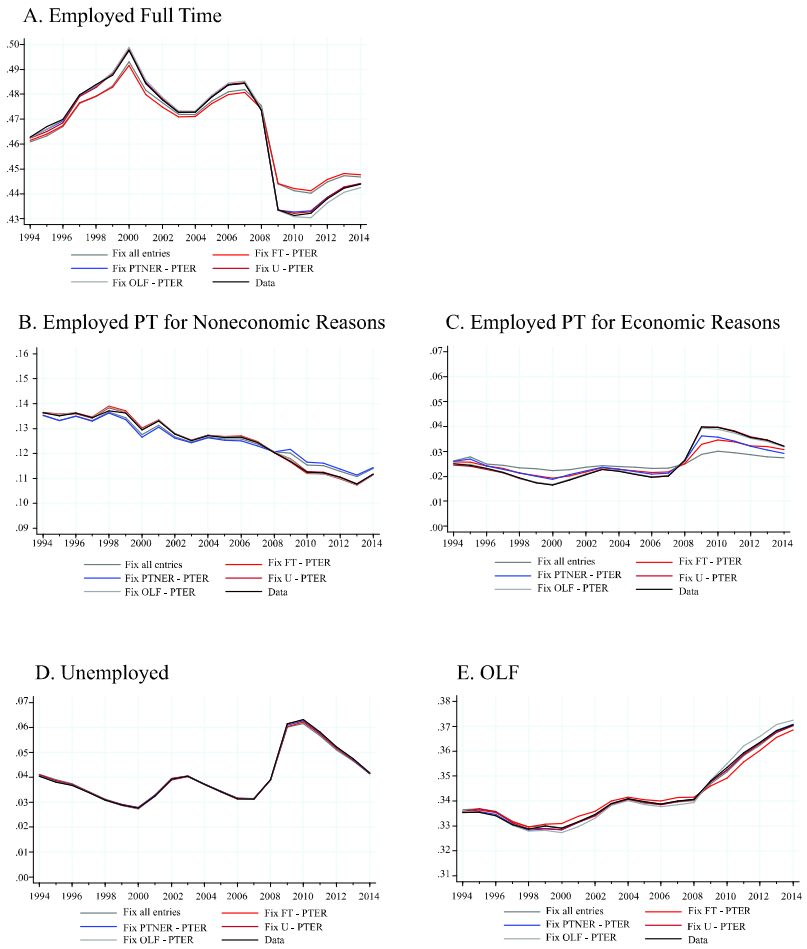
Figure 8 shows the counterfactuals with fixed transition probabilities to PTER. The effect of the counterfactual transition probabilities of entering PTER on the aggregate stocks is as follows:

---

[20] Due to the rotating panel structure of the CPS, at most 75 percent of the observations may be matched to the following month when we exclude individuals in months four and eight in the survey, and thus the labor force stocks tabulation from unmatched monthly CPS data may differ from the labor force stocks tabulation from the matched month-to-month files (see, for example, Frazis et al. [2005]). We therefore employ a procedure that ensures that in every period the recursion delivers the distribution of the labor force stocks consistent with the one observed in the unmatched CPS monthly files.

[21] Additionally, we impute missing data in unmatchable months, i.e., we take the average of each stock and probability of the adjacent months for June–September 1995 and May 2004. We employ the same procedure for September 1998 and September 2009 for FT and PTNER to remove the effect of full-time workers being classified as part time for noneconomic reasons due to Labor Day—this is the only national holiday occurring in any reference week after 1994 and would constitute a significant spike in the series if not adjusted.

Figure 8 Counterfactual Exercises with Entry Rates to PTER



Notes: The figure shows the stocks as shares of the civilian noninstitutionalized population (16+). The black solid lines (labeled "Data") show the actual series. The remaining five lines show the counterfactual series. The dashed gray line (labeled "Fix all entries") shows the counterfactual with the four entry rates fixed (except entry from PTER to PTER). In the counterfactuals, the entry rates are fixed at their respective 1994–2014 sample means.

1. PTER (Figure 8, Panel C): We observe that if all transition probabilities to PTER are fixed at their sample means, PTER in 2014 is 0.47 pp lower than the actual population share observed.

As with the case of fixed exit rates, PTER is primarily affected by transition probabilities from FT and from PTNER.

2. FT (Figure 8, Panel A): If the transition probability from FT to PTER remains at its 1994–2014 sample mean, the population share of FT in 2014 increases by 0.39 pp (as compared to its 44.4 pp level in 2014). Other entries to PTER do not have a substantial impact on the share of FT workers.

3. PTNER (Figure 8, Panel B): If the transition probability from PTNER to PTER remains at its 1994–2014 sample mean, the population share of PTNER in 2014 is 0.27 pp higher than the actual share observed. Other entries to PTER do not have a substantial impact on the share of PTNER workers.

4. U and OLF (Figure 8, Panels D, and E): The fixed transition probabilities into PTER have essentially no effect on U or OLF.

As can be seen from Figures 7 and 8, the transition probabilities to PTER contribute substantially to the cyclical behavior of the share of PTER workers, while the exit rates do not drive much of the cyclical fluctuations.

4. CONCLUSIONS

The elevated number of PTER workers in the aftermath of the 2007–09 recession has raised a concern of whether the extent of resource underutilization in the labor market is greater than that captured by the standard unemployment rate.

In this article, we find that the changes in the transition probabilities to and from PTER in the aftermath of the 2007–09 recession have been mainly associated with the composition of employment (full versus part time, and part time for economic versus for noneconomic reasons) instead of with the distribution of individuals between employment and non-employment.

We also find that, in general, part-time workers represent a significantly higher fraction of low-skill and medium-skill occupations than of high-skill occupations. Among the highest skill occupations, classified as non-routine cognitive, the share of PTER workers is only 0.03 while the share of PTNER workers is 0.16. The share of PTER workers is highest among non-routine manual occupations, which are typically low-skill occupations. The educational achievement of PTER workers is typically lower than of those working full time or part time for noneconomic reasons. PTER workers typically earn less per hour than full-time or PTNER workers, even after controlling for age, education,

and broadly defined occupational groups. Given the recent work on job polarization (Autor 2010), it thus becomes a challenging exercise to disentangle the effect of cyclical versus structural factors on driving up the number of PTER following the deep recession of 2007–09.

REFERENCES

Abel, Jaison R., Richard Deitz, and Yaqin Su. 2014. "Are Recent College Graduates Finding Good Jobs?" Federal Reserve Bank of New York *Current Issues in Economics and Finance* 20 (1): 1–8.

Acemoglu, Daron, and David Autor. 2011. "Skills, Tasks and Technologies: Implications for Employment and Earnings." In *Handbook of Labor Economics*, Volume 4B, edited by David Card and Orley Ashenfelter. Elsevier: 1,043–171.

Autor, David. 2010. "The Polarization of Job Opportunities in the U.S. Labor Market: Implications for Employment and Earnings." Center for American Progress and The Hamilton Project (April).

Autor, David, Frank Levy, and Richard J. Murnane. 2003. "The Skill Content of Recent Technological Change: An Empirical Exploration." *Quarterly Journal of Economics* 118 (November): 1,279–333.

Cajner, Tomaz, Dennis Mawhirter, Christopher Nekarda, and David Ratner. 2014. "Why is Involuntary Part-Time Work Elevated?" FEDS Notes, April 14. Available at www.federalreserve.gov/econresdata/notes/feds-notes/2014/why-is-involuntary-part-time-work-elevated-20140414.html.

Elsby, Michael W. L., Donggyun Shin, and Gary Solon. 2014. "Wage Adjustment in the Great Recession and Other Downturns: Evidence from the United States and Great Britain." Mimeo, University of Edinburg. Available at https://sites.google.com/site/mikeelsby/papers.

Frazis, Harley J., Edwin L. Robison, Thomas D. Evans, and Martha A. Duff. 2005. "Estimating Gross Flows Consistent with Stocks in the CPS." *Monthly Labor Review* 128 (September): 3–9.

Hornstein, Andreas, Marianna Kudlyak, and Fabian Lange. 2014. "Measuring Resource Utilization in the Labor Market." Federal Reserve Bank of Richmond *Economic Quarterly* 100 (First Quarter): 1–21.

Jaimovich, Nir, and Henry E. Siu. 2012. "The Trend is the Cycle: Job Polarization and Jobless Recoveries." Cambridge, Mass.: National Bureau of Economic Research Working Paper No. 18334.

Kearns, Jeff, and Jeanna Smialek. 2014. "Part-Time Workers a Full-Time Headache on Yellen Radar: Economy." Bloomberg, August 18. Available at www.bloomberg.com/news/2014-08-18/yellen-dashboard-warning-light-glows-as-millions-work-part-time.html.

Polivka, Anne E., and Jennifer M. Rothgeb. 1993. "Overhauling the Current Population Survey: Redesigning the CPS Questionnaire." *Monthly Labor Review* 116 (September): 10–28.

Shimer, Robert. 2012. "Reassessing the Ins and Outs of Unemployment." *Review of Economic Dynamics* 15 (April): 127–48.

Valetta, Rob, and Leila Bengali. 2013. "What's Behind the Increase in Part-Time Work?" Federal Reserve Bank of San Francisco *Economic Letter* 2013-24, August 26.

Yellen, Janet. 2014. "Labor Market Dynamics and Monetary Policy." Remarks at the Federal Reserve Bank of Kansas City Economic Symposium, Jackson Hole, Wyo., August 22.

Economic Quarterly—Volume 100, Number 2—Second Quarter 2014—Pages 113–157

Large U.S. Bank Holding Companies During the 2007–09 Financial Crisis: An Overview of the Data

Peter S. Debbaut and Huberto M. Ennis

Large banking organizations were at the center of the recent financial crisis in the United States. For example, Wachovia Corporation, the fourth largest banking institution in the country at the time, experienced significant stress and its acquisition, by Wells Fargo, was announced in the first days of October 2008. JPMorgan Chase, also a top-five institution, acquired in late September 2008 the branch network of the largest thrift in the country, Washington Mutual, after that institution was declared unsound and then seized by the Federal Deposit Insurance Corporation (FDIC). As a response to the financial market turmoil that followed the collapse of Lehman Brothers, the Emergency Economic Stabilization Act of 2008 was signed into law on October 3, 2008. The Act established the Troubled Asset Relief Program (TARP), authorizing the U.S. Treasury Department to spend as much as $700 billion to prop up financial institutions in distress. Large banking organizations were the primary recipients of the transfers distributed through TARP programs. To gain some perspective on these and other events impacting large banking institutions during the crisis, we provide an overview of the evolution of the consolidated balance sheet and income statement of large U.S. bank holding companies between the beginning of 2005 and the end of 2011.

We would like to thank Marios Karabarbounis, Hoossam Malek, Roisin McCord, Ned Prescott, and John Walter for comments on a previous draft and the participants at the Banking Research Lunch for discussions during the early stages of this project. The views expressed in this article are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Commercial banks in the United States are usually just one part of a larger legal and economic entity, a bank holding company (BHC). While pure banking activities constitute a significant portion of what BHCs do (Avraham, Selvaggi, and Vickery 2012), most of these financial companies are relatively large and complex institutions with numerous subsidiaries that undertake a wide variety of financial and banking activities. When trying to understand the way banking is being conducted and its evolution over time, focusing on just the commercial bank subsidiaries of BHCs is bound to give a distorted view. While surely there is significant operational decentralization in these large companies, for those issues that have the most economic and financial impact the ultimate decision unit is effectively the BHC. In line with this logic, we will concentrate attention on data at the consolidated BHC level.

Our intention in this article is to provide a general overview of the main fluctuations and trends in the data characterizing the activities and performance of large U.S. BHCs in the recent past. We focus on companies with more than $10 billion in assets and use different ways (such as computing weighted means and splitting the sample using $50 billion in assets as a threshold) to try to gauge the extent to which company size is a factor in explaining the different experiences of companies during the turbulent seven years covered by our sample period. The role of large BHCs and how to regulate them has been the subject of active debate since the onset of the crisis. We think that the overview we provide here is useful to put in perspective the different explanations and proposals that have been offered—and are being offered—about the multiple issues surrounding these important players in the U.S. financial sector.

The analysis of data carried out in this article could be considered a first step in the process of answering a number of important questions about the recent behavior of large BHCs in the United States. Examples of these questions are: Have the largest BHCs become even larger as a result of the crisis? Did the composition of their portfolios of loans and securities change during the crisis? How about the composition of their liabilities? Do they rely less on repos and other borrowed money after the crisis, for example? We also analyze the capital position of BHCs to gauge the extent by which, on average, these large BHCs exited the crisis with more and better-quality capital. Furthermore, we provide an overview of the impact of the crisis on quarterly earnings for these companies and we assess whether their off-balance-sheet activities have changed in response to the dismal performance of those activities during the crisis.

The article is organized as follows. In the next section we discuss the data we use as well as some preliminary statistics. In Section 2 we present information about the evolution of balance sheet and off-balance-sheet activities. In Section 3 we study the income statements, and in Section 4 we conclude.

1. THE DATA

Our data come from SNL Financial, which collects and organizes the information coming from FR Y-9C reports filed by bank holding companies on a quarterly basis.[1] The FR Y-9C report contains "... basic financial data from a domestic bank holding company (BHC)... on a consolidated basis in the form of a balance sheet, an income statement, and detailed supporting schedules, including a schedule of off balance-sheet items."[2] Corporations that file form FR Y-9C as a BHC do so in accordance with the definitions provided in the Bank Holding Company Act of 1956 and its subsequent amendments and modifications.[3]

We focus on BHCs with more than $10 billion in assets, and we call this group "large BHCs." These institutions have received a great deal of attention during and after the financial crisis—for example, the Dodd-Frank Act establishes that all BHCs with more than $10 billion in assets are subject to annual stress tests. Also, since the banking industry in the United States is highly concentrated, changes in the activities of these companies are bound to have a significant impact on the financial system and the real economy. We use quarterly data from the beginning of 2005 to the end of 2011, in order to include the financial crisis and a period before and after.

To be in our data set for a given quarter, the BHC must have assets greater than $10 billion at the end of that quarter. Since many companies classified as BHCs are subsidiaries of another BHC, we keep only the ultimate parent institution to avoid double counting. We also restrict attention to domestic institutions and do not analyze BHCs that are part of a foreign corporation. While foreign banks are an

[1] There is a large amount of data on BHCs that is periodically collected for regulatory purposes. Form FR Y-9C is part of this data. An excellent source for understanding how the publicly available information fits together is Avraham, Selvaggi, and Vickery (2012).

[2] More detailed information about the reports is available at the Federal Reserve Board of Governors website at www.federalreserve.gov/apps/reportforms/.

[3] The Bank Holding Company Act defines a BHC as any company with control over any bank or over any company that is or becomes a BHC by virtue of the Act. In turn, a company has control over a bank or another company if it directly or indirectly owns, controls, or holds 25 percent of the voting rights on the other company. What constitutes control is also explicitly defined in the Act, which also addresses other various issues pertinent to this definition.

important segment of the U.S. financial system and played a significant role during the crisis (see Cetorelli and Goldberg [2012], for example), we limit our study this way so that we can study the behavior of entire corporations using only FR Y-9C data.

We are interested in describing the average behavior of the banking companies in our sample. In most cases, however, we also investigate if there are systematic differences between the average behavior of the largest companies and the rest. We use two alternative methods to conduct this comparison.

In some instances we divide the sample into two subsamples, those BHCs with $10 billion–$50 billion in assets, which we call "large-medium" size companies, and those with more than $50 billion in assets, which we call "large-large" BHCs. We then plot averages within each subsample. The subsamples are constructed on a quarter by quarter basis in the same way that we construct the sample of all large BHCs. We use the $50 billion threshold because it is commonly used (for example, in the Dodd-Frank Act) to identify companies that are most likely to pose a systemic risk to the economy. In principle, it would be interesting to study the behavior of the largest companies (say those with more than $500 billion in assets) separately. These companies are crucial to understand many issues concerning the U.S. banking system and often behave in a distinctive way relative to smaller ones. We hint at some of these differences in parts of this article but we leave a more detailed analysis of the behavior of these companies to future research.

Alternatively, in many cases, we use a more compact way of capturing systematic differences across companies of different size by comparing the standard mean with the weighted mean. By construction, the weighted mean is more representative of the behavior of the largest companies in the sample. To see this, denote by X_i a generic variable reported by the BHCs (say, for example, a balance sheet component like loans), let A_i be the total assets of BHC i in a particular quarter, and by N the number of BHCs in the sample (or subsample) under consideration. The two measures for the average (calculated quarterly) are the standard mean

$$\bar{X} = \frac{1}{N}\sum_{i=1}^{N}\frac{X_i}{A_i} = \sum_{i=1}^{N}\frac{1}{N}\frac{X_i}{A_i},$$

and the weighted mean

$$\hat{X} = \frac{\sum_{i=1}^{N} X_i}{\sum_{i=1}^{N} A_i} = \sum_{i=1}^{N} w_i \frac{X_i}{A_i},$$

where $w_i = A_i/A$ and A is the sum of the total assets of all the companies in our sample (or subsample) for the relevant quarter. It is clear from these formulas, then, that the weighted mean puts more emphasis on the behavior of larger institutions and, hence, by comparing the two measures we can get a sense of whether the largest institutions behave differently than the rest of the institutions in our sample.

Interestingly, note that the weighted mean is also the expression for the balance sheet component as a proportion of assets for the aggregated data (for the large BHCs as a group). In this way, if we want to think about the banks in the system as an aggregate (a common approach when using simple models of the macroeconomy) then the weighted mean is the variable of interest. This is another reason for including the weighted mean in some of our figures.

In some cases we express a particular variable of interest as a proportion of a more comprehensive variable, not necessarily total assets. For example, we may be interested in the proportion of loans that are real estate loans. As with the previous case, to investigate systematic differences across company size we may split the sample into large-large and large-medium companies or we may compute a weighted mean and compare it with the standard mean. To calculate the weighted mean we use the same asset-based weights that we use to compute $\hat{X}$. Hence, the expression for the weighted mean in this case is

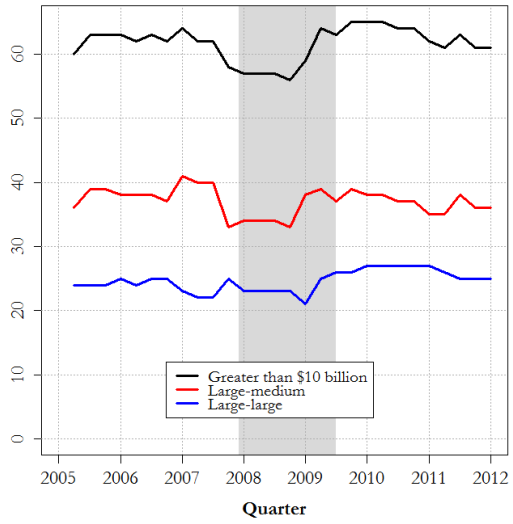
$$\tilde{X}_j = \sum_{i=1}^{N} w_i \frac{X_{ji}}{X_i},$$

where $X_i = \sum_{j=1}^{J} X_{ji}$ and $w_i = A_i/A$ as before. As an example, X_i could be total loans in company i and X_{ji} could be real estate loans in company i, where the subindex j would be the one corresponding to real estate loans, a component of total loans.

