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Abstract

The Federal Reserve's "quantitative easing" (QE) policy ended in the fall of 2014, even though economic growth in the US was still sluggish, wage growth was stagnant and inflation was still far below the Federal Reserve's target of 2%. In this paper we seek some clues to help explain the Fed's decision by studying the political economy of the QE policy. In particular, we study which business sectors were expected to gain and which ones were expected to lose from the three rounds of QE, indicating, perhaps, the political pressures the business community might have brought to bear on Federal Reserve decisions at that time. This paper is a follow up to Montecino and Epstein (2014) in which we studied the impact of QE I on the large banks that had been counter parties to the Federal Reserve's Large Scale Asset Purchase Program and on other banks that had significant amounts of mortgage backed securities (MBS) on their balance sheets. We showed that these banks' profits were increased by QE1 compared to other banks that did not have a large amount of MBS. These positive effects were especially large for large banks. In the current paper, we extend the analysis to encompass all three rounds of QE, and we study the impacts of these rounds on the expected profitability of all sectors of US business. Here we undertake an "event study" to assess whether there were "cumulative abnormal returns" around the windows of the announcements of the rounds of QE. We find that in QE1, investors' expectations were quite dispersed but that, as in our previous study, large financial firms (among others) were expected to benefit from QE1, as were several other key business sectors, including energy, construction and autos. With QE2, investor expectations were less dispersed, and most firms were expected to benefit, as judged by abnormal returns. Importantly, during the QE2 round, the mean expected benefits for all firms were reduced relative to QE1. By QE3, only a few sectors, including some subsectors of finance, especially large banks, were expected to benefit, while now a non-trivial set of sectors were expected by investors to be harmed by QE3. Moreover, the mean expected benefit for all firms was quite small, compared with the previous two rounds. These vanishing expected benefits accompanied by more negative impacts suggest that "QE fatigue" might have set in for much of US business. We conjecture that this "QE fatigue" along with the expected negative returns experienced by many banks and other firms by the third round, helps to explain the Federal Reserve's decision to end QE in the fall of 2014.

JEL classification: G21, G28, G32

Keywords: Quantitative Easing, monetary policy, profitability

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1 Introduction

On October 29, 2014, just a month shy of six years after it began, the Federal Reserve ended its experiment with "quantitative easing" (QE). Conceived in the throes of the financial market meltdown following the bankruptcy of Lehman Brothers in September, 2008, the Fed's QE was initiated on November 25, 2008 as part of a broad and massive program to prevent the US and, indeed, global economy from spiraling downward, and to prevent major banks and other financial institutions in the US and Europe from collapsing altogether. (See Bernanke (2015b) for an explanation of the Fed's motives and Engen et al. (2015), for details about the program). Over the course of these six years, the Federal Reserve bought 3.5 trillion dollars of government securities and mortgage backed securities in three main phases, while in the process, maintaining short term interest rates near zero. These policies drove up asset prices and expanded the Federal Reserve's balance sheet to the unprecedented level of almost $4.5 trillion (Engen et al., 2015). In response to these unconventional monetary policy actions, there has been a large amount of research into the effects of QE on key macroeconomic variables, including interest rates, bank lending, asset prices, inflation, and economic growth. Reflecting some concerns that these policies may have undermined the stability of the financial sector, there has also been some research concerning the impacts of QE on levels of risk taking and balance sheet health by financial institutions.

Meanwhile, a lively political debate has broken out, especially in the United States, about the impact of expansionary monetary policy generally and QE in particular on income and wealth distribution. Some politicians, former Federal reserve officials, economists and political pundits have argued that the Federal Reserve's QE and zero interest rate policies have worsened income and wealth distribution by raising prices on assets mainly held by the wealthy, while driving down returns on savings and financial assets mainly held by the middle class and poor (Brookings, 2015). Ben Bernanke and other Federal Reserve officials have responded that the distributional impacts are unclear, and in any case, are of secondary importance compared with the major objectives of monetary policy in the current environment: price stability, employment creation and financial stability (Bernanke, 2015a).

Rigorous academic research on these issues is sparse but does exist. Perhaps the best paper that covers the period prior to the financial crisis is the paper by Coibion et al. (2012). They find that, contrary to those who claim that expansionary monetary policy generates income inequality, that in fact it is contractionary monetary policy that is associated with more inequality. Unfortunately, from the perspective of the question posed in this paper, their study period ends in 2008, prior to the onset of quantitative easing. Only a few papers have investigated empirically the impact of QE on inequality in the U.S. Bivens (2015) integrates the results of a number of other studies to derive an over-all picture of the impact of near zero-interest rates plus QE on income inequality. He argues that if the counter-factual is that fiscal policy would have replaced monetary policy to provide similar economic stimulation, then in this case, QE plus zero-interest

rate monetary policy has been distributionally neutral. On the other hand, if the counterfactual is "no counter-cyclical policy", then, according to Bivens' analysis, the QE plus near-zero interest rate policy reduces inequality, primarily through its impacts on employment generation.