With respect to the size of our sample, Figure 1 shows the time series for the number of BHCs included in the sample; that is, all U.S. domestic ultimate parent BHCs with more than $10 billion in assets. Interestingly, while the number of institutions falls during the height of the crisis, it returns to the pre-crisis level and appears fairly constant during more normal times. This is also the case when we look at the subsamples, although perhaps in this case there is a slight shift toward a higher number of large-large BHCs after the crisis.[4]

[4] There is a large drop in the number of large-medium size BHCs during the third quarter of 2007. A total of seven BHCs exited this subsample in that quarter. Three of the BHCs became large-large (due to secular growth in assets that pushed them over the $50 billion threshold in the third quarter of 2007). One of the other four BHCs lost

Figure 1 Number of BHCs with more than $10 Billion in Assets



Notes: The black and blue lines represent the number of BHCs in our sample with more than $10 billion in assets and more than $50 billion in assets, respectively. The red line is the difference between these two numbers. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the National Bureau of Economic Research (NBER), from December 2007 to June 2009.

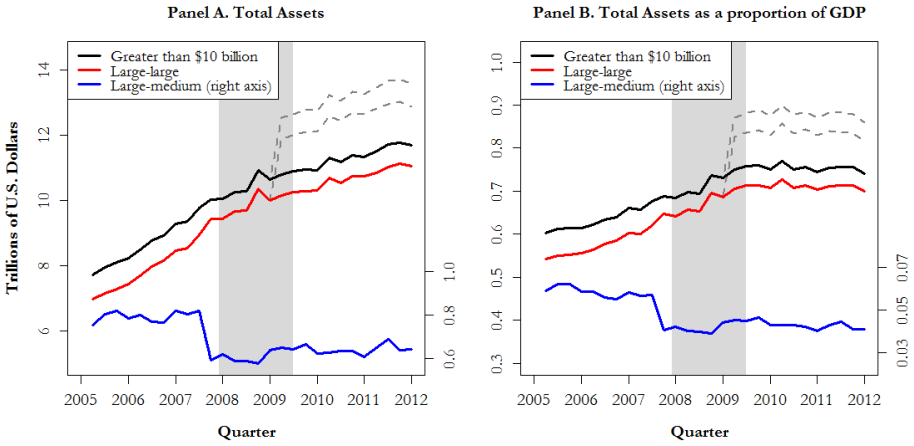
There is a significant increase in the number of institutions in our sample during the last quarter of 2008 and the first quarter of 2009. In the fourth quarter of 2008, five institutions that previously held less than $10 billion in assets crossed the $10 billion threshold.[5]

Four large companies that previously were not filing FR Y-9C reports began to do so in the first quarter of 2009. These companies are Goldman Sachs, Morgan Stanley, American Express, and CIT Group. All four converted to the BHC organizational form during the worst

assets and exited the sample while the remaining three were acquired by other BHCs, subsequently ending their reporting.

[5] There appears to be no clear common pattern explaining why these five institutions (Arvest Bank Group, Doral GP Ltd., PrivateBancorp, UMB Financial, and Wintrust Financial) increased their total assets during this period. In particular, it does not seem to be the case that these companies were bringing off-balance-sheet activity into their books.

Figure 2 Total Assets



Notes: Panel A presents total assets in trillions of U.S. dollars. Panel B presents total assets as a proportion of nominal GDP. The black, red, and blue lines represent BHCs with more than $10 billion in assets, more than $50 billion in assets, and between $10 billion and $50 billion in assets, respectively. The black and red lines are measured by the left axis while the blue line is measured by the right axis. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

weeks of the crisis: The investment banks Goldman Sachs and Morgan Stanley became BHCs in the fourth week of September 2008; American Express, in mid-November 2008; and CIT Group, in mid-December 2008. These four companies enter our sample with more than $50 billion in assets. They are primarily involved in credit card or investment banking and tend to have very different characteristics compared with traditional BHCs. For this reason, in parts of the article we will conduct the analysis with and without these companies in the sample and compare the results.[6]

In Panel A of Figure 2 we plot the time series of total assets held by the institutions in our sample. The gray dashed lines show total assets including the four companies that began filing FR Y-9Cs in the

[6] Aside from these four companies, in most cases we also exclude Franklin Resources, Inc. from the sample for similar reasons. Franklin is predominantly involved in asset management on behalf of private, professional, and institutional investors and entered our sample in the second quarter of 2010, as its balance-sheet assets crossed the $10 billion threshold.

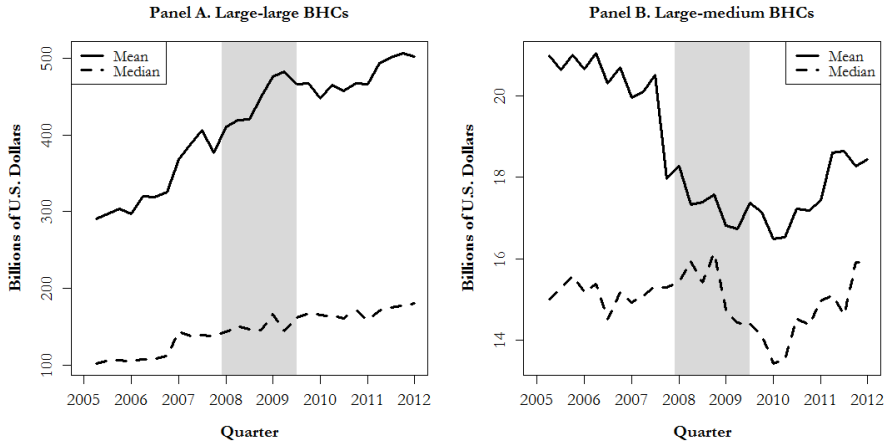
first quarter of 2009. The combined assets of BHCs with more than $10 billion in assets grew steadily during the period from 2005 until the end of 2011. However, when we disaggregate the data into the two subsamples, large-large and large-medium, we see that the bulk of the growth comes from the evolution of very large corporations.

From the second to the third quarter of 2008 there is a sharp increase in total assets that partially reverses itself in the following quarter. The banking sector experienced many changes during this period, corresponding to the deepening of the financial crisis. It is important to keep in mind that mergers between banks already in the sample would not be reflected in changes in the aggregate value of assets. However, some large transfers of assets did take place during this period between companies in the sample and outside the sample such as JPMorgan Chase's acquisition of Washington Mutual on September 25, 2008, for a value of $264 billion in targeted assets. State Street, Bank of New York Mellon, and JPMorgan Chase experienced noticeable increases in assets in the third quarter of 2008 that partially reverted back in the fourth quarter. The last two quarters of 2008 were also a period of significant stress in money markets, where these three banks play a critical role and, for this reason, it is not surprising to observe considerable volatility in the data originating with them (see also the discussion in Section 3). Finally, between the second and third quarters of 2008, there was a noticeable increase in bank lending that contributed to the increase in total bank assets observed at that time. We return to the data on lending in the next section.

To gain some perspective on the growth of total assets in large BHCs we divide total assets by nominal gross domestic product (seasonally adjusted annual rate) and plot it in Panel B of Figure 2. Relative to gross domestic product (GDP), large BHCs were becoming bigger before the crisis, but their growth appears to slow down after the crisis and stabilized at a level of roughly 75 percent of GDP. While the inclusion of the four new BHCs created toward the end of 2008 shifted the level to almost 90 percent of GDP (see gray dashed line in Panel B of Figure 2), this level also remains stable after the crisis.

We saw from Figure 1 that the number of large institutions was roughly constant over the period under consideration, as was the split between the large-large and the large-medium subsamples. Figure 2 showed an increase of total assets for large-large institutions, which together with Figure 1 suggests an increase in asset concentration at the top of the size distribution of firms. Figure 3 plots the mean and median size (measured by assets) for the BHCs in each subsample. We see that the mean size for large-large BHCs increased over the entire period, with perhaps some acceleration during the height of the crisis

Figure 3 Mean and Median Total Assets



Notes: Panel A presents the mean and median total assets of BHCs with over $50 billion in assets (large-large companies). Panel B presents the mean and median total assets of BHCs with $10 billion to $50 billion in assets (large-medium companies). Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

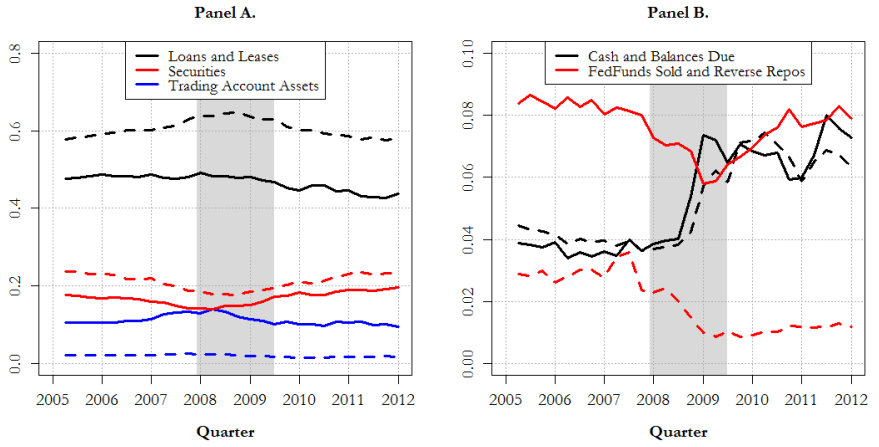
in 2008–09. The median size of these companies also increased but at a slower pace. Notice, however, that the median size of the large-medium subsample remained relatively constant over the entire period.[7]

2. BALANCE SHEET

In this section we examine the balance sheet of BHCs in our sample. For each institution, we express the main components of its balance sheet as a proportion of total assets for that institution. Size heterogeneity is very significant even among the subsample of large BHCs that we consider in this article. For this reason, normalizing values by total assets is an essential step in the process of producing meaningful comparisons across institutions or groups of institutions.

[7] The drop in the mean total assets for large-medium BHCs during the second half of 2007 (see Panel B of Figure 3) is a reflection of the transition of three relatively large BHCs from that group to the large-large group. Removing three of the largest companies in the group naturally reduces the mean. However, it is worth noticing that the change did not affect the median size (dashed line) in a significant way.

Figure 4 BHC Balance Sheets: Asset Components as a Proportion of Total Assets



Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

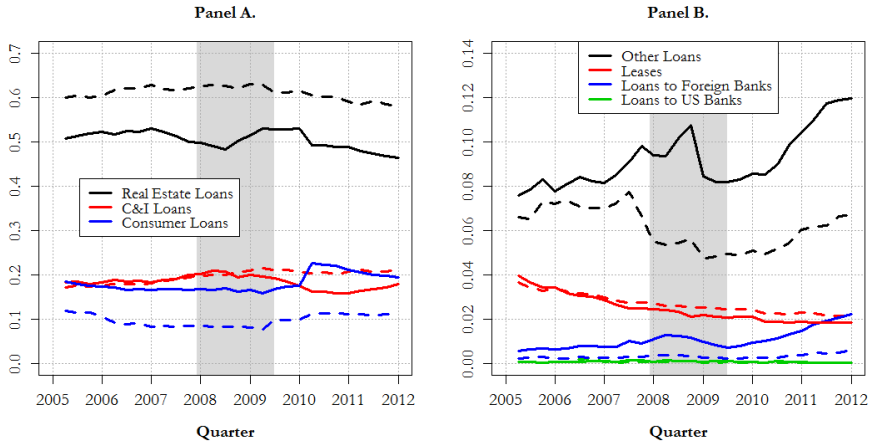
Assets

Figure 4 presents the components on the asset side of BHCs' balance sheets as a proportion of total assets. The solid lines are the weighted mean while the dashed lines are the standard mean. Loans and leases is the main component of assets, followed by securities and trading assets. Larger institutions tend to have fewer loans and fewer securities (as a proportion of assets) and more trading assets. Similarly, larger institutions appear to be relatively more active than the smaller ones on the supply side of the money market (that is, lending in the federal funds market and entering into reverse repurchase agreements).

Loans and Leases

Mean loans and leases as a proportion of total assets increased steadily between 2005 and the third quarter of 2008 (the dashed black line in Panel A of Figure 4). In fact, for many of these BHCs, loan growth actually accelerated in the third quarter of 2008 as the financial crisis deepened and firms drew down on their pre-committed lines of credit (Ivashina and Scharfstein 2010). This is barely noticeable in the figure in part because total bank assets also increase at that time (see Figure

Figure 5 Loan Categories as a Proportion of Total Loans



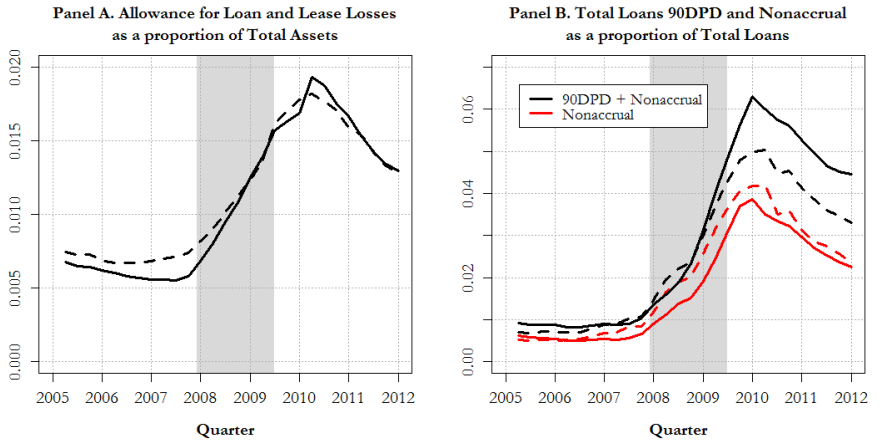
Notes: All quantities are expressed as a proportion of total loans. The black lines in Panel B plot loans to non-depository financial institutions and other loans as reported in the FR Y-9C. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

2). Starting in the fourth quarter of 2008, and until the end of our sample period, however, average loans and leases as a proportion of assets decreased persistently.[8] In contrast to the standard mean, the weighted mean remained fairly flat until the crisis, suggesting that larger BHCs in our sample tended to have a constant, or even decreasing, proportion of loans to assets before the financial crisis.

Loans secured by real estate are the largest category of loans (see Panel A of Figure 5). Over half of the loans in large BHCs are of this type. Commercial and industrial loans (C&I loans) and consumer loans are the other two main categories. While size does not seem to significantly influence the proportion of loans that are C&I loans, larger companies appear to have a higher proportion of consumer loans

[8] It is interesting to note that JPMorgan Chase's acquisition of Washington Mutual at the end of the third quarter of 2008 does not impact the weighted mean in any noticeable way even though Washington Mutual (with a 0.77 ratio of loans to assets in the second quarter of 2008) had a higher ratio of loans to assets than the average BHC in our sample.

Figure 6 Allowances and Loan Performance



Notes: The black line in Panel B plots the proportion of total loans that are 90 days past due plus nonaccruals. The dashed and solid lines in both panels represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

and a lower proportion of real estate loans. A noticeable trend in the evolution of these loan categories is the decline in the proportion of C&I loans following the financial crisis. The proportion only starts to recover toward the end of our sample period in 2011.

The jump in consumer loans in the first quarter of 2010 (see Panel A of Figure 5) is the consequence of changes in accounting rules that stipulate how banks must treat loans in securitization pools (El-Ghazaly and Gopalan 2010). Since securitization was more common among larger banks, the jump is more noticeable in the weighted mean (the solid blue line) than in the standard mean (the dashed blue line).

The other loan categories are all relatively small (see Panel B of Figure 5). Leases are less than 4 percent of the total of loan and lease financing receivables in large BHCs' balance sheets and they have been trending down during the entire sample period. Perhaps one interesting fact worth noticing from Panel B of Figure 5 is the increase in loans to foreign banks by the largest domestic BHCs after the crisis.

Subtracting from loans and leases on the asset side of banks' balance sheets is the value of total allowances for loan and lease losses that

BHCs make as they update their assessment of the quality of their portfolio of loans. Panel A of Figure 6 plots these total allowances for loan and lease losses as a proportion of total assets. We see that there is a surge in allowances during the crisis that aligns well with the deterioration in loan performance as seen in Panel B of Figure 6. It is interesting to see in the figure that the proportion of non-performing loans started to increase toward the end of 2007. This is approximately the same time that allowances started to increase. Also worth noting is that the behavior of allowances does not appear systematically different across companies of different size: The standard mean (dashed line) and the weighted mean (solid line) are very close and move together during the entire sample period.

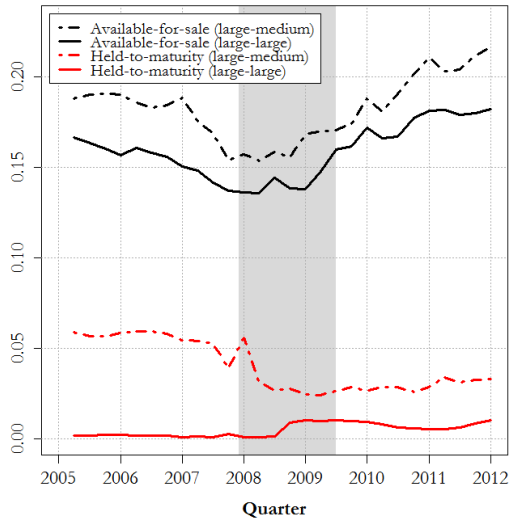
Securities

Large BHCs hold approximately 20 percent of their assets as securities, with larger companies holding, on average, fewer securities relative to assets (the solid red line in Panel A of Figure 4 is below the dashed red line). Securities are reported in two separate categories: held to maturity and available for sale. Held-to-maturity securities are those for which the institution has the intent and ability to hold until maturity. When an institution is holding securities without the explicit intent of trading them in the near term (that is, they are not considered trading assets) but, at the same time, the institution does not consider those securities part of the held-to-maturity category, then the securities are reported as available for sale. Following standard practice, we use amortized cost to value the portion of securities that is held to maturity and fair (market) value for available-for-sale securities. Figure 7 shows that most of the securities held by the institutions in our sample are categorized as available for sale. This is especially true for the large-large institutions that had almost no held-to-maturity securities before the crisis and only a very small amount after the crisis.

When looking at time trends of total securities as a proportion of total assets (Panel A of Figure 4), it is important to note that the total dollar value of securities (not plotted) remained mostly constant before 2008:Q2 (even increasing moderately before 2007). Thus, the observed gradual decline in the mean and weighted mean from 2005:Q1–2008:Q1 can be attributed entirely to the increase in total bank assets observed in Figure 2, rather than a decrease in the total value of securities held by these institutions. On the other hand, the secular increase in securities observed since mid-2008 stems from an increase in the dollar value of securities that more than compensates for the increase in total assets.

Overall, the proportion of total securities in large BHCs' balance sheets remained fairly stable during our sample period (see Panel A of

Figure 7 Composition of Securities as a Proportion of Total Assets

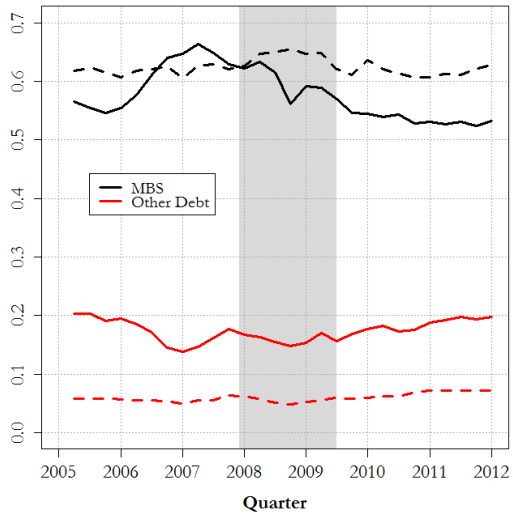


Notes: The solid lines refer to large-large BHCs (companies with over $50 billion in assets) and the dashed lines refer to large-medium BHCs (companies with $10 billion to $50 billion in assets). Both solid and dashed lines represent the weighted mean by asset size. For example, the dashed black line is the sum of all the available-for-sale securities held by large-medium BHCs divided by the total assets held by large-medium BHCs. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Figure 4). Figure 8 plots the main categories of securities, mortgage-backed and other debt securities, as a proportion of total securities. Comparing the standard means and the weighted means in Figure 8 suggests that in general the largest institutions hold fewer mortgage-backed securities on their balance sheets and more bonds and commercial paper issued by private corporations (which are the securities that account for most of what is labeled as "other debt securities"). However, the black solid line indicates that the largest companies in the sample actually increased their holdings of mortgage-backed securities in the period leading up to the crisis and then adjusted that proportion back down as the crisis progressed.

Interestingly, some of the smaller components of securities experienced more significant swings during our sample period. For example,

Figure 8 Components of Securities, as a Proportion of Total Securities (I)

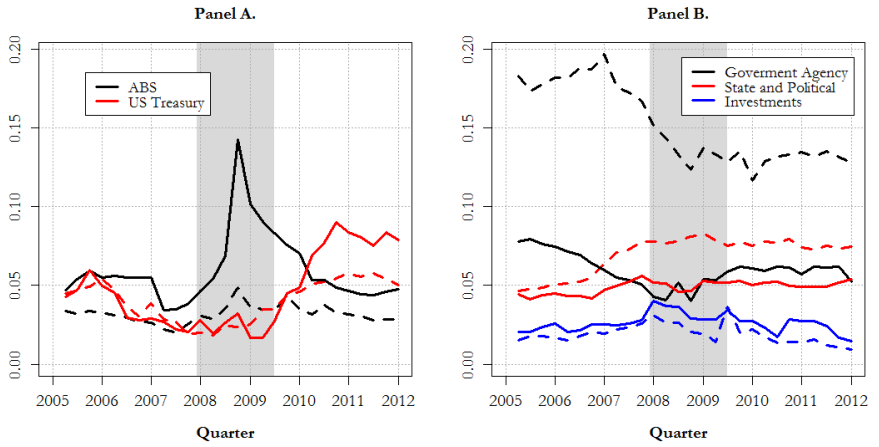


Notes: The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel A of Figure 9 shows that large BHCs, and in particular the largest ones, increased their holdings of U.S. Treasury securities after the crisis (red solid line). This increase is especially noteworthy since it coincides with a period when the Federal Reserve was purchasing large amounts of U.S. Treasury securities from the private sector to pursue its monetary policy objectives. In other words, both the Fed and large BHCs were increasing their holdings of U.S. Treasury securities simultaneously.

Panel B of Figure 9 shows that, on average, the largest companies tend to hold far fewer U.S. government agency obligations than the large-medium companies, and the holdings of these securities declined across the board leading up to the crisis. The decline is more abrupt for the large-medium institutions relative to the larger ones (as indicated by the steeper drop in the dashed black line relative to the solid black line).

Figure 9 Components of Securities, as a Proportion of Total Securities (II)



Notes: The black lines in Panel A correspond to asset-backed securities and structured financial products as reported in the FR Y-9C reports. The blue lines in Panel B correspond to investments in mutual funds and other equity securities with readily determinable fair values, also as reported in FR Y-9C reports, and the red lines are state and political subdivisions in the United States. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Finally, the spike in asset-backed securities in late 2008 deserves some explanation. Looking at the behavior of individual companies, it seems that the event is mostly driven by spikes (a move up with an immediate reversal) in asset-backed securities at JPMorgan Chase and State Street. These are large organizations whose behavior can drive the weighted mean. The standard mean, in comparison, shows no significant spike. More generally, it is interesting to note that despite the problems in the market for asset-backed securities during the crisis, by the end of our sample period the proportion of securities that banks held in this form is approximately the same as that at the beginning of the sample period (i.e., before the crisis).

Trading Assets

Larger BHCs tend to hold a higher proportion of their assets for trading purposes (see the solid and dashed blue lines in Panel A of Figure 4).[9] Indeed, only companies with more than $50 billion in total assets (large-large) had more than 10 percent of their assets as trading assets at some point in our sample period. As an example, in the fourth quarter of 2011 only three companies in our sample held more than 10 percent of their assets in trading accounts, and all three of them were in the extreme right tail of the size distribution with more than $1.5 trillion in total assets. These companies were Bank of America (11 percent), Citigroup (16 percent), and JPMorgan Chase (19 percent).

It is also the case that most companies with more than $50 billion in assets (large-large) held some trading assets in their balance sheets at any point in time: The percentage of large-large companies with no trading assets was never higher than 12.5 percent during our sample period. Large-medium companies are less involved in asset trading: The percentage of large-medium companies with zero trading assets in a given quarter was never below 29.7 percent. Furthermore, for firms that engage in active asset trading, the presence of these assets in the firms' balance sheet tends to be more significant for large-large firms than for large-medium firms. Among the firms with positive trading assets, for example, the mean (median) proportion of trading assets to total assets in a given quarter is at least 3.4 percent (1.1 percent) for large-large firms and at most 1.6 percent (1.1 percent) for large-medium firms. However, the difference is largely driven by the high degree of skewness in the proportion of trading assets held by large-large firms (the mean proportion tends to be much larger than the median for large-large BHCs). Finally, it is also the case that large-large companies are more likely than large-medium companies to have significant trading assets (greater than 2 percent of total assets) on a consistent basis (i.e., for every quarter). In particular, 29 percent of the large-large companies present during our entire sample period had at least 2 percent of their assets as trading assets in every quarter. For large-medium companies, only 11 percent had at least 2 percent of assets as trading assets throughout our sample period.

The time series behavior of trading assets appears in Panel A of Figure 4. A more detailed examination of the data reveals that Citigroup and JPMorgan Chase significantly reduced the proportion of trading

[9] Trading assets are securities that are held for the purpose of selling them in the near term as part of the company's trading activities, which include active and frequent buying and selling of securities for the purpose of generating profits on short-term fluctuations in price.

assets in their balance sheets during the crisis, going from more than 25 percent of assets to less than 20 percent. In fact, adjustments by these two companies of their holdings of trading assets are the main driver of the behavior of the aggregate data displayed in the figure.

Cash and Balances Due

Starting in October 2008, the Federal Reserve significantly increased the amount of excess reserves outstanding in the banking system. Since our measure of cash and balances due from other depository institutions, including a Federal Reserve Bank, "cash" for short, displayed in black in Panel B of Figure 4 includes bank reserves, it is not surprising that there is a large increase in the proportion of cash relative to total assets late in 2008.

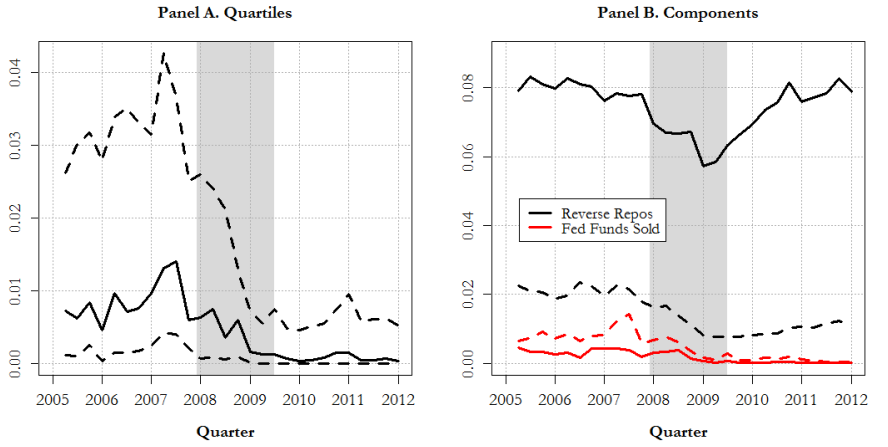
During the first half of 2011 the Fed further increased the level of aggregate reserves by a total of around $600 billion and, consistent with that, we see an increase in cash holdings for the firms in our sample. However, the dollar value of the increase in cash for these firms from the last quarter of 2010 to the second quarter of 2011 is equal to $259 billion, which is less than half of the total increase in reserves in the system over that period. This is not surprising given that we restrict attention to domestic institutions and it is well known that foreign-related institutions absorbed a significant proportion of the increase in reserves that occurred during 2011 (Ennis and Wolman 2015).

It is interesting to note that both the standard mean and the weighted mean of cash holdings as a proportion of assets are approximately at the same level and evolved similarly during our sample period. In other words, the proportion of cash holdings in total assets does not appear to be systematically influenced by the size of the institution, at least once the institution has reached a certain size (i.e., greater than $10 billion in assets, which is the cutoff for being in our sample). For a more detailed discussion of the evolution and distribution of reserves in the U.S. banking system during the period under consideration, see Ennis and Wolman (2015).

Federal Funds Sold and Reverse Repos

Events in both the federal funds market and the repo market played a significant role in the progression of the crisis. There are several articles in the literature documenting and studying the strained condition of these markets. For the federal funds market, two important examples are Taylor and Williams (2009) and Afonso, Kovner, and Schoar (2011) (see also the discussion in Ennis [2011]). Gorton and Metrick (2012) is the common reference in the case of the repo market. While the causes

Figure 10 Federal Funds Sold and Reverse Repos as a Proportion of Total Assets



Notes: Panel A presents the median (black solid line) and the 25th and 75th percentiles (black dashed lines) for the companies in our sample. In Panel B the dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

of stress in these markets are, to a large extent, a matter of controversy, it is evident that the level of activity of large BHCs in both the federal funds market and the repo market declined during the crisis and did not fully recover by the end of 2011 (see Panel B of Figure 4).

Two things are worth noticing about the behavior of the standard and weighted means for federal funds sold and reverse repos as a proportion of total assets displayed in Panel B of Figure 4. First, the fact that the weighted mean is significantly above the standard mean clearly indicates that the largest BHCs tend to be more active than the smaller BHCs on the lending side of the federal funds and repo markets (red lines in Figure 4). In fact, the more disaggregated data plotted in Panel B of Figure 10 shows that this is driven mostly by the repo activity of the largest BHCs. Second, the participation of this broad asset class in the balance sheets of large BHCs starts to decrease in mid-2007 and continues decreasing until the end of 2008.[10] In 2009,

[10] Another manifestation of this trend is the fact that the number of BHCs in our sample reporting no lending in these markets went from three in the second quarter of

once the worst part of the crisis had passed, large BHC participation in the federal funds and repo markets started to recover. However, it is clear from the disparity in behavior of the dashed and solid red lines in Panel B of Figure 4 that the recovery was mostly driven by the largest corporations. Again, Panel B of Figure 10 reveals that this recovery is concentrated in the repo activity of the largest BHCs in our sample. That federal funds activity does not recover is not surprising given the large amount of excess reserves in the system after 2008.

Panel A of Figure 10 shows quartiles of the distribution of federal funds sold plus reverse repos as a proportion of total assets across companies in our sample. We can see that, before the crisis, there was significant heterogeneity across large BHCs in terms of their intensity of participation in the supply side of the money market. After the second quarter of 2008, however, the dispersion drops considerably. It is clear from the figure that some of the companies that used to participate most in selling federal funds and entering reverse repurchase agreements noticeably reduced this participation during 2008 and, since then, the majority of these companies have remained concentrated around markedly lower levels of participation.

Intangible Assets

We did not plot intangible assets in Figure 4 because they are an insignificant portion of the balance sheet and moved very little over the sample period.[11] During the sample period, the mean value of this asset category stayed at around 3 percent of assets and the third quartile never went above 5 percent. Comparing standard and weighted means reveals that the largest companies tend to have higher intangible assets.

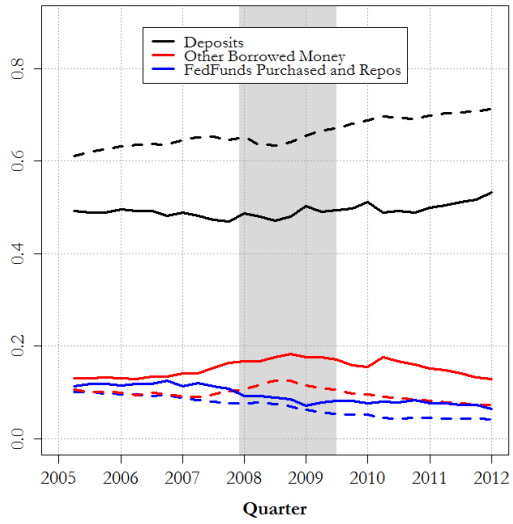
Liabilities

Figure 11 presents the liabilities of BHCs expressed as a proportion of total assets. Again, the solid lines are the weighted means and the dashed lines are the standard means. Deposits are the main category, with BHCs funding, on average, 50 percent of their assets with deposits. Comparing the standard and the weighted means shows that the largest companies tended to rely relatively less on deposits as a source of funding and more on other borrowed money. The proportion of other borrowed money started to trend down at the worst part

2007 to 18 in the first quarter of 2009. Similarly, 41 out of 52 BHCs in our sample decreased the amount of federal funds sold and reverse repos during that same period.

[11] Intangible assets include goodwill and other intangible assets that result from the acquisition of portions of another institution's business, such as the carrying value of mortgage servicing assets and purchased credit card relationships.

Figure 11 BHC Balance Sheets: Liabilities as a Proportion of Total Assets

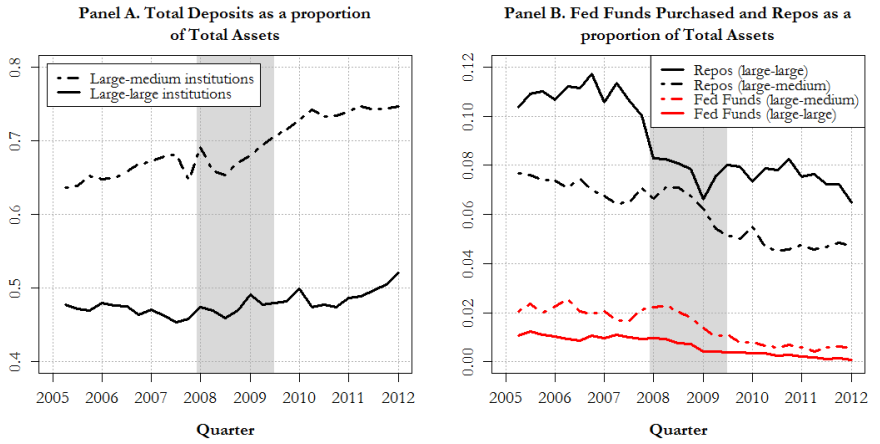


Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

of the crisis in the fourth quarter of 2008. Overnight repo and federal funds borrowings amounts to about 10 percent of assets and also shows a downward trend that started earlier, at the beginning of 2007, and lasted until the end of our sample period.

The standard mean of deposits over assets trended upward after the crisis. Panel A of Figure 12 shows that the tendency to increase the reliance on deposits after the crisis was most prevalent among large-medium companies in our sample. Similarly, Panel B of Figure 12 shows a steep decline in repo borrowings at the largest institutions during the early stages of the crisis, with these repo borrowings not recovering after the crisis. Large-medium companies were relatively active borrowers in the federal funds market but noticeably reduced their participation after the crisis. A high level of excess reserves in the banking system (see Panel B of Figure 4) tends to reduce banks' need for short-term (overnight) borrowing. This is likely to be one of the main explanations for the overall decrease in banks' participation

Figure 12 Liability Composition and Bank Size



Notes: The solid lines refer to large-large BHCs (companies with more than $50 billion in assets) and the dashed lines refer to large-medium BHCs (companies with $10 billion to $50 billion in assets). Both solid and dashed lines represent the weighted mean by asset size. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

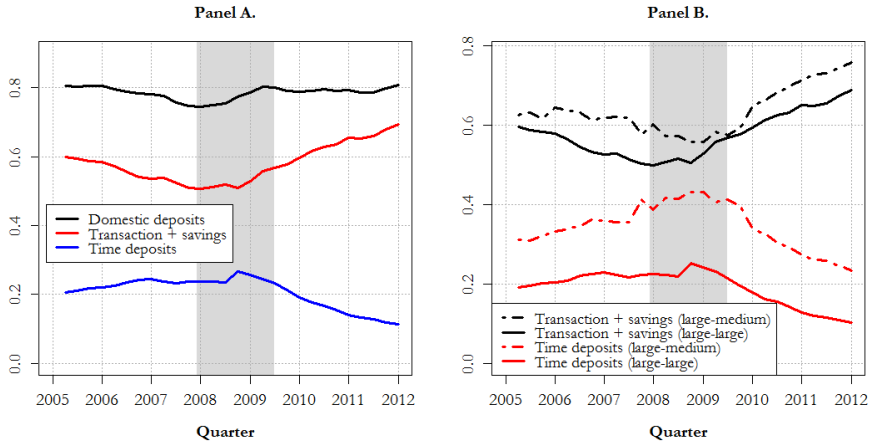
on the buying side of the interbank and repo markets reflected in the figure.

Deposits

To study changes in the composition of deposits during the crisis we create three subcategories that group deposits of similar characteristics. First, we aggregate domestic retail (less than $100,000) and jumbo (more than $100,000) certificate of deposits (CDs) into a category that we call "time deposits." Both retail and jumbo CDs behave similarly during the period of study and not much is lost from aggregating them.