Montecino and Epstein (2015), by contrast, undertake an econometric analysis of QE based on a decomposition of household income data from the Federal Reserve's Survey of Consumer Finances. We identify key channels of the impact of QE on income distribution and also perform a counterfactual analysis to assess a range of causal impacts of QE. We find that QE probably did increase inequality, as measured, for example, by the 99/10 percentile ratio, largely because of the large impact of equity price increases on income inequality, and the relatively small impacts of employment generation and mortgage refinancing on reducing inequality.

While the debate on the distributional consequences of QE has been couched in terms of its impact on household inequality, this is not the only, or perhaps even the most important way to assess distributional affects, especially if one is interested in looking at the political economy of monetary policy. For political economy questions, such as, "why did the Fed undertake QE and why did it stop when it did?", an assessment of the firm level and sectoral impacts of policy might be more informative. There is an important body of research in political economy that sees major groups, such as firms, sectors and labor unions, as having a large influence on policy making. (See, eg., Ferguson, 1995). With respect to the Federal Reserve, one would expect that banks would have an especially strong influence given the Federal Reserve's structure and history, but that other firms might also have influence as well (Epstein, 1982; Epstein and Ferguson, 1984; Greider, 1989).

To shed light on the political economy of QE from this perspective, in a recent and closely related paper, we study the impact of the first phase of QE (from November 2008 until March 2010) on the bank profitability of counter-party banks to the Fed's Large Scale Asset Buying Program and to a broader group of banks that held the assets targeted by the Fed (Montecino and Epstein, 2014). We found that both the counter-party banks and other banks that held significant amounts of the targeted assets gained from the LSAP, and that this was especially true of large banks. At the same time, there is only mixed evidence that this program contributed to increases in lending by these banks to the economy.

In this earlier paper, we were concerned not only with the impact of the early phase of QE on bank profitability, but also with the motivations of the Fed's policy. The impact of QE on bank profits reported in our earlier paper is consistent with the argument that Fed policy is, to some extent at least, captured by the large wall street banks. But of course, these results are not definitive in this regard, if for no other reason that they do not assess the impact of the Fed's QE policies on other key groups.

In the current paper we extend this earlier study in several ways. First, whereas our earlier paper investigated only the first of the three phases of Federal Reserve quantitative easing, this paper evaluates

the impacts of all three phases of QE. Second, whereas the earlier paper investigates the impact of QE only on the banking sector, the current paper studies the impacts on all industries. Enlarging the scope of the analysis requires changing in important ways the approach we take to investigating the impacts so the results are not strictly comparable to the earlier work. (We discuss this in more detail below). Specifically, whereas in our earlier paper we assessed the impact of the LSAP program on bank profits, in this paper we use an "event study" framework to assess the impacts of QE announcements on "abnormal" stock returns of firms throughout the economy. As such, we look in this paper at the impact of QE on the market's expectations of future risks and returns, not on the returns themselves as in the earlier study. Nonetheless, this focus on expectations conveys important information relevant to the political economy questions we ask since it is these expectations that also reflect the political evaluations made by firm owners and managers of likely impacts of policy on their profits.

Our paper gives clues about which firms and industries were expected to benefit from the several rounds of QE, and also why QE was terminated after the third round. In particular, we find that, as in our previous study, financial institutions were expected to be big beneficiaries of QE in the first round of the bond buying program. They were joined by firms in construction and automobile production as companies that the markets expected to benefit significantly from QE. Interestingly, expectations about the impacts of the first round of QE were quite dispersed, as investors were quite unsure what the impact of this new policy would be on various firms and industries.

In Phase 2 of QE, November 3, 2010 to mid 2011, expectations of the impacts were much less widely dispersed. The median expectation was that firms in many sectors would gain, notably again finance, real estate and automobiles. Relatively few industries were expected to lose from QE. But, importantly, the median gain expected by the markets in this second phase was lower than in the first phase.

Finally, by the time phase III came around, QE "fatigue" seems to have settled in among many investors. The median expected gain was still positive but had fallen further. And at the same time, more industries were expected by investors to come out as losers. Even finance was not, overall, expected to gain. Still, it is important to note that the largest financial firms were still expected to gain, but not by as much as in previous rounds.

Plausibly, it was the lack of strong positive impact on expected returns, even for finance, in the last round of QE that sealed its demise. With increased concerns by inflation hawks, and without strong pushback by the banks or firms in other sectors to continue QE, the path of least resistance was simply to shut it down.