The other main category of domestic deposits is an aggregate of demand, NOW, and savings accounts (including money market deposit accounts). We call this category transaction plus savings accounts. It is worth mentioning that in this period savings accounts are the main component of bank deposits with approximately 50 percent of the total. Finally, the third category consists of deposit accounts in foreign subsidiaries.

Figure 13 Deposits Composition and Bank Size

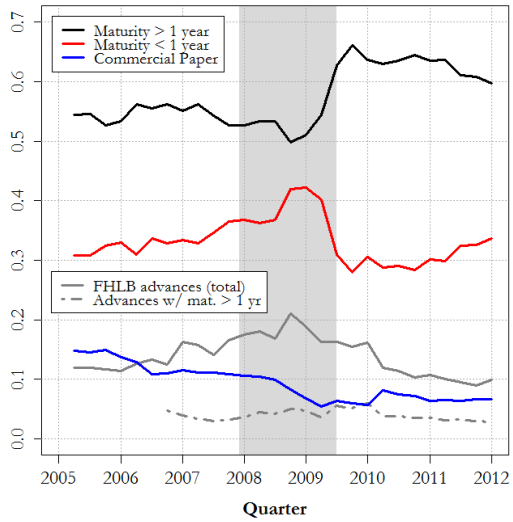


Notes: In Panel A, all quantities represent ratios of totals across all companies in the sample. For example, the black line is total domestic deposits divided by total deposits in our sample. In Panel B the solid lines refer to large-large BHCs (companies with more than $50 billion in assets) and the dashed lines to large-medium BHCs (companies with $10 billion to $50 billion in assets). Quantities are expressed as a proportion of total deposits within each subsample. For example, the solid red line is total time deposits in large-large BHCs divided by total deposits in large-large BHCs. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel A of Figure 13 presents the proportion of aggregate total deposits that are domestic deposits (black solid line), domestic transaction and savings deposits (red solid line), and domestic time deposits (blue solid line). We can see in the figure that, after the crisis, banks in our sample shifted away from domestic time deposits and into domestic transactions and savings deposits.[12] The growth in transaction and savings deposits (red solid line in Panel A of Figure 13) after the crisis is a combination of growth in savings and NOW accounts from the beginning of 2008 until the end of 2010 and a more pronounced growth in demand deposits during 2011 when the growth in savings accounts moderated significantly.

[12] As we can see in Figure 11, total deposits over assets (black solid line) are relatively stable over the sample period. Hence, the change in the composition of deposits shown in Panel A of Figure 13 is also representative of the changes in the different components of deposits when expressed as a proportion of total assets.

Figure 14 Components of Other Borrowed Money as a Proportion of Total Other Borrowed Money



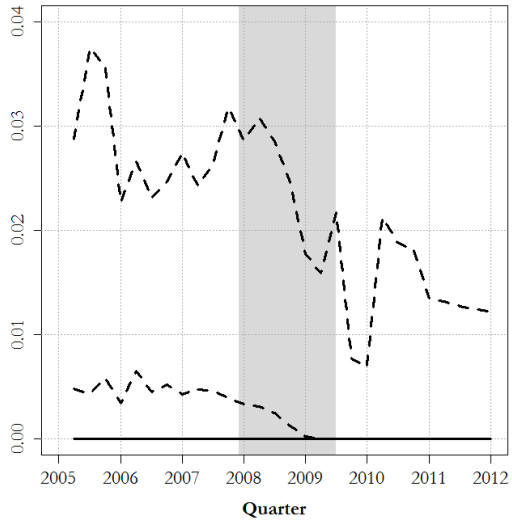
Notes: All quantities represent ratios of totals across all companies in the sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel B of Figure 13 shows that larger companies (large-large BHCs) tend to have a lower proportion of deposits as time deposits. The figure also shows that the trends in the composition of deposits are common for the two subsamples (large-large and large-medium BHCs).

Other Borrowed Money

The main components of other borrowed money are commercial paper, term federal funds (i.e., not overnight), certain term repos not involving securities, discount window borrowing, certain forms of unsecured and unsubordinated debt, and Federal Home Loan Bank (FHLB) advances. Figure 14 displays a decomposition of other borrowed money into commercial paper and other borrowed money with a maturity of less than and more than a year. We see that before the crisis, companies were gradually increasing their short-term borrowing. During the height of the crisis in late 2008 there is actually a brief surge in short-term borrowings that reverts back to pre-crisis levels during the first

Figure 15 Median, 75th, and 95th Percentiles of the Distribution of Commercial Paper over Assets



Notes: The black solid line is the median of the distribution of commercial paper over assets in our sample. The dashed lines are the 75th and the 95th percentiles. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

half of 2009 when large BHCs shifted their borrowing in a significant way toward longer maturities.

It is somewhat surprising that the proportion of borrowing that was done using commercial paper was trending down before the crisis. This decline actually accelerated during the crisis, which is consistent with the well-documented stresses in the commercial paper market (Kacperczyk and Schnabl 2010). Since mid-2009, however, the proportion of commercial paper in total borrowed money has remained fairly constant. Figure 15 shows that the median company in our sample has no commercial paper before and after the crisis. The 75th percentile actually drops to zero during the crisis and never recovers. The 95th percentile went from 3 percent of assets funded with commercial paper to less than 1.5 percent (only three or four companies in our sample are over the 95th percentile). The decline in commercial paper borrowing during the crisis is due to both intensive margin effects (firms that used commercial paper tended to use it less) and

extensive margin effects (firms that used commercial paper stopped using it). Before the crisis, more than 98 percent of the commercial paper issued by the companies in our sample was issued by companies in the large-large category. After the crisis, all commercial paper was issued by large-large companies.

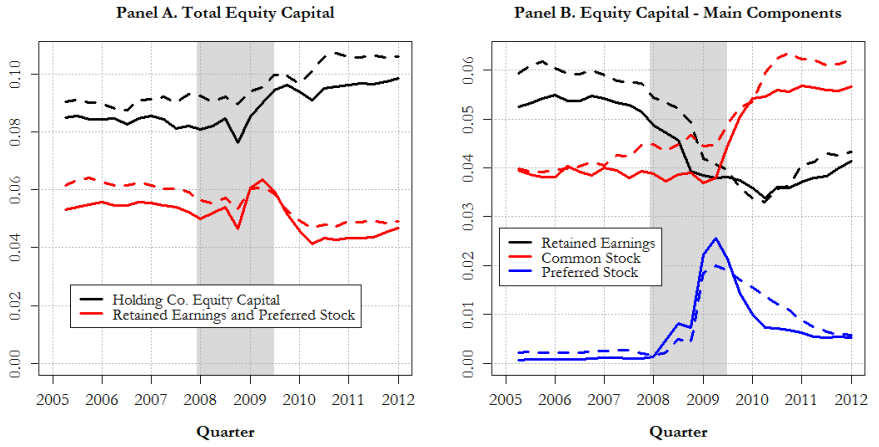
FHLB advances are a significant component of other borrowed money and its evolution during the crisis received some attention in the literature (see, for example, Ashcraft, Bech, and Frame [2010]). During the second half of 2007, bank borrowings from the FHLB system increased significantly. At the time, FHLBs were able to issue debt at relatively low rates and then lend to banks at more favorable rates than the ones that banks were able to obtain via other sources. As the crisis deepened, however, the funding advantage of FHLBs eroded and in the fourth quarter of 2008 total borrowing from FHLBs started to decrease (Ashcraft, Bech, and Frame 2010).

FHLB advances are included in the aggregates for other borrowed money with maturities less and more than a year as plotted in Figure 14. In principle, the changes in FHLB advances could be the main driver of the patterns observed in those aggregates during the crisis. To investigate this issue we complement our data with information from the Call Reports filed by depository institutions. We do this because BHCs do not report FHLB advances in the FR Y-9C reports. Conveniently, SNL Financial collects data on FHLB advances from the Call Reports and aggregates it at the holding company level. Using this source, we plot in Figure 14 total FHLB advances for the companies in our sample as a proportion of total borrowed money—the gray solid line. Roughly a third of the FHLB advances have a maturity greater than a year (the gray dashed line) and the rest have a maturity of less than a year. We see in the figure an upward trend in FHLB advances during 2006 and 2007 and a decline after 2008, but the patterns in the proportion of other borrowed money with a maturity of more and of less than a year seem more pronounced than what could be accounted for by movements in FHLB advances.

Bank Equity Capital

Even though large banks entered the crisis with what appeared to be acceptable levels of capital (Bernanke 2007), the accumulation of losses and the increasing turmoil in financial markets made bank capital an evident reason for concern as the crisis deepened. In fact, bank recapitalization played a significant role in the policy response to the crisis devised by the U.S. Treasury and other bank regulatory agencies. Here we provide an overview of how equity capital for large BHCs evolved

Figure 16 Equity Capital and its Main Components as a Proportion of Total Assets



Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

during the period and highlight the abrupt shifts in its composition that occurred at different points in the crisis.

Figure 16 presents a time series of total equity capital (as a proportion of assets) for the BHCs in our sample. As before, the solid line corresponds to the weighted mean and the dashed line to the standard mean. We see that, in general, larger companies tend to have lower capital-to-asset ratios before and after the crisis (black lines in Panel A). It is also evident from the figure that the companies in our sample have, on average, increased their capital ratios after the crisis (relative to the average ratios before the crisis). The main component accounting for this increase is common stock. The figure in Panel B shows that common stock over total assets increased significantly after the crisis. Also, the red lines in Panel A show that changes in the sum of retained earnings and preferred stocks, the other two main components of equity capital, do not account for the higher capital ratios observed after the crisis (relative to those before the crisis).

It is interesting to see in Panel B of Figure 16 the significant drop in retained earnings during the crisis and the "compensating" surge in

preferred stock.[13] The Capital Purchase Program (CPP), one of the main TARP programs, went into effect in October 2008 and dedicated $250 billion to the purchase of senior preferred stock in financial institutions. Half of these funds were allocated to nine financial firms, six of which are part of our sample in the fourth quarter of 2008: Citigroup, JPMorgan Chase, Wells Fargo, Bank of America, BNY Mellon, and State Street received a total of $95 billion when the program began (Financial Crisis Inquiry Commission 2011). The three large investment banks, Merrill Lynch, Morgan Stanley, and Goldman Sachs, received the other initial $30 billion allocated through the program. The change in the level of total preferred stock in our sample between the third and the fourth quarter of 2008 is $156 billion, 61 percent of which can be accounted for by the TARP money dedicated to large BHCs in the initial days of the CPP program.

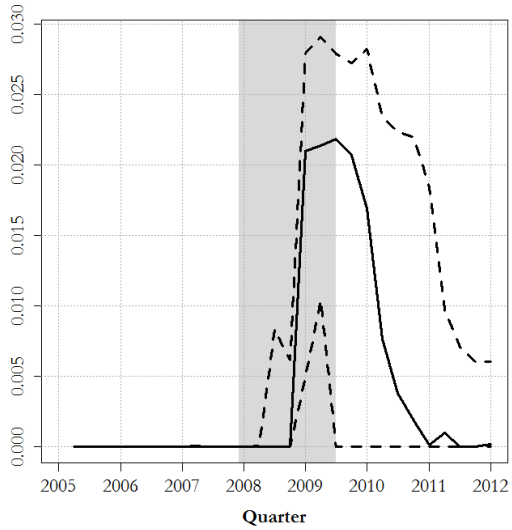
Aside from the initial allotment of CPP funds to the nine largest banks, many other banking organizations received capital injections as part of this program.[14] It is evident from Panel B of Figure 16 that both the dashed and solid lines corresponding to preferred stock experienced a comparable surge. However, we see that the largest banks initially increased their preferred stock relatively more (the solid line moving above the dashed line) while also reverting back more quickly to lower levels after the crisis. This rapid reversal may be explained by the fact that the CPP imposed restrictions on dividend distributions and executive compensation that gave banks (especially large banks) clear incentives to recover the preferred stock issued under the program.

By the end of our sample period, the majority of the companies in our sample that issued preferred stock during the crisis had reverted back to their pre-crisis strategy of not having preferred stock outstanding. To see this, in Figure 17 we plot the median amount (across companies in our sample) of preferred stock as a percentage of assets (solid line), and the first and third quartiles (the two dashed lines). We see that the median was zero before the crisis and increased to more than 2 percent of assets at the beginning of 2009. By 2011, however,

[13] One may think that the decline in retained earnings is the consequence of generous dividend policies that were not appropriately adjusted down as the symptoms of the crisis started to become visible. Hirtle (2014) studies the dividend and stock repurchase decisions of large BHCs during the crisis. She shows that many large companies were indeed slow at adjusting dividends down during the crisis. However, she also documents that, in response to the crisis, many companies *sharply* reduced their repurchase of stock.

[14] A total of 707 financial institutions received capital injections under the CPP. Of these, 646 were banks that received in total $193 billion. Relatively large, publicly traded banks (350 of them) account for $188 billion of this total. See Bayazitova and Shivdasani (2012) for more details.

Figure 17 Preferred Stock as a Proportion of Total Assets

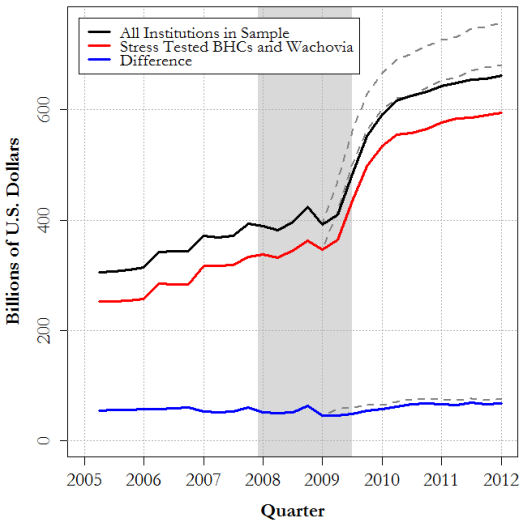


Notes: The solid line is the median of the distribution of preferred stock as a proportion of assets in our sample. The dashed lines are the 25th and 75th percentiles. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

it had gone back to close to zero. Yet it is also the case that the third quartile had not reverted back to its pre-crisis level. Some large BHCs were still relying on preferred stock as a source of capital by the end of our sample period.

The surge in common stock during 2009 (Panel B of Figure 16) is consistent with the change in approach adopted by policymakers to deal with banks' weak financial conditions as the crisis deepened. The second stage of TARP in February 2009 included the Capital Assistance Program (CAP), which required regulators to conduct stress tests for the 19 largest U.S. banks (greater than $100 billion in assets) and established that those banks for which the stress test revealed a shortfall of capital will be required to raise common equity within a period of a few months. As a result of the stress test, 10 large banks were required to increase their common equity for a total aggregate amount of $75 billion. Figure 18 plots the dollar value of common equity for all BHCs with assets greater than $10 billion (black line). It also plots in red the total dollar value of common equity for the 19 companies that were

Figure 18 Dollar Value of Common Stock

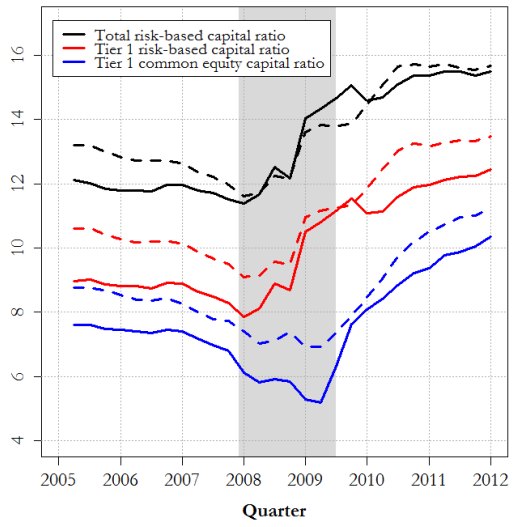


Notes: Each line is the total dollar value of common stock for the subsample described in the label of the figure. The dashed gray line includes the four large companies that started filing FR Y-9C reports in the first quarter of 2009. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

stress tested as part of CAP. We include Wachovia Co. in this partial aggregate for consistency since Wachovia was one of the largest banking organizations while it existed and was acquired in late 2008 by Wells Fargo (also one of the largest BHCs in the country). Not including Wachovia with the group of stress tested banks does not change the pattern that we intend to highlight here: Mainly, that we see the surge in common equity during 2009 as almost entirely accounted for by the behavior of the 19 largest institutions in the system that were subject to the stress tests imposed by CAP.[15] Note also that the increase in the red line during 2009 is close to $200 billion and, hence, a significantly higher amount than the CAP-required $75 billion.

[15] The gray dashed lines in Figure 18 are the result of including the four large institutions that started reporting as BHCs at the beginning of 2009; that is, Goldman Sachs, Morgan Stanley, American Express, and CIT Group. The first three of these companies were part of the group of 19 companies subjected to the stress test required by CAP.

Figure 19 Regulatory Capital Ratios



Notes: The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Patterns similar to the ones in the previous figures arise when we plot the risk-based capital ratios for the banks in our sample (see Figure 19). These capital ratios are mainly used for regulatory purposes. Tier 1 capital includes the book value of equity (after deductions) and certain classes of preferred equity while tier 2 capital includes certain holdings of subordinated debt. Total risk-based capital includes both tier 1 and tier 2 capital. These ratios are calculated using risk-adjusted assets in the denominator. To calculate risk-adjusted assets, companies adjust the different categories of assets using risk weights that are provided by regulators. Risk-adjusted assets include a measure of the off-balance-sheet exposure of the bank. As for some of the previous figures, we compute a mean and a weighted mean across companies at each point in time. The weights to compute the weighted mean are the ratio of assets in the corresponding company and the sum of all the assets for the companies in our sample for that time period (we

take these weights as a crude way to account for the relative size of the companies).

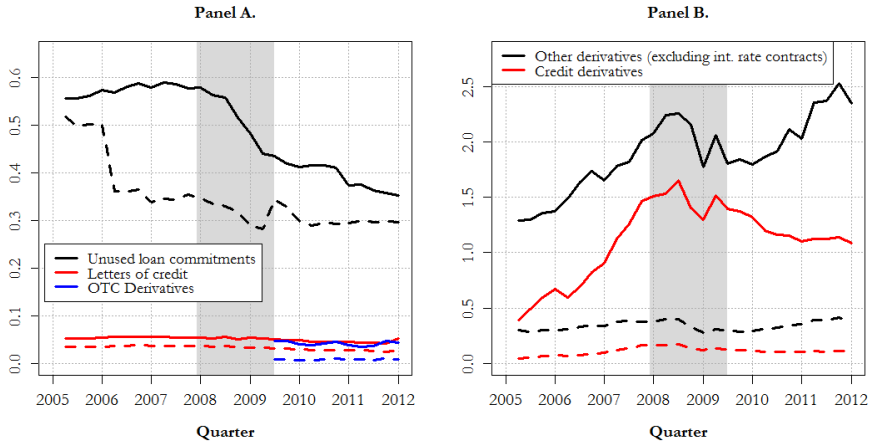
We see in Figure 19 that the largest companies tend to have lower tier 1 capital ratios (the red solid line is generally below the red dashed line). We also see in the figure that both the standard mean and the weighted mean of the tier 1 capital ratio were trending down before the crisis and rapidly increase with the onset of the crisis, remaining at relatively high levels since 2009. The increase in these ratios appears to occur a few quarters earlier than the increase in equity capital displayed in Figure 16. Furlong (2011) points out that the quality of tier 1 capital, measured by the proportion of it that is common equity, decreased significantly during the crisis. This is evident in Figure 19 as we see that common equity declines until the second quarter of 2009 while tier 1 capital starts increasing at the beginning of 2008 (this is consistent with the increase in preferred equity during the early stages of the crisis that we see in Panel B of Figure 16). Finally, the standard mean and the weighted mean for the total risk-based capital ratio behave similarly to the tier 1 ratios, except that there seems to be less of a systematic pattern across companies of different sizes (the black solid and dashed lines are very close and move together).

Off-Balance-Sheet Items

Large BHCs and their subsidiaries engage in significant amounts of off-balance-sheet activities, such as the provision of loan commitments, financial and performance guarantees, and various derivatives contracts. Conceptually, these activities create a contingent asset or liability for the firm, and in that sense they have implications for the financial condition of the firm, similar to those associated with more standard components of firms' balance sheets. Furthermore, off-balance-sheet activities can be a substantial source of fee income. For these reasons, it is important to assess their state and evolution.

Measuring off-balance-sheet activities is not straightforward. For example, the size of a position on a derivative contract is often accounted for by its notional amount. The notional amount is the base value used to calculate the payments associated with the derivative contract. This dollar amount (in general) does not change hands, and in that sense it is considered notional. For example, an interest rate swap could call for payment of the difference between a fixed interest rate and a market interest rate multiplied by a given notional amount (say, $1 million). While the actual payments are directly linked to the notional amount, payment amounts are typically only a fraction of

Figure 20 Off-Balance-Sheet Activity as a Proportion of Balance Sheet Assets



Notes: The blue lines in Panel A represent the net current credit exposure on OTC derivatives held by the companies in our sample. All other derivatives positions are reported in notional amounts. All quantities are expressed as a proportion of total balance sheet assets. The dashed and solid lines represent, respectively, the standard and weighted means across all companies in our sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

the notional amounts.[16] Alternatively, in some cases, firms report the fair value of their derivative contracts. The fair value is an estimate of the price of the contract that would prevail in an orderly transaction between market participants (not a forced liquidation or distressed sale) at the measurement date. The FR Y-9C form disaggregates derivative contracts according to the type of instrument (futures, forwards, swaps, etc.) using notional amounts. This is what we use in most of the figures in this section, except when plotting over-the-counter (OTC) derivatives for which we use net current credit exposure since notional amounts are not reported.[17]

[16] In the case of an interest rate swap, we can think of the notional amount as representing the size of the underlying position being hedged with the swap.

[17] The current credit exposure is the fair value of a derivative contract when that fair value is positive. The current credit exposure is zero when the fair value is negative or zero. For reporting OTC derivatives, companies are allowed to net out multiple positions with a given counterparty if certain conditions are satisfied.

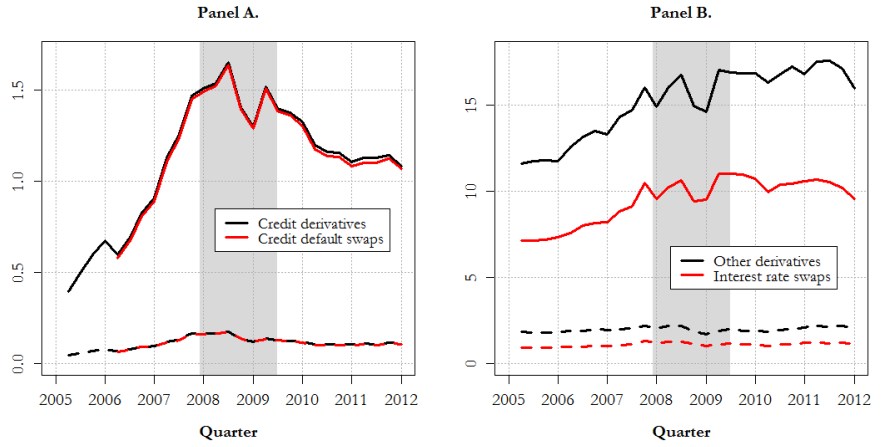
Figure 20 plots different off-balance-sheet activities undertaken by U.S. BHCs in our sample (expressed as a proportion of total balance sheet assets). Solid lines represent the weighted mean and dashed lines represent the standard mean. Panel A shows the values of unused loan commitments (credit lines) and letters of credit, and the current credit exposure on OTC derivatives (for which reporting started in mid-2009). Panel B shows the notional values of credit derivatives (including credit default swaps) and other derivatives, such as equity, foreign exchange, and commodity future, forward, swap, and option contracts but excluding interest rate contracts. We exclude interest rate contracts from the figure because their total notional amount is an order of magnitude larger than the total notional amount of other categories of derivatives (see Panel B of Figure 21).

We see in Figure 20 that larger companies tend to have (as a proportion of assets) more loan commitments and letters of credit (Panel A) and are counterparties in significantly more derivatives contracts (Panel B). Before the crisis, the largest companies were rapidly increasing their amount of derivative contracts, but this growth stopped during the crisis and we only see some renewed growth in other derivatives during 2010–11.

Credit lines are commitments to make a loan or perform some other transaction with a counterparty. Letters of credit are contracts where one party commits to the other, in exchange for a fee, to step in and undertake an obligation if a third party fails to perform. Boyd and Gertler (1993) attribute the growth in bank loan commitments during the 1980s to the rapid development of the commercial paper market since commercial paper issuers generally secured their loans with a backup line of credit from banks. In line with this idea, the secular decline in unused loan commitments that started in 2008 may, in part, be a consequence of the observed decline in activity in the commercial paper market that came about as a result of the crisis (Kacperczyk and Schnabl 2010). As we discussed earlier in this section when looking at the evolution of bank lending, another factor that can help explain the decline in outstanding loan commitments in 2008 (see Panel A of Figure 20) is the fact that many firms took loans from banks by drawing down their existing lines of credit during the crisis (Ivashina and Scharfstein 2010).

Credit derivatives are financial contracts that allow one party (the purchaser) to transfer the credit risk of a "reference" asset or entity to another party (the seller). If the referenced asset fails to deliver a promised payment, then the seller steps in and covers the shortfall. Panel A of Figure 21 shows that almost all the credit derivatives owned by the BHCs in our sample are credit default swaps (CDS). A CDS is

Figure 21 Credit Default and Interest Rate Swaps as a Proportion of Total Assets



Note: All quantities are notional amounts expressed as a proportion of total balance sheet assets. The dashed and solid lines represent, respectively, the standard and weighted means across all companies in our sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

a contract in which a protection seller, for a fee, agrees to reimburse a protection buyer for any losses that occur due to a credit event of a particular entity. If there is no credit default event (as defined by the derivative contract), then the protection seller makes no payments to the protection buyer and receives only the contract-specified fee. Under standard industry definitions, a credit event is normally defined to include bankruptcy, failure to pay, and restructuring.

We plotted other derivatives excluding interest rate contracts in Panel B of Figure 20. In Panel B of Figure 21 we plot other derivatives including interest rate contracts. The main category of interest rate contracts is interest rate swaps, which accounts for over 60 percent of the total of interest rate contracts during our sample period. We plot the notional amount of interest rate swaps as a proportion of assets in Panel B of Figure 21. Just like with CDS (Panel A of Figure 21), the holdings of interest rates swaps by the largest companies was growing in the years leading up to the crisis, but growth stalled with the crisis and did not recover during our sample period.

Table 1 Off-Balance-Sheet Items as a Proportion of Total Assets, Q4:2011

BHCs	Commitments	Letters of Credit	Derivatives		
			Credit	Other	OTC
Medium-Large	0.2174	0.0142	0.0004	0.1514	0.0015
Large-Large	0.3593	0.0548	1.1467	16.919	0.0453

Notes: OTC derivatives are the net current credit exposure on OTC derivatives held by the companies in our sample. All other derivatives positions are reported in notional amounts. All quantities are expressed as a proportion of total balance sheet assets.

To complement the picture of how the predominance of different off-balance-sheet activities varies with the size of companies, we split our sample in large-large and large-medium companies as before and compute subsample averages. For each of the main categories of off-balance-sheet items, Table 1 shows the total value reported by these companies in the last quarter of 2011, expressed as a proportion of total assets. We confirm with this table that BHCs with more than $50 billion in assets (the large-large subsample) have a much more active participation in off-balance-sheet activities than the large-medium companies for all off-balance-sheet categories.

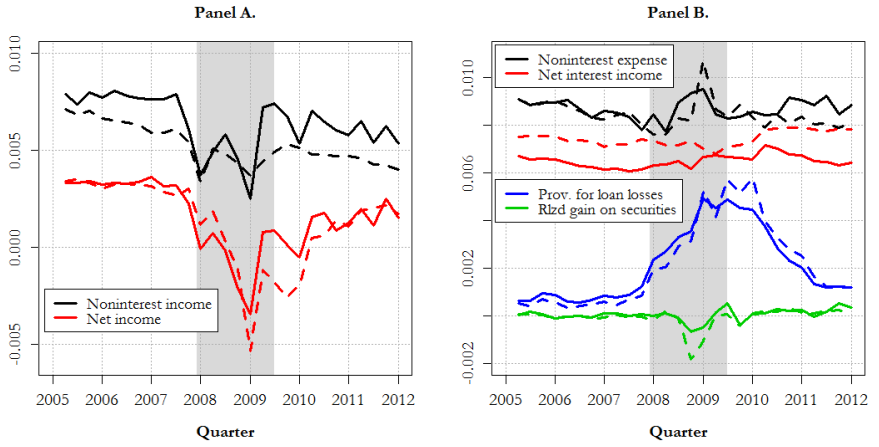
Off-balance-sheet activities also have an impact on the income statement as they are an important generator of fee income. Similarly, securitization and loan sales are two other common activities of these large BHCs that we have not yet discussed and are significant sources of noninterest income. We investigate this issue in the next section.

3. INCOME STATEMENT

In this section, we discuss the evolution of income for the BHCs in our sample. Panel A of Figure 22 presents the standard and weighted means of net income, as a proportion of assets (dashed and solid red lines, respectively). This measure of relative income is often called return on assets (ROA).[18] We see that ROA fell dramatically during

[18] In all the figures, we plot quarterly income as a proportion of assets at the end of the quarter. This way of presenting the data matters for the levels of some of these variables. For example, ROA is often reported on an annualized basis and it is calculated using average assets. We are mainly interested in the behavior of these variables over time and just use assets as a way to normalize the data across companies with very different sizes. For our purposes, then, the simpler ratio of values at the end of the quarter used in the figures suffices.

Figure 22 BHC Income Statement: Components as a Proportion of Total Assets



Notes: The blue lines in Panel B represent the item on the income statement named "Provision for loan and lease losses" and the green lines represent "Realized gains (losses) on held-to-maturity and available-for-sale securities." All quantities are expressed as a proportion of total assets. The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

the crisis and was actually negative from mid-2008 until mid-2009. It is interesting to see that there appears to be no significant difference between the behavior of income in the largest companies and the rest. They all share a similar experience in terms of the evolution of their net income.

Figure 22 also presents some of the various components of bank income. We see from the figure that noninterest income and provision for loan and lease losses (which is subtracted from income) have been the main drivers of net income during the sample period. Noninterest income appears to be more volatile for the largest banks (as indicated by the solid and dashed black lines in Panel A). Interest income and noninterest expenses are fairly stable across time. The largest banks tend to have lower net interest income as a proportion of assets (the

solid red line in Panel B of Figure 22 is consistently lower than the dashed red line).[19]

Net interest income is the income that banks get from lending at higher rates than they borrow. In a sense, this is the kind of income associated more closely with traditional banking. Noninterest income is generated by other activities, such as asset trading, insurance, and financial services and advice. Importantly, most of the income originated in off-balance-sheet activities is considered noninterest income. Comparing the levels of noninterest income (black lines in Panel A) and net interest income (red lines in Panel B) for the period before the crisis, we see that the companies in our sample tend to have (on average) as much or higher noninterest income than net interest income. The BHCs we study are relatively large organizations (more than $10 billion in assets) with multiple business lines, far beyond the standard deposits-and-loans business associated with traditional banking. This relative comparison of net interest income and noninterest income is a reflection of that fact.[20]

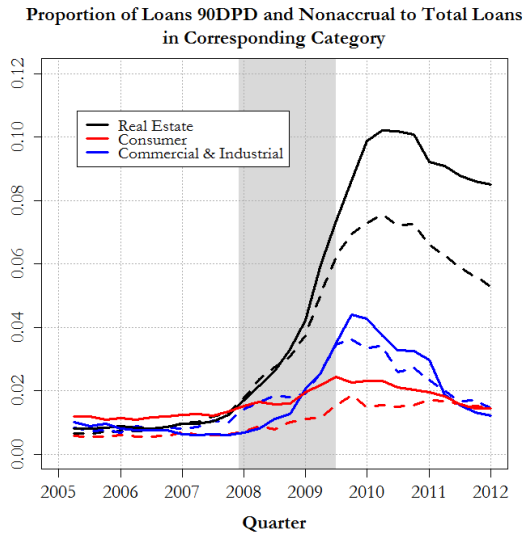
We saw in Figure 6 that allowance for loan losses (an item on the asset side of banks' balance sheets) increased significantly during the crisis period. The change in allowances is basically the result of provision for loan losses net of loan charge-offs and other write-downs. Consistent with the behavior of allowances, Panel B of Figure 22 shows the surge in provisions (blue lines) starting in mid-2007 and lasting for more than three years. This increase in provisions is another important factor that reduced banks' net income during the crisis years.

Presumably, companies started to provision for losses as they saw the prospects for loan deterioration increase. As a complement to Panel B of Figure 6, Figure 23 shows that the proportion of nonperforming loans started to increase in late 2007 driven mainly by real estate loans. Later in the sample period, during 2009, the rate of nonperforming loans in the commercial and industrial category increased significantly as well. The performance of real estate loans appears to be noticeably

[19] Note that noninterest expense includes general costs (such as salaries and employee benefits) not just associated with generating noninterest income; in particular, noninterest expense is the overhead cost of generating both net interest and noninterest income. For this reason, it does not really make sense to net out noninterest expense from noninterest income and we keep them separate in the figure.

[20] Copeland (2012) discusses the evolution of bank income for large BHCs in the period from 1994 to 2010 and shows that the largest BHCs have shifted away from the traditional sources of bank income—mainly, interest income—and toward noninterest income: in particular, income that comes from securitization activities and from sources of income related to capital markets, such as income from trading assets, investment banking, and insurance.

Figure 23 Loan Performance

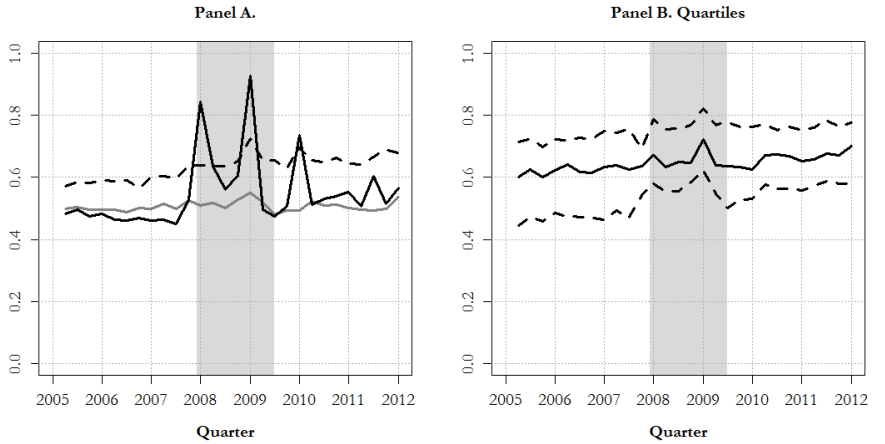


Notes: Each line shows averages across firms of the proportion of nonperforming loans over total loans in each category (real estate loans, consumer loans, and C&I loans). Nonperforming loans are loans that are 90 days past due or nonaccrual. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

worse in the largest companies (comparing the black solid and dashed lines), especially after mid-2009.

In Panel A of Figure 24 we plot net interest income as a proportion of total revenue, which we define as the sum of net interest income and noninterest income. The dashed line is the standard mean of this ratio for all companies in our sample. The solid line is the weighted mean, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. We see in the figure that, in general, 50 percent to 60 percent of bank revenue originates from exploiting the spread between borrowing and lending rates. Consistent with Copeland (2012), we also see that the larger companies tend to rely more on noninterest income as a source of income (the dashed line is generally above the solid line).