Perhaps just as important, for many banks the relationship between monetary policy, interest rates and bank profits returned to a more normal pattern: in the longer run, there is historically a positive relationship between interest rates and bank profits (Boria et al., 2015). If there are diminishing returns on asset price increases from open market purchases and maintaining near zero interest rates, then the asset appreciation

channel for higher financial returns is reduced in importance relative to higher interest rate margin channel (Epstein and Ferguson, 1984). As a consequence, financial pressure on the Fed to raise interest rates builds from some banks.

The rest of the paper is organized as follows. Section 2 presents our data and methodology. Section 3 presents the main results and the final section concludes.

2 Data and Methodology

In order to investigate market reactions to QE announcements, we use simple event-style regressions that make it possible to distinguish between a portfolio's "normal returns" and "abnormal returns" following a market event, We use daily stock return data obtained from CRSP and construct balanced panels of 3120 stocks for sample windows corresponding to each of the three rounds of QE (defined below). To capture differences across types of firms in the anticipated effect of QE we calculate stock return portfolios across a range of sector classifications. Specifically, the portfolios are defined according to S&P's Global Industry Classification (GIC) codes at the 2-digit, 4-digit, and 6-digit levels of disaggregation.

Let i index each firm's stock and j denote a given sector. The portfolio returns are simple equally-weighted averages of stock returns within a sector j. That is,

$$R_{jt} = \frac{1}{N_j} \sum_{i \in j}^{N_j} r_{it} \tag{1}$$

where R_{jt} is the average return at date t of portfolio j, N_j is the total number of stocks included in the portfolio, and $r_i t$ is the daily return of an individual stock i. For each constructed portfolio j, we run the following regression:

$$R_{jt} = \alpha_j + \beta_j R_t^m + \sum_{t=t_1}^{t_2} \gamma_{jt} E_t + u_{jt} \tag{2}$$

where R_t^m is the daily log return on the S&P500 index and β_j therefore captures the "market return." The event window is defined as the 2 days before and after the relevant quantitative easing announcement dates. This is captured by the third term on the right-hand side of (2). Here E_t is the event dummy and the terms γ_{jt} capture the abnormal returns of portfolio j on each day within the event window. Thus, the cumulative abnormal returns during the event window are simply the sum:

$$CAR_j = \sum_{t=t_1}^{t_2} \hat{\gamma}_{jt} \tag{3}$$

Our starting point for defining the QE announcement events are the dates identified by Gagnon et el

(2011) for QE1. Gagnon et al. identify the Federal Open Market Committee (FOMC) statement of Nov. 25, 2008 as the first announcement of quantitative easing. A number of more recent studies have extended the event dates from Gagnon et al. (see Krishnamurthy and Vissing-Jorgensen (2011), Woodford (2012), Campbell et al (2012)). Hancock and Passmore (2014) extent the event dates through December 2012 and distinguish between events foretelling increases or decreases in asset purchases. Using the dates compiled by Hancock and Passmore, we identify Federal Reserve Chairman Ben Bernanke's Aug. 27, 2010 speech as the first announcement of QE2. In addition, we identify the minutes released by the FOMC on Aug. 22, 2012 as the first hint of QE3.

In contrast to Hancock and Passmore, we focus exclusively on the initial announcement of each round of QE. In other words, we estimate the abnormal returns generated by the first hints of a new QE program, not any subsequent news. This narrower focus allows us to sidestep the issue of coding differences in types of announcements and thus avoids relying on potentially controversial judgments.

3 Results

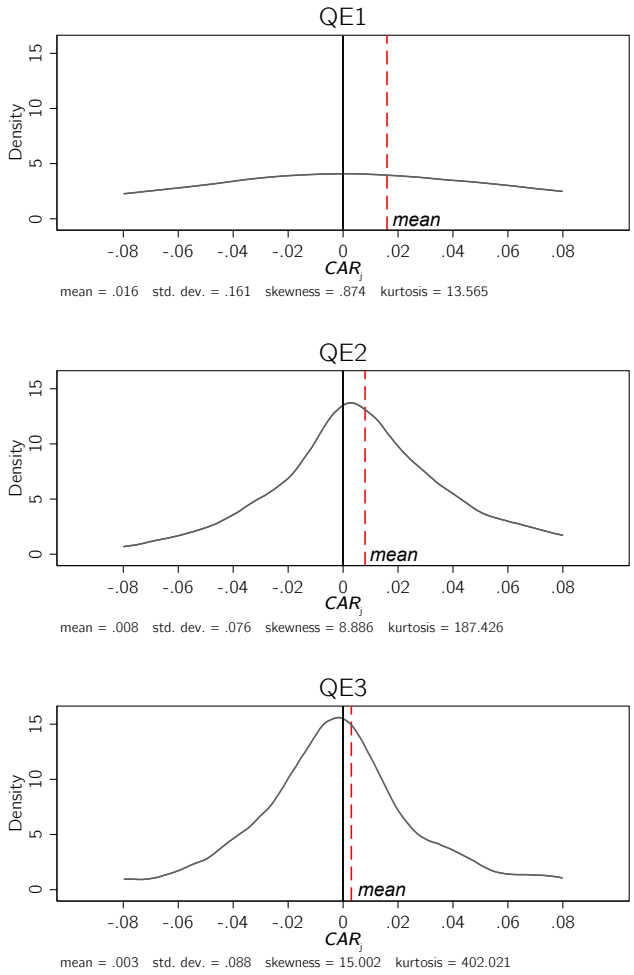
This section will present the main empirical results. We first characterize broad trends in the distributions of CAR's across individual firms through stock-specific event-style regressions. Next, we discuss the pattern of cumulative abnormal returns during QE event dates across different industrial sectors. Third, we examine the anticipated impact of QE on the financial sector distinguishing between financial firms of various types and asset sizes.