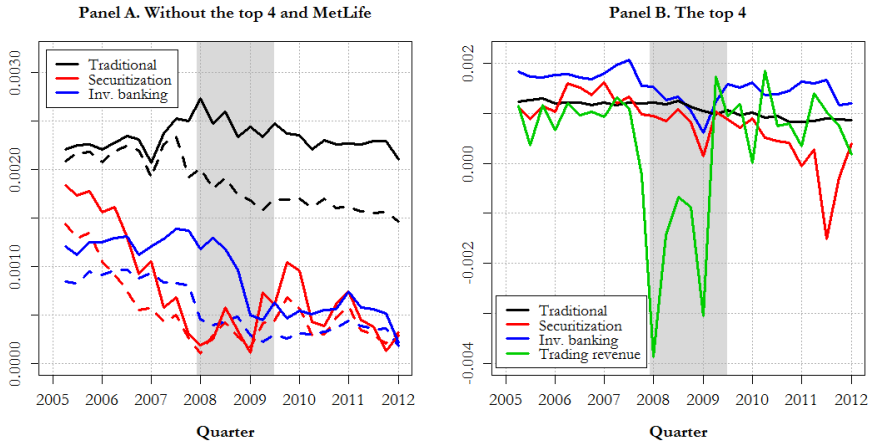
Figure 24 Net Interest Income as a Proportion of Total Income



Notes: The dashed and solid lines in Panel A represent the standard and weighted means, respectively, where the weights in the weighted mean are calculated as the ratio of assets in the corresponding company and total assets in our sample for each respective quarter. The gray line is the weighted mean excluding the four largest companies as of 2011. Panel B shows the median (black solid line) and the 25th and 75th percentiles (black dashed lines) of the distribution across firms in the sample of the ratio of net interest income and total income. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

The gray line in Panel A is the weighted mean excluding the four largest BHCs: JPMorgan Chase, Bank of America, Citi, and Wells Fargo. The spikes in the ratio, which are evident in the black solid line in Panel A, are the result of significant fluctuations in noninterest income at the four largest banks (see the behavior of noninterest income in Panel A of Figure 22). It is worth noticing, however, that to a certain extent the drop in the last quarter of 2008 in noninterest income relative to net interest income is still present in many of the other companies in our sample. Evidence of this is that both the standard mean and the median (the black solid line in Panel B of Figure 24) of the ratio both go up in the last quarter of 2008. Panel B of Figure 24 also plots the 25th and 75th percentiles of the distribution of this ratio at each point in time. While we see some variation across companies, we do not see

Figure 25 Main Components of Noninterest Income as a Proportion of Total Assets



Notes: All quantities are expressed as a proportion of total assets for each company. The dashed and solid lines represent the standard and weighted means, respectively. Panel A presents averages for all companies in our sample except the largest four according to assets and MetLife. Panel B plots the weighted average for the largest four companies. For a full description of traditional noninterest income, securitization income, income from investment banking activities, and trading revenue see text. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

significant variation or trends in the level of heterogeneity in this ratio among the companies in our sample.[21]

Figure 25 presents a decomposition of noninterest income. For this purpose, we created four categories of income that allow us to summarize the most interesting developments. Traditional noninterest income includes service charges on deposit accounts and other income from fiduciary activities. Securitization income includes net securitization income, other servicing fees, and net gains from loan sales. Investment banking includes fees and commissions from securities brokerage, investment banking, underwriting, and venture capital revenue. Finally, trading revenue is exactly what is reported under that category in the FR Y-9C forms. More specifically, trading revenue is the net gain

[21] Copeland (2012) provides further evidence on the heterogeneity of income sources across large bank holding companies.

or loss from trading cash instruments and off-balance-sheet derivative contracts (including commodity contracts) that has been recognized during the calendar year-to-date. We do not plot trading revenue for the companies in Panel A as it is a very small number and fairly stable.

There are some sources of income that we choose to not report. For example, income from insurance activities is mainly driven by one company, MetLife.[22] After excluding MetLife, this item is quite small and nothing significant appears when plotting the series. The figure also does not include the category "other noninterest income," which contains income and fees from the printing and sale of checks and from ATMs, rents from safe deposit boxes, income from other real estate owned, debit and credit card interchange fees, and other small items. This category of income is also relatively small.

Some observed sharp fluctuations in the largest companies' components of noninterest income tend to dominate the weighted means of the full sample. This is especially noticeable when looking at trading revenue, but it also occurs, to a lesser degree, for other components. For this reason, in Panel A of Figure 25 we report the standard and the weighted means for all companies excluding JPMorgan Chase, Bank of America, Citi, and Wells Fargo. We also exclude MetLife from these averages as MetLife is an evident outlier in terms of receiving most of its noninterest income from insurance-related activities. In Panel B of Figure 25 we plot the weighted mean for the four largest BHCs that were not included in Panel A.

We see in Panel A that both income from securitization and investment banking dropped sharply with the crisis and remained low for the rest of the sample period. This is a fairly widespread phenomenon (as we see from both means experiencing similar behavior). In sharp contrast with the rest of the companies, fluctuations in trading revenue of the four largest companies tended to dominate the behavior of overall noninterest income during the crisis. Panel B of Figure 25 makes this evident. Finally, note that the largest companies share with the rest of our sample the decline in income from securitization and investment banking as sources of income after the crisis. These trends, however, seem moderate when compared with the swings in trading revenue.

[22] Note that the last report filed by MetLife, Inc. is from the third quarter of 2012, after the end of our sample period. The approval for the company to deregister as a BHC was announced on February 14, 2013.

4. CONCLUSION

Large U.S. bank holding companies are complex organizations. They played an important role in the recent financial crisis and many of them experienced significant financial turmoil during that period. We have attempted here to provide a comprehensive overview on the performance of these companies between the beginning of 2005 and the end of 2011, based on information provided in the FR Y-9C reports that these companies submit for regulatory purposes. The discussion in the article touched on many different aspects, too many to summarize in this concluding section. Instead, we will highlight a few of the most interesting facts.

First, the number of companies with more than $10 billion in assets and with more than $50 billion in assets has been fairly stable (at around 60 and 25, respectively). The total assets in companies with more than $50 billion was growing rapidly before the crisis but growth slowed at the beginning of 2009 and remained slow for the rest of the sample period. Of course, loan performance deteriorated significantly after the crisis, but in general the traditional business of banking—borrowing and lending—was a source of stability for these large companies. The most significant swings were observed in those variables that describe the BHCs' asset-markets activities, with noninterest income volatility being a leading example.

Large BHCs are crucial participants in both sides of the repo market. The total volume of both repos and reverse repos for these companies fell during the crisis, and while reverse repos recovered after the crisis—mainly for companies with more than $50 billion in assets—borrowing in the repo market by the companies in our sample remained at crisis levels by the end of our sample period in December 2011. This last fact is just one more manifestation of a general change in the way these companies are funded: After the crisis, the composition of deposits shifted away from time deposits and into transaction and savings accounts, the time-to-maturity of other borrowed money increased significantly, and the composition of bank capital changed to include a more significant proportion of common equity.

Our goal was to paint a broad picture of the evolution of large BHCs in the recent past. While obtaining a broad understanding of what happened is important, it required us to use a thick brush. We only discussed the main components of balance sheets, off-balance-sheet activities, and income statements. We also restricted ourselves, for the most part, to describing the time series of standard and weighted averages and aggregates for two subsamples: large-large and large-medium companies. There is much more detailed information in the FR Y-9C reports that could be interesting to analyze. Furthermore, there

is a large amount of cross-company heterogeneity hidden behind our reported averages. Digging deeper into the performance of these companies is likely to be a fruitful activity. For that investigation, the general perspective we have provided here could be a valuable starting point and a guiding reference.

REFERENCES

Afonso, Gara, Anna Kovner, and Antoinette Schoar. 2011. "Stressed, not Frozen: The Federal Funds Market in the Financial Crisis." *Journal of Finance* 66 (August): 1,109–39.

Ashcraft, Adam B., Morten L. Bech, and W. Scott Frame. 2010. "The Federal Home Loan Bank System: The Lender of Next-to-Last Resort?" *Journal of Money, Credit and Banking* 42 (June): 551–83.

Avraham, Dafna, Patricia Selvaggi, and James Vickery. 2012. "A Structural View of U.S. Bank Holding Companies." Federal Reserve Bank of New York *Economic Policy Review* (July): 65–81.

Bayazitova, Dinara, and Anil Shivdasani. 2012. "Assessing TARP." *Review of Financial Studies* 25 (2): 377–407.

Bernanke, Ben S. 2007. "The Recent Financial Turmoil and its Economic and Policy Consequences." New York, N.Y.: Speech at the Economic Club of New York (October 15).

Boyd, John H., and Mark Gertler. 1993. "U.S. Commercial Banking: Trends, Cycles, and Policy." *NBER Macroeconomics Annual* 8: 319–77.

Cetorelli, Nicola, and Linda S. Goldberg. 2012. "Follow the Money: Quantifying Domestic Effects of Foreign Bank Shocks in the Great Recession." *American Economic Review* 102 (May): 213–8.

Copeland, Adam. 2012. "Evolution and Heterogeneity among Larger Bank Holding Companies: 1994 to 2010." Federal Reserve Bank of New York *Economic Policy Review* (July): 83–93.

El-Ghazaly, Hoda, and Yadav Gopalan. 2010. "A Jump in Consumer Loans?" Federal Reserve Bank of St. Louis *Economic Synopses* 18 (July):1–2.

Ennis, Huberto M. 2011. "Discussion of Acharya and Skeie: A Model of Liquidity Hoarding and Term Premia in Inter-bank Markets." *Journal of Monetary Economics* 58 (July): 448–52.

Ennis, Huberto M., and Alexander L. Wolman. 2015. "Large Excess Reserves in the U.S.: A View from the Cross-Section of Banks." *International Journal of Central Banking* 11 (January): 251–88.

Financial Crisis Inquiry Commission. 2011. *The Financial Crisis Inquiry Report*. Available at fcic.law.stanford.edu/report (January).

Furlong, Fred. 2011. "Stress Testing and Bank Capital Supervision." Federal Reserve Bank of San Francisco *Economic Letter* (June 27).

Gorton, Gary, and Andrew Metrick. 2012. "Securitized Banking and the Run on Repo." *Journal of Financial Economics* 104 (3): 425–51.

Hirtle, Beverly. 2014. "Bank Holding Company Dividends and Repurchases during the Financial Crisis." Federal Reserve Bank of New York Staff Report No. 666 (March).

Ivashina, Victoria, and David Scharfstein. 2010. "Bank Lending During the Financial Crisis of 2008." *Journal of Financial Economics* 97 (September): 319–38.

Kacperczyk, Marcin, and Philipp Schnabl. 2010. "When Safe Proved Risky: Commercial Paper during the Financial Crisis of 2007–2009." *Journal of Economic Perspectives* 24 (Winter): 29–50.

Taylor, John B., and John C. Williams. 2009. "A Black Swan in the Money Market." *American Economic Journal: Macroeconomics* 1 (January): 58–83.

Economic Quarterly—Volume 100, Number 2—Second Quarter 2014—Pages 159–181

The Real Bills Views of the Founders of the Fed

Robert L. Hetzel

Milton Friedman (1982, 103) wrote: "In our book on U.S. monetary history, Anna Schwartz and I found it possible to use one sentence to describe the central principle followed by the Federal Reserve System from the time it began operations in 1914 to 1952. That principle, to quote from our book, is: 'If the 'money market' is properly managed so as to avoid the unproductive use of credit and to assure the availability of credit for productive use, then the money stock will take care of itself.'"

For Friedman, the reference to "the money stock" was synonymous with "the price level."[1] How did American monetary experience and debate in the 19th century give rise to these "real bills" views as a guide to Fed policy in the pre-World War II period?

As distilled in the real bills doctrine, the founders of the Fed understood the Federal Reserve System as a decentralized system of reserve depositories that would allow the expansion and contraction of currency and credit based on discounting member-bank paper that originated out of productive activity. By discounting these "real bills," the short-term loans that financed trade and goods in the process of production, policymakers fulfilled their responsibilities as they understood them. That is, they would provide the reserves required to accommodate the "legitimate," nonspeculative, demands for credit.[2] In so doing, they

The author acknowledges helpful comments from Huberto Ennis, Motoo Haruta, Gary Richardson, Robert Sharp, Kurt Schuler, Ellis Tallman, and Alexander Wolman. Historical inaccuracies are the fault of the author. The views expressed are those of the author rather than those of the Federal Reserve Bank of Richmond or the Federal Reserve System. E-mail: robert.hetzel@rich.frb.org.

[1] See also Friedman ([1964] 1969, 75–6).

[2] Friedman and Schwartz (1963, 358) noted that "most of the governors of the Banks, members of the Board, and other administrative officials of the System... tended to regard bank failures as regrettable consequences of bad management and bad banking practices, or as inevitable reactions to prior speculative excesses...."

believed they were restraining speculation, the collapse of which they believed led to deflation and recession.

1. OVERVIEW

The founders of the Fed wanted to end the periodic occurrence of bank panics—runs on banks and the suspension of payments by the New York banks in response to currency drains to the interior. They were aware that the European central banks (the Bank of England, the Banque de France, and the Reichsbank) had eliminated bank runs through the confidence they had created that, in a panic, banks could always discount with them (Vreeland 1912). The solution of creating a central bank, however, was not politically feasible. The fear was that a central bank would be captured by Eastern financial interests, especially Wall Street financiers. The solution was to centralize reserves but in a system of regional depositories organized within a federal structure. The boards of directors in regional banks would have regional directors representing a combination of public and private interests but with checks on their powers exercised by a board in Washington of presidential appointees and the comptroller of the currency and Treasury secretary as ex-officio members.

Another facet of ending bank panics entailed creating an "elastic currency." Under the National Banking Act passed during the Civil War, the national banks chartered by the comptroller of the currency could only issue bank notes, which circulated as currency, if backed by government bonds. The limited supply of such bonds along with the difficulty of obtaining them in a timely fashion in a panic meant that currency could not expand as the demand for it increased in a panic. The solution was to create an elastic currency by allowing banks to discount commercial paper at their regional Federal Reserve Bank. However, discounting was limited to real bills. Credit would then expand and contract in order to accommodate the need to finance productive activity. At the same time, the limitation of discounting to real bills was intended to prevent the speculation that led to the asset bubbles—the collapse of which produced panics. Moreover, ending the significant concentration of reserves in New York as existed in the correspondent-respondent system of the National Banking System would prevent Wall Street from using those reserves to engage in speculation.

The individual Reserve Banks had a mandated gold cover for the issue of their notes. There was a Gold Settlement Account that would settle balances among the Reserve Banks with an ability to even out temporary shortages among them. The new system could have operated on the principles of the gold standard. There were instances in

which gold outflows prompted the Reserve Banks to raise their discount rates. However, countries abandoned the international gold standard during World War II and only reconstructed it in the last part of the 1920s. During the 1920–21 and 1929–33 economic contractions, real bills principles underlay policymaking.

With the entry of the United States into World War I in April 1917, the Fed lost its independence. Although the war ended in November 1918, the Fed gained its independence only later in 1919 when the Treasury had completed the last of its Liberty Bond issues. Its immediate response illustrated the way in which real bills principles influenced its actions. From the end of 1919 to June 1920, the New York Fed raised its discount rate from 4 percent to 7 percent. Robert Owen (senator from Oklahoma) criticized the Fed for the recession and deflation that followed.

In a written reply to Owen, the Federal Reserve Board responded that the regional Reserve Banks had raised the discount rate "... with the object of bringing about more moderation in the use of credits, which a year ago were being diverted into all kinds of speculative and non-essential channels..." (Federal Reserve Board 1920, 8). The Board letter went on to argue that the decline in prices came from factors affecting individual prices. "Sugar was advanced by speculative manipulation until it reached a price which checked domestic consumption.... Then followed a drastic decline in the price of sugar" (Federal Reserve Board 1920, 10). In sum, in line with real bills principles, the Fed saw its role as allocating credit toward productive uses and away from speculative uses and did not recognize responsibility for the behavior of the price level apart from that role.[3]

2. THE U.S. DEBATE OVER THE 1819–20 DEFLATION

In the United States, historically, the default explanation of recession and deflation has been the collapse of speculative excess. Contemporary commentary on the 1819 panic illustrates the long-standing belief that panics originate in the collapse of asset bubbles produced by speculative excess.[4]

[3] There is a rich diversity of views on the impetus to the creation of the Fed. For a contrasting view, see Wicker (2005) and Haltom and Lacker (2014). Hetzel (1985) documents the debate in the 1920s over whether the Fed should control the quantity of credit in order to stabilize economic activity or pursue real bills principles according to which the Fed should accommodate the demand for legitimate uses of credit while preventing the speculative extension of credit.

[4] For a monetary interpretation, see Timberlake (1993) and Wood (2009).

In the last years of the decade of the 1810s, the United States entered into severe recession and deflation. Washington Irving ([1819–20] 2008, 4) captured the popular mood of the times:[5]

> Every now and then the world is visited by one of these delusive seasons, when the 'credit system'... expands to full luxuriance: everybody trusts everybody; a bad debt is a thing unheard of; the broad way to certain and sudden wealth lies plain and open.... Banks... become so many mints to coin words into cash; and as the supply of words is inexhaustible, it may readily be supposed that a vast amount of promissory capital is soon in circulation.... Nothing is heard but gigantic operations in trade; great purchases and sales of real property, and immense sums made at every transfer. All, to be sure, as yet exists in promise; but the believer in promises calculates the aggregate as solid capital....
>
> Now is the time for speculative and dreaming of designing men. They relate their dreams and projects to the ignorant and credulous, [and] dazzle them with golden visions.... The example of one stimulates another; speculation rises on speculation; bubble rises on bubble.... No 'operation' is thought worthy of attention, that does not double or treble the investment.... Could this delusion always last, the life of a merchant would indeed be a golden dream; but it is as short as it is brilliant.

Similarly, William Graham Sumner (1874, cited in Wood [2009, 156]) cited a report of the Pennsylvania legislature that attributed the 1819 recession to prior speculative excess.[6]

> In consequence..., the inclination of a large part of the people, created by past prosperity, to live by speculation and not by labor, was greatly increased. A spirit in all respects akin to gambling prevailed. A fictitious value was given to all kinds of property. Specie was driven from circulation as if by common consent, and all efforts to restore society to its natural condition were treated with undisguised contempt.

The 1819 panic nurtured the populist tradition in American 19th century culture of how the collapse of speculative excess caused hardship and bankruptcy in rural America. That speculative excess took the form of speculation in commodity markets and in the purchase of the large tracts of land made available as the nation expanded westward. Kamensky (2008, 274) wrote:

---

[5] Irving was an American author known for stories like *Rip van Winkle* and *The Legend of Sleepy Hollow*.

[6] Sumner was an economist and sociologist who taught at Yale.

> The panic of 1819, the convulsive beginning of a prolonged nationwide depression, was... nowhere more debilitating than in the booming southwest. Cotton prices—the fuel that stoked Alabama [speculative land] fever—fell to less than half the giddy highs they had reached in 1817.... The Bank of the United States called loans and hoarded specie. State-chartered banks felt the pinch of deflation and passed the pain along to their customers. Speculators who had bought their slices of Alabama on margin scrambled to pay their debts. Many failed, the most highly leveraged falling first, and hardest.

When the United States entered the War of 1812, it had few means of financing its military expenditures. Most of its taxes came from customs duties, which fell during the war. Because the charter for the First Bank of the United States had expired in 1811, the government had no central bank from which to borrow. In order to finance the wartime deficits, the government issued Treasury notes. The notes had the status of legal tender and because of their small denomination served as a medium of exchange. The money stock increased and inflation followed. Faced with a loss of gold, banks suspended convertibility of their bank notes into gold.[7]

With the end of the war in 1815, the Treasury ceased issuing debt and the deficit turned into a surplus. Treasury Secretary William Crawford used the government surpluses to contract the circulation of Treasury notes. Monetary contraction raised the value in exchange of bank notes until it became possible to go back onto the gold standard with the resumption of convertibility between bank notes and gold at the pre-war parity in 1817. By 1818, a severe recession had commenced.

During the War of 1812, Congress chafed at payment of taxes in the depreciated bank notes of the state-chartered banks instead of specie (gold or silver coins). In 1816, it chartered the second Bank of the United States, which began operation in January 1817. "[T]he second Bank of the United States was adopted primarily as a means of forcing resumption on the state banks" (Wood 2005, 129). During the 1818–19 recession, popular anger for foreclosures and business failures fell upon the Bank of the United States.[8] The main office of the Bank was located in Philadelphia but it had branches throughout the country. In July 1818, the main office ordered the branches to renew loans only if accompanied by a deposit of specie of 12.5 percent by the borrowers at

[7] This paragraph and the next summarize Timberlake (1993, Ch. 2).

[8] This paragraph and the next summarize Nelson (2013, 69–71). For an informative account of the role of the first Bank of the United States in the first financial panic in the United States, see Cowen (2000).

the branch. Moreover, the main office would no longer supply specie to the branches. In order to build their specie balances, the regional banks restricted lending.

In March 1819, a hard-money man, Langdon Cheves, took control of the Bank of the United States. The branches of the Bank took the bank notes from the state-chartered banks that had been paid to them, presented them to the state banks, and demanded specie. When the state banks failed for lack of specie, the Bank of the United States took possession of the land that they held as collateral. The Bank ended up owning most of Cincinnati. Nelson (2013, 72) wrote, "Western land prices in parts of Ohio, Tennessee, Alabama, and Kentucky dropped more than 50 percent. 'Look at Kentucky,' declared one Kentucky correspondent.... 'Nothing is to be seen but a boundless expanse of desolation'."

As documented by Bray Hammond (1957, 258), Cheves was just trying to save the Bank of the United States. In 1818, its ratio of liabilities to specie had risen to 10 to one instead of the five to one specified in its charter. Even those reserves evaporated when the government asked for the greater part in order to repay a debt to France. Hammond (1957, 259) wrote:

> A popular hatred of it [the Bank of the United States] based on the grim efforts made to collect or secure what was receivable subsided but was never extinguished. "The Bank was saved," wrote William Gouge, "and the people were ruined." ... Senator Thomas Hart Benton of Missouri dilated on the consequences of those efforts. "All the flourishing cities of the West... are mortgaged to this money power. They may be devoured by it at any moment. They are in the jaws of the monster!"

Passions over states' rights exacerbated animosity toward the second Bank of the United States.[9] As detailed by Hammond (1957, 263–5), in February 1818, the state of Maryland imposed a tax on all banks operating in its boundaries not chartered by the state legislature. The Baltimore branch of the Bank of the United States refused payment. Maryland sued the Bank in the name of its cashier, J. W. McCulloch, and the case *McCulloch v. Maryland* ended up at the Supreme Court. Other states (Tennessee, Georgia, North Carolina, Kentucky, and Ohio) had also adopted taxes intended to end operation of Bank of the United States branches in their boundaries. In March 1818,

[9] Rockoff (2014) cited Wilburn (1967) in noting that in 1832 among the future Confederate States, with the exception of Louisiana, all the congressmen voted overwhelmingly against its re-charter.

the Supreme Court presided over by Chief Justice John Marshall decided in favor of the Bank of the United States. That decision greatly broadened federal powers and inflamed states' rights advocates. This decision occurred against a backdrop of mismanagement and scandal at the Bank of the United States, even including the Baltimore cashier J. W. McCulloch who was embezzling funds from the Bank.[10]

Ironically, locally in New England in the form of the Suffolk banking system, the Suffolk Bank of Boston organized a system of correspondent banks that operated very much in the spirit of the Bank of England. The Suffolk Bank guaranteed clearance of the bank notes of the correspondent banks at par. In return, the correspondent banks maintained reserves with the Suffolk Bank, which monitored their books and limited their risk-taking. However, this nascent system of central banking could never become a model for a U.S. central bank given the implacable hostility toward a central bank in much of the rest of the United States. As Hammond (1957, 287) noted, "In popular accounts the Bank of the United States is most often presented as an embodiment of the 'money power,' a vague but immense evil, overcome by Andrew Jackson and his agrarian followers."

Distrust of domination of the financial system by the eastern financial establishment reflected the populist view that one's destiny was controlled by powerful external forces. Hammond (1957, 499) first quoted James K. Polk, governor of Tennessee and later U.S. president, and then elaborated:

> "What the farmer or planter should most desire is a regular course of policy, steadily pursued, by which prices may remain settled and not be subjected to great and sudden changes, often brought about by extended bank credits to a small class who have overtraded or engaged in visionary or disastrous speculation."
>
> Whether expressed by the urban mechanic or by the farmer, the complaint was the same. It was the venerable complaint that credit and speculation artificially disturb the normal values of things, inflicting on the economy alternate fever and prostration and undoing the sober efforts of steady and honest men.

Hard money men including John Adams and Thomas Jefferson simply thought of banks as swindlers and cheats because they could create paper money as a multiple on a smaller base of specie. Jefferson (2011, 128) expressed the American populist view that through their ability

[10] Hammond (1957, 598) wrote that free banking (state-chartered banks) "was a program...to advance states' rights in the economic field at the cost of federal powers. . . ."

to create paper money banks encouraged the speculation that led to asset bubbles and subsequent financial ruin:

> Everything predicted by the enemies of banks, in the beginning, is now coming to pass. We are to be ruined by the deluge of bank paper. It is cruel that such revolutions in private fortunes should be at the mercy of avaricious adventurers, who, instead of employing their capital, if any they have, in manufactures, commerce, and other useful pursuits, make it an instrument to burden all the interchanges of property with their swindling profits, profits which are the price of no useful industry of theirs [Letter to Thomas Cooper 1814].

Mihm (2007, 110) captured the popular perception that the ability of banks, especially state banks, to issue bank notes was the equivalent of counterfeiting:

> During the following years [after the end of the first Bank of the United States in 1811] there occurred an explosion of state-chartered banks and an erosion of the boundaries between genuine and counterfeit currency. Emancipated from the strictures of the national bank (and flush with federal deposits), state banks issued far too many notes.... As every man became a banker, advocates of sound currency took issue with the "rags" that now passed for money. One satirist inquired why "the privilege of coining money, one of the highest attributes of sovereignty, [was] permitted thus to be exercised by bankrupts, and tavern keepers, whose notes will either not pass at all, or pass under a depreciation?" In "civilized countries," the writer continued, counterfeiting was "severely punished." What was the difference between a man passing a "fictitious note" versus "a note that he knows will not command the value expressed on the face of it? The one indeed is a forgery, the other a rank imposition, but the offence of the individual, and the injury to society, is of the same nature." It was hardly a new observation, but it captured the dissolution of the boundaries between the real and the counterfeit accelerated by the national bank's demise.

The newly formed state-chartered banks earned the pejorative appellation of "caterpillar banks," a mocking reference to banks that should be pillars of the community (Nelson 2013, 55).[11] Later, after the demise of the second Bank of the United States, the rise of such banks earned a similar moniker of "wildcat" banks.

[11] While Nelson (2013, 49–54) noted that the caterpillar banks provided their stockholders with the resources to speculate in land and caused "currency inflation" (p. 55), he pointed out that they replaced a system of granting credit that could be much more usurious. Stores granted farmers the credit they needed to buy the means to plant crops, "but the families paid high prices for goods, as well as hidden interest rates that approached 50 percent or more" (p. 56).

A legacy of the 1819 panic was the public perception that recession and deflation resulted from the bursting of speculative asset bubbles, in this case speculation in land.[12] Numerous groups looked for scapegoats in banks. The agrarian southern and western interests blamed financial interests in New England. State-chartered banks blamed the Bank of the United States. "After 1825 Andrew Jackson and Martin Van Buren forged these camps into a party that—rightly or wrongly—would blame the nation's financial troubles on New England" (Nelson 2013, 79). The Jacksonian implacable opposition to a central bank would continue in the Democratic Party down through William Jennings Bryan.

The First Bank of the United States (1791–1811) and Second Bank of the United States (1816–36) were national banks chartered by Congress. They assured a uniform currency by enforcing convertibility into gold of the bank notes issued by the state banks, which were chartered by state legislatures. Whig Party politicians, who favored a government in Washington that could make national improvements, supported the Second Bank of the United States. However, the association of the Bank of the United States with eastern financial interests led the agrarian interests in the West and South to oppose it. Congress failed to override President Andrew Jackson's 1832 veto of the re-chartering of the Second Bank of the United States. Opposition to a central bank that would regulate state banks also arose from defenders of states' rights. Moreover, hard money men, who thought of the bank issuance of money as akin to theft, distrusted all banks. After the charter of the Second Bank of the United States expired in 1836, the United States had no central bank until the creation of the Federal Reserve.

3. THE IMPETUS TO REFORM OF THE MONETARY SYSTEM

Agitation for currency reform increased in 1894 after the 1893 financial panic and suspension of payments by correspondent banks (central reserve city banks in New York, Chicago, and St. Louis) to country banks wanting currency for deposits held with their correspondents.[13]

[12] That perception still existed at the time of the establishment of the Federal Reserve. F. W. Taussig (1913, 424), eminent Harvard professor, wrote in his textbook, "The sharp crises of 1818 and 1837 came as the climax, not only of general speculative activity, but of excessive issues of notes by scattered and ill-regulated banks."

[13] For example, John DeWitt Warner (1895) wrote of the 1893 financial panic: "Almost between morning and night the scramble for currency had begun and culminated all over the country, and the preposterous bulk of our circulating medium had been swallowed up.... Currency was hoarded until it became so scarce that it had to be bought as merchandise at a premium.... Our laws provided but one resource—additional issue

Before then, agitation had come primarily from the western silver-mining states wanting free silver coinage at a fixed ratio to gold coinage. General agreement existed over the problem. In 1863 and 1864, the National Bank Act had created a charter for national banks. They gained the exclusive right to issue bank notes, but only against collateral in the form of Treasury bonds. As a result, the supply of bank notes had an upper limit. This "inelasticity" strained the ability of the financial system to function during periods of peak seasonal demands for credit and during financial panics when gold flowed out of the banking system.

Bankers and businessmen could agree that the country needed an "elastic" currency, that is, a system of money and credit that could expand with the needs of trade and accommodate the demand for currency in a panic. However, the country remained divided between the eastern financial and industrial interests and the southern and western agrarian interests. There was widespread opposition to anything representing a European central bank.

Wicker (2005) summarized the variety of reform proposals that emerged toward the end of the 19th century. Reflecting the input of commercial bankers, the least-common-denominator in these proposals was the provision of "elasticity" to the currency through variation in bank notes responsive to the supply of commercial paper. The prevention of over issue would occur through the "self-regulating" mechanism of restricting bank note issuance to the discounting of commercial paper or real bills (Mints 1945, 227–8). As expressed in the term "asset-based currency," bank notes would be issued based on the supply of real bills.

In opposition to the proposals advanced by bankers' groups, William Jennings Bryan (D-Nebraska) organized the populist agrarian interests of the Democratic Party and the free-silver western interests into a coalition that challenged the gold standard in favor of bimetallism. He became the nominee of the Democratic Party in the 1896 presidential election and ran against Republican William McKinley. Under the gold standard, the price level had declined in the last quarter of the 19th century. Bryan attacked the gold standard as a system favoring creditors over debtors by making the repayment of loans more costly. The large banks of the Northeast represented the creditors and the farmers

---

of National-bank notes. The National banks were urgently summoned to perform their most important legitimate function—that of giving elasticity to a currency.... The only result was to demonstrate the worthlessness of the National banking system itself.

We had had it for thirty years. Its original aim had really been, not to provide bank note currency—there was a plethora of that when the National banking system was established—but rather to starve the business public into purchasing Government bonds as a condition for being permitted to do business at all."

of the Midwest and South represented the debtors. The most famous line in Bryan's 1896 speech at the Democratic National Convention was its ending:

> Having behind us the commercial interests and the laboring interests and all the toiling masses, we shall answer their demands for a gold standard by saying to them, you shall not press down upon the brow of labor this crown of thorns. You shall not crucify mankind upon a cross of gold.

After Bryan's defeat by McKinley in the 1896 presidential election, bimetallism as a political agenda died. Nevertheless, Bryan assembled a powerful Democratic populist coalition that attacked the eastern financial interests. Bryan's opposition rendered impossible the creation of a central bank modeled after the Bank of England and located in New York. Bryan wanted "exclusive public control of the reserve system [and] governmental issue of and liability for the currency" (Link 1956, 206).

However, opponents of government control of the monetary system associated those powers with the government's issue of greenbacks in the Civil War. Governments, they believed, would over-issue money and initiate speculative boom-bust cycles. No one proposed anything like a modern central bank with the power to create money in the sense of adding to "lawful money" (gold and silver certificates, gold and silver coins, U.S. Treasury issued currency).

In the later debate over the creation of the Federal Reserve, Elihu Root, Republican senator from New York and earlier secretary of War under William McKinley and secretary of State under Theodore Roosevelt, expressed these views. In a speech in 1913, Root (cited in Grant [1992, 143]) exclaimed:

> With the exhaustless reservoir of the government of the United States furnishing easy money, the sales increase, the businesses enlarge, more new enterprises are started, the spirit of optimism pervades the community. Bankers are not free from it. They are human. The members of the Federal Reserve Board will not be free of it. They are human. All the world moves along upon a growing tide of optimism. Everyone is making money. Everyone is growing rich. It goes up and up, the margin between costs and sales continually growing smaller as a result of the operation of inevitable laws, until finally someone whose judgment was bad, someone whose capacity for business was small, breaks; and as he falls he hits the next brick in the row, and then another, and then another, and down comes the whole structure.
>
> That, sir, is no dream. That is the history of every movement of inflation since the world's business began, and it is the history

> of many a period in our own country. That is what happened to greater or less degree before the panic of 1837, of 1857, of 1873, of 1893, and of 1907. The precise formula which the students of economic movements have evolved to describe the reason for the crash following this universal process is that when credit exceeds the legitimate demands of the country the currency becomes suspected and gold leaves the country.

Bankers distrusted any government involvement in the control of the banking system. In the course of the later debate over the Federal Reserve Act, Link (1956, 225) wrote that in summer 1913, "[T]he evidence was overwhelming that the great majority of bankers, whether from Wall Street or Main Street or from the North or the South, regarded the Federal Reserve bill with repugnance ranging from merely strong to violent hostility."

The bank panic and recession of 1907 provided a strong impetus to reform.[14] The Aldrich-Vreeland Act of 1908 passed in response to the 1907 panic provided for a National Monetary Commission comprising nine representatives and senators from Congress with Senator Nelson Aldrich, chairman of the Senate Finance Committee and Republican from Rhode Island, as chairman. As an input to the final report of the Commission, in 1910 a small number of key players from Wall Street met secretly at Jekyll Island to formulate a plan for monetary reform. The 1910 "duck hunt" on Jekyll Island included Senator Nelson Aldrich, his personal secretary Arthur Shelton, former Harvard University professor of economics Dr. A. Piatt Andrew, J.P. Morgan & Co. partner Henry P. Davison, National City Bank president Frank A. Vanderlip, and Kuhn, Loeb, and Co. partner Paul M. Warburg (Wicker 2005). This group produced a precursor to the Aldrich Plan, which was the core of the bill the National Monetary Commission sent to Congress.

On January 9, 1912, the National Monetary Commission sent to Congress its draft of a bill, known as the Aldrich bill, to create a National Reserve Association. It would have its headquarters in Washington with 15 branches that would discount the paper of member banks in their district. The member banks would elect the boards of the local branches. These boards would elect the national board's directors, which would include representatives of agricultural, commercial, and industrial interests.

---

[14] On the Panic of 1907, see Bruner and Carr (2007) and Tallman and Moen (2012).

A. Piatt Andrew's views offer insight into the purposes of the Aldrich plan.[15] Wicker (2005, 65) listed Andrew's statement of the goals of the Aldrich proposal: (1) to prevent banking panics; (2) to relieve seasonal stringencies in the money market; (3) to control stock market speculation by the diversion of funds from the money market; (4) to make bank notes and reserves more responsive to business needs; and (5) to provide new facilities for foreign trade.

The Aldrich bill elicited widespread criticism. Critics considered it a central bank with regional branches. The proposed National Reserve Association would have had the authority to set a uniform rate of discount throughout the country. The Democratic Platform of 1912, in the section "Banking Legislation," opposed it as creating a central bank (Woolley and Peters 1999–2015):

> We oppose the so-called Aldrich bill or the establishment of a central bank; and we believe our country will be largely freed from panics and consequent unemployment and business depression by such a systematic revision of our banking laws as will render temporary relief in localities where such relief is needed, with protection from control of dominion by what is known as the money trust.
>
> Banks exist for the accommodation of the public, and not for the control of business. All legislation on the subject of banking and currency should have for its purpose the securing of these accommodations on terms of absolute security to the public and of complete protection from the misuse of the power that wealth gives to those who possess it.

While governor of New Jersey, Woodrow Wilson had denounced the "money trust" and declaimed that "the greatest monopoly in the country is the money monopoly. So long as it exists our old variety of freedom and individual energy of development are out of the question." As recounted in Berg (2013, 299), President Wilson consulted Louis Brandeis on the contentious issues involved with the legislation creating the Fed.[16] Brandeis told Wilson that the legislation would have "to

[15] Andrew is important as the chief assistant to Nelson Aldrich in the latter's capacity as chairman of the National Monetary Commission. As Wicker (2005, 64) reported, Andrew was a professor of economics at Harvard University and was recommended to serve on the Commission by Harvard's president. Andrew edited the special studies sponsored by the Commission. See also Andrew (1913).

[16] Brandeis was a progressive lawyer and Supreme Court justice from 1916 to 1939. He published a book in 1913 arguing that investment bankers created monopolies through interlocking directorates of corporations. Brandeis (1913, 6) started Chapter I ("Other People's Money and How the Bankers Use It") by citing Wilson's "money trust speech" and continued, "The development of our financial oligarchy followed... lines with which the history of political despotism has familiarized us:—usurpation, proceeding by gradual encroachment.... It was by processes such as these that Caesar Augustus became master of Rome."

curb the money trust" and "remove the uneasiness among business men due to its power."

In a speech on June 23, 1913 ("On Banking and Currency Reform"), cited in Berg (2013, 297), Wilson wrote:

> We must have a currency... elastically responsive to sound credit.... Our banking laws must mobilize reserves; must not permit the concentration anywhere in a few hands of the monetary resources of the country or their use for speculative purposes in such volume as to hinder or impede or stand in the way of more legitimate, fruitful uses. And the control of the system of banking and of issue which our new laws are to set up must be public, not private, must be vested in the Government itself, so that the banks may be instruments, not the masters, of business and of individual enterprise and initiative.

If a coup de grace had been needed to kill a proposal for a central bank headquartered in New York, it came with the Pujo hearings. Under the leadership of Arsene Pujo (D-Louisiana), chairman of the House Committee on Banking and Currency in 1912 and 1913, the House of Representatives conducted hearings on the "Money Trust." Its investigation showed that a small number of individuals like J. P. Morgan, through the arrangement of interlocking directorates, controlled the large Wall Street banks and many large corporations, especially the railroads and utilities. The Pujo hearings ran concurrently with the hearings on the proposals for the Federal Reserve.

Despite the widespread criticism of the Aldrich bill, it served as the prototype for the Federal Reserve Act. The draft bill sent to Congress in 1912 by the National Monetary Commission recommended elimination of the backing of bank notes by Treasury bonds because "Our bond secured-currency... is not... responsive, either in expansion or contraction, to the ever-changing conditions and demands of business" (National Monetary Commission 1912, 17). A National Reserve Association with 15 branches would hold reserves of the member banks. The private/public character of the National Reserve Association would come from the election by member banks of the regional boards, which would elect the members of the national board. In addition, the national board would include the secretary of the Treasury, the secretary of Agriculture, the secretary of Commerce and Labor, and the comptroller of the currency. The private element reflected the desire to prevent the political control of money. "While it may be contended that the issue of money of any kind is a distinctive function of sovereign power, the exercise of this authority directly by Governments has, as shown by the experience of the world, inevitably led to disastrous results" (National Monetary Commission 1912,18).

Real bills principles appeared in the intention to prevent the flow of funds to New York for financing the purchase of stocks on margin. The regional associations would have the responsibility to prevent the speculative use of credit.

> The narrow character of our discount market...results in sending the surplus money of all sections... to New York, where it is usually loaned out on call on Stock Exchange securities, tending to promote dangerous speculation... (National Monetary Commission 1912, 8).
>
> An advance in bank rates is used to curb speculation and prevent overexpansion of credit (National Monetary Commission, 27). We give the Reserve Association effective means to check speculation and to prevent undue expansion through the power to advance its discount rate (National Monetary Commission 1912, 37). We can not suppose that the directors of a local association would be likely to indorse the paper of an individual bank to promote speculation or when dangerous expansion would be likely to follow (National Monetary Commission 1912, 39).

In August 1913, Wilson acted decisively to push through Congress the Federal Reserve Act. Earlier, he made clear "that he would insist upon exclusive government control of the Federal Reserve Board and upon making Federal Reserve notes the obligation of the United States" (Link 1956, 213).[17] Presumably reassured, Bryan supported the bill and ended the threat of a "general rebellion" among Bryan Democrats (Link 1956, 222). Wilson ignored the protests of bankers and pressured congressional Democrats. Wilson stated, "The Democrat who will not support me is not a Democrat. He is a rebel" (Link 1956, 230). The result was the Federal Reserve System. The unintended consequence was to create a central bank.

4. THE REAL BILLS FOUNDATION OF THE EARLY FED

What the players involved in the creation of the Federal Reserve failed to understand in their rejection of the Bank of England as a model was how the central role it played in the operation of the international gold standard provided a nominal anchor for the paper pound and to the other currencies pegged to gold. As a result, the policymakers who ran the Federal Reserve System failed to understand how raising interest rates in order to squelch what they perceived as speculation would produce the very deflation they believed they were preventing. The

[17] Bank note issuance would end with the creation of the Federal Reserve.

following elaborates this point by highlighting the common emphasis in the writings of Paul Warburg and Carter Glass.[18]

Paul Warburg campaigned for a bank modeled after the Bank of England and the Reichsbank.[19] Sensitive to the political aversion to a central bank, he proposed a United Reserve Bank, which served as a model for the National Reserve Association proposed by Senator Nelson Aldrich. Warburg contrasted unfavorably the illiquidity of the loans that American banks made to finance trade to the liquidity of debt instruments in the London money market. For the United States, there was no secondary market. In contrast, in London, a broker could issue a bill of exchange. A bill of exchange was a commitment to pay a given sum of money at a future date to a specified party. Because it was transferable through endorsement, it could obligate payment to a third party. When signed (by one or two banks that vouched for the creditworthiness of the issuer), it could be sold in a liquid acceptances market. Warburg believed that the London money market was more liquid than the New York money market because the Bank of England stood ready to provide reserves by discounting bills in the event of a financial panic.

Warburg believed that the centralization of reserves at the Bank of England and its willingness to discount freely in the event of a financial panic provided the confidence that prevented panics from occurring. Warburg (1910, 32) wrote:

> This system is based on confident and immutable reliance by the banks on the fact that against good and legitimate bills a cash credit is always obtainable at the central bank, and that no one will therefore needlessly withdraw or hoard cash.... [A]ctual hoarding must be a thing inconceivable in a modern country....

[18] Paul Warburg was a German-born financier who became a partner in the New York firm of Kuhn, Loeb, & Co. He campaigned tirelessly for a bank like the German Reichsbank or Bank of England that would create a deep market for discounted paper and make New York a rival to London as a financial center. See also Roberts (1998).

Carter Glass was from Lynchburg, Va. In 1902, he won election to the House of Representatives as a Democrat. In 1913, Glass became chairman of the House Committee on Banking and Currency where he and his assistant H. Parker Willis were instrumental in passing the Federal Reserve Act. The bill establishing the Federal Reserve was known as the Glass-Owen Act. Robert Latham Owen had been elected as a senator in 1907 from Oklahoma. In 1913, he became chairman of the Senate Banking Committee.

[19] Good discussions are in Whitehouse (1989), Wicker (2005), and Morris (forthcoming). In general, American debate was parochial and confined to U.S. experience. "In matter of banking theory there is little evidence of interchange of ideas between the United States and Great Britain between the years 1860 and 1913" (Mints 1945, 255). Similarly, in her review of the contributions of Edwin W. Kemmerer to debates over the founding of the Federal Reserve, Rebeca Betancourt (2010, fn. 43) noted the absence of any mention of the British monetary tradition such as Hume's price-specie-flow mechanism, Currency School principles, and Bagehot's lender of last resort theory.

In the United States, in the absence of a central bank, the call loan market, that is, the short-term loans made for the purchase of stocks on margin, buffered fluctuations in the demand for circulating currency. Loans flowing into the call loan market encouraged speculation and loans flowing out encouraged panicky selling. Warburg (1910, 24, 25, 36, and 37) wrote:

> In sharp contrast with such a system [the British system] the attempts to liquidate [sell money-market instruments] in the United States are directed primarily at the contractors of stock exchange loans. This means that a comparatively limited number of debtors are called upon to sell securities.... The concomitant of this is that those forced to sell securities at such times must offer them at sufficiently reduced prices to bring about an entire change in the attitude of the investor. The difficulty here is that violent reductions of prices in themselves cause distrust, and low prices caused by distrust not only frighten away purchasers but, in addition, unsettle the owners of securities and thus cause them to join the ranks of the sellers. An acute convulsion, therefore, must inevitably follow before the tide can be turned.... Everybody knows that under our system convulsions must follow acute strains and must precede a cure....
>
> Elasticity [of the note issue] does not mean expansion, but expansion and contraction.... [T]he additional benefit of contraction is that it prevents inflation [of asset prices], with all its dangerous consequences.... Notes issued against discounts mean elasticity based on the changing demands of commerce and trade of the nation, while notes based on government bonds mean constant expansion without contraction, inflation based on the requirements of the government without connection to any kind with the temporary needs of the toiling nation.

Carter Glass (1927, 61) wrote in his book *An Adventure in Constructive Finance* (cited in Morris [forthcoming]):

> The national currency was inelastic because it was based on the bonded indebtedness of the United States. The ability of the banks to meet the currency needs of commerce and industry was largely measured by the volume of bonds available.... For half a century we banked on the absurd theory that the country always needed a volume of currency equal to the nation's bonded indebtedness and at no time ever required less, whereas we frequently did not need as much as was outstanding and quite often required more than it was possible to obtain. So, when more was needed than could be gotten, stringencies resulting and panics would be precipitated.... When currency was redundant, when the volume was more than required for actual currency transactions, instead of taking it through the expensive process of retirement, it was sent by interior banks to the

> great money centres to be loaned on call for stock and commodity gambling.
>
> [I]n seasons of depression, with moderate demands for credits and currency for local commercial transactions, the country banks would bundle off their surplus funds to the money centres, to be loaned, on call, for speculation. At periods with stock gambling in full blast, trading in business would revive, demands for credit and currency would ensue, and, with speculative loans extended beyond all capacity to pay, the call for funds from "the street" would create consternation. Interest charges would quickly jump higher and higher, panic would seize gambler and banker alike, and prevailing prosperity would be superseded by distress everywhere.

Both Glass and Warburg subscribed to real bills principles. Friedman and Schwartz (1963, 266) quoted Charles Hamlin, member of the Federal Reserve Board who cited Warburg, as arguing that when the Fed put "money into circulation" by purchasing a bankers' acceptance it "went primarily to aid a genuine business." In contrast, when it purchased a government security, "no one could tell where it might go, e.g. to be loaned on Wall Street." In the main entrance of the Eccles building of the Federal Reserve Board of Governors, there is a bas-relief figure of Glass with an inscription stating the mission of the Fed as the prevention of financial "debauches."

Real bills principles also carried the name "commercial loan theory of banking." Alvin Hansen (1941, 75 and 71), Harvard professor and the chief proselytizer for Keynesianism in America, summarized this philosophy of central banking:

> The Reserve System had been established on the commercial banking theory. The member banks ideally were to extend credit only on the basis of self-liquidating loans. They were to "monetize" the credit of producing and marketing units. Bank loans work to refinance goods during the process of production or marketing. And when the process was completed, the sale of the goods would supply the funds to repay the loans. Thus, the process of production would be facilitated by bank credit accommodation.
>
> The central basis of stabilization policy rested upon the firm belief that the boom was the progenitor of the depression and, if it could be controlled, stability would result. It would not do to wait until depression was already upon us to introduce control measures. The time for action was in the preceding phase of the cycle. Once the boom had been allowed to run its course, depression was regarded as inevitable and it, in turn, would perforce have to be permitted to run its course. Preventive, not remedial, measures were required.

The creators of the Federal Reserve intended that the real bills provisions of the Federal Reserve Act would automatically allocate credit toward productive uses and away from speculative uses. In order to implement this objective, the act transferred bank reserves from the New York banks, which lent them in the call loan market to finance the purchase of stocks on margin, to the regional Reserve Banks, which lent only on real bills. Edwin W. Kemmerer (1928, 37) wrote:[20]

> The time therefore arrived in the summer of 1917 when commercial banks belonging to the federal reserve system ceased tying up their legal reserve money by depositing it in the banks of our money market centers there to be loaned out at call to speculators on the stock and produce exchanges. This divorcing of the legal reserve of over 9,000 commercial banks from the speculative and capital loans of the stock market—mainly that of Wall Street—is one of the big achievements of the federal reserve system.[21]

Concluding Comments

Today, one naturally uses the term "central bank" to describe the Federal Reserve System. Given the present association of that term with responsibility for macroeconomic stability and prices, the Fed's willingness in the Depression to allow deflation is puzzling. However, this concept of the responsibilities of a central bank developed only after the Treasury-Fed Accord in 1951. The Fed's willingness to allow deflation during the Depression came from a real bills understanding of its responsibilities, that is, a responsibility to prevent speculation. Moreover, early monetary policymakers had no sense of their responsibility for the price level. When viewed in the historical context described here, that deflation is less puzzling.

---

[20] Kemmerer, who was a professor of economics at Princeton, was known as "Dr. Money" for his advising on issues of central banking.

[21] In June 1917, Federal Reserve member banks had to hold all their required reserves with their regional Federal Reserve Bank. The citation is from Jacobson and Tallman (2014).

REFERENCES

Andrew, A. Piatt. 1913. "The Crux of the Currency Question." *Yale Review* 2 (July): 595–620.

Berg, A. Scott. 2013. *Wilson*. New York: G. P. Putnam's Sons.

Betancourt, Rebeca Gomez. 2010. "Edwin Walter Kemmerer and the Origins of the Fed." *Journal of the History of Economic Thought* 32 (December): 445–70.

Brandeis, Louis D. 1913. *Other People's Money and How the Bankers Use It*. New York: Frederick A. Stokes Company.

Bruner, Robert F., and Sean D. Carr. 2007. *The Panic of 1907: Lessons Learned from the Market's Perfect Storm*. Hoboken, N. J.: John Wiley & Sons.

Cowen, David J. 2000. "The First Bank of the United States and the Securities Market Crash of 1792." *The Journal of Economic History* 60 (December): 1,041–60.

Federal Reserve Board. 1920. "Reply of the Federal Reserve Board to A Letter from Senator Robert L. Owen Criticizing Certain Policies of the Federal Reserve System." Available in Fraser, Federal Reserve Bank of St. Louis (December).

Friedman, Milton. [1964] 1969. "Post-War Trends in Monetary Theory and Policy." In *The Optimum Quantity of Money and Other Essays*, edited by Milton Friedman. Chicago: Aldine Publishing Company, 75–9.

Friedman, Milton. 1982. "Monetary Policy: Theory and Practice." *Journal of Money, Credit, and Banking* 14 (February): 98–118.

Friedman, Milton, and Anna J. Schwartz. 1963. *A Monetary History of the United States, 1867–1960*. Princeton, N. J.: Princeton University Press.

Glass, Carter. 1927. *An Adventure in Constructive Finance*. Garden City, N.Y.: Doubleday, Page.

Glass, Carter. 1932. "Senator Glass' Testimony, May 10, 1932." *Congressional Record—Senate*, 1,984–5.

Grant, James. 1992. *Money of the Mind: Borrowing and Lending in America from the Civil War to Michael Milken*. Farrar Straus Giroux: New York.

Haltom, Renee, and Jeffrey M. Lacker. 2014. "Should the Fed Have a Financial Stability Mandate: Lessons from the Fed's first 100 Years." Federal Reserve Bank of Richmond *2013 Annual Report*, 5–25.

Hammond, Bray. 1957. *Banks and Politics in America from the Revolution to the Civil War*. Princeton, N. J.: Princeton University Press.

Hansen, Alvin H. 1941. *Fiscal Policy and Business Cycles*. New York: W.W. Norton & Co.

Hetzel, Robert L. 1985. "The Rules versus Discretion Debate over Monetary Policy in the 1920s." Federal Reserve Bank of Richmond *Economic Review* 71 (November/December): 3–14.

Irving, Washington. [1819–20] 2008. "A Time of Unexampled Prosperity," *The Crayon Papers: The Great Mississippi Bubble, 1819–1820*. Federal Reserve Bank of Dallas *Economic Letter* 3 (April): 1–8.

Jacobson, Margaret M., and Ellis W. Tallman. 2015. "Liquidity Provision during the Crisis of 1914: Private and Public Sources." *Journal of Financial Stability* 17 (April): 22–34.

Jefferson, Thomas. 2011. *The Papers of Thomas Jefferson, Retirement Series*, vol 7, 28 November 1813 to September 1814. Princeton, N. J.: Princeton University Press.

Kamensky, Jane. 2008. *The Exchange Artist: A Tale of High-Flying Speculation and America's First Banking Collapse*. New York: Viking.

Kemmerer, Edwin Walter. 1928. *The ABC of the Federal Reserve System*. Princeton, N. J.: Princeton University Press.

Link, Arthur S. 1956. *Wilson: The New Freedom*. Princeton, N. J.: Princeton University Press.

Mihm, Stephen. 2007. *A Nation of Counterfeiters: Capitalists, Con Men, and the Making of the United States*. Cambridge, Mass.: Harvard University Press.

Mints, Lloyd W. 1945. *A History of Banking Theory*. Chicago: University of Chicago Press.

Morris, Edward. Forthcoming. *Wall Streeters: The Creators and Corruptors of American Finance*. New York: Columbia University Press.

National Monetary Commission. 1912. "Letter from Secretary of the National Monetary Commission Transmitting, Pursuant to Law, the Report of the Commission." Washington, D. C.: Government Printing Office, January 9.

Nelson, Scott Reynolds. 2013. *A Nation of Deadbeats: An Uncommon History of America's Financial Disasters*. New York: Vintage Books.

Roberts, Priscilla. 1998. "'Quis Custodiet Ipsos Custodes?' The Federal Reserve System's Founding Fathers and Allied Finances in the First World War." *Business History Review* 72 (Winter): 585–620.

Rockoff, Hugh. 2014. "Review of *Fragile by Design: The Political Origins of Banking Crises and Scarce Credit*, by Charles W. Calomiris and Stephen Haber." Available at http://eh.net/book_reviews/fragile-by-design-the-political-origins-of-banking-crises-and-scarce-credit/.

Sumner, William G. 1874. *A History of American Currency*. New York: Henry Holt.

Tallman, Ellis W., and Jon R. Moen. 2012. "Liquidity Creation Without a Central Bank: Clearing House Loan Certificates in the Banking Panic of 1907." *Journal of Financial Stability* 8 (December): 277–91.

Taussig, F. W. 1913. *Principles of Economics*, vol. I. New York: The Macmillan Company.

Timberlake, Richard H. 1993. *Monetary Policy in the United States: An Intellectual and Institutional History*. Chicago: The University of Chicago Press.

Vreeland, Edward B. 1912. "The Plan of the National Monetary Commission for the Revision of Our Banking and Currency Laws : Speech of Hon. E. B. Vreeland in the House of Representatives, February 6, 1912." Available at https://fraser.stlouisfed.org/scribd/?title_id=647&filepath=/docs/historical/nmc/nmc_1912_vreeland.pdf#scribd-open.

Warburg, Paul M. 1910. "The Discount System in Europe." Washington, D.C.: National Monetary Commission/Washington Government Printing Office. Available at https://fraser.stlouisfed.org/docs/historical/nmc/nmc_402_1910.pdf.

Warner, John DeWitt. 1895. "The Currency Famine of 1893." In *Sound Currency*, vol. II, no. 6. New York: The Sound Currency Committee of the Reform Club, February 15.

Wheelock, David C. 1991. *The Strategy and Consistency of Federal Reserve Monetary Policy, 1924–1933*. Cambridge, Mass.: Cambridge University Press.

Whitehouse, Michael A. 1989. "Paul Warburg's Crusade to Establish a Central Bank in the United States." Federal Reserve Bank of Minneapolis *The Region,* May, 1–9.

Wicker, Elmus. 2005. *The Great Debate on Banking Reform: Nelson Aldrich and the Origins of the Fed*. Columbus, Ohio: The Ohio State University Press.

Wilburn, Jean Alexander. 1967. *Biddle's Bank: The Crucial Years*. New York, Columbia University Press.

Wood, John H. 2005. "A Model of Federal Reserve Behavior." In *A History of Central Banking in Great Britain and the United States*. New York: Cambridge University Press, 2005.

Wood, John H. 2009. *A History of Macroeconomic Policy in the United States*. London and New York: Routledge.

Woolley, John, and Gerhard Peters. 1999–2015. "Political Party Platforms." The American Presidency Project. Available at www.presidency.ucsb.edu/ws/?pid=29590.