3.1 Stock-level Analysis

In this section we consider the impact of quantitative easing on individual firm stock returns. Instead of calculating the cumulative abnormal returns for stock portfolios, we instead calculate the abnormal returns for each of the 3120 individual stocks in our dataset. This allows us to examine the broader distribution of abnormal returns across the three rounds of quantitative easing and assess if there are any discernible changes in higher moments over time. The density of the abnormal returns for each round of quantitative easing is estimated using a kernel density estimator. This is shown in Figure 1, where the full range of each distribution have been truncated for expositional purposes.

The first point to note is that the anticipated effect of quantitative easing fell over each subsequent announcement. This is reflected by the falling means of the abnormal returns. The average abnormal return during QE1 was 1.6 percent, compared to 0.8 percent and 0.3 percent during QE2 and QE3, respectively. Second, QE1 was associated with a much wider range of expectations than both QE2 and QE3. In particular, the first round of quantitative easing had a far greater standard deviation than later rounds. Finally, the

Figure 1: Distribution of stock-specific cumulative abnormal returns – QE1, QE2, QE3



kurtosis of the estimated abnormal returns increases markedly over the three rounds from 13.6 during QE1 to 402 by QE3.

This exercise suggests that the expected impact of quantitative easing gradually faded across each subsequent round and that financial market expectations adjusted over time as QE became more familiar. Indeed, the first round of QE represented a major change in the conduct of monetary policy and as such was accompanied by great uncertainty regarding the overall and sector-level effects of this new policy regime. This suggests that the overall support for QE by firms might have faded over the rounds of QE, so that by the end, the Fed faced little opposition in abandoning QE.

3.2 Industry-level Analysis

We begin the sector analysis at the 4-digit level of disaggregation of the GIC, which consists of 24 distinct categories of economic activity (eg. energy, consumer staples, health care, etc). The full breakdown of GIC codes is available in the Appendix. Figure 2 depicts the estimated CARs for all 24 categories across all three rounds of quantitative easing.[1] Each dot represents the estimated CAR while the "plus signs" show the upper and lower bound of the 95 percent confidence interval for each industry category.

The first thing to note from this figure is the diversity of expectations across sectors priced into the market around each round of QE. Nevertheless, it is still possible to identify meaningful patterns across sectors. Perhaps not surprisingly, sectors associated with real estate, heavy industry, and durable goods were expected to benefit significantly from QE. Specifically, the materials (MAT) and industrials (IND) sectors registered large and statistically significant CARs in all three rounds of quantitative easing. The MAT sector experienced a cumulative abnormal return of over 7 percent during the QE1 event window, followed by 3.7 and 3.1 percent returns during QE2 and QE3, respectively. Zooming into finer levels of disaggregation, the CARs observed in the materials sector appears to be driven, in large part, by large returns in firms producing construction materials (GIC 151020).

Within industrials, firms producing capital goods were also expected to benefit from quantitative easing. Indeed, the industrials sub-category for capital goods registered consistently positive and significant abnormal returns during all three rounds of quantitative easing. The capital goods sub-category (GIC 2010) had abnormal returns of 3.6 percent during QE1, 0.7 percent during QE2, and 1 percent during QE3. Moreover, firms specializing in construction equipment and machinery drove these returns, especially during the first round of quantitative easing.

The first announcement of quantitative easing led to significantly positive abnormal returns for most firms in the consumer discretionary sector (COD, GIC 2510 through 2550). As can be seen in Figure 2, all five sub-categories at this level of aggregation had positive and significant abnormal returns. The sub-category that stands out the most, however, is the automobile and components sector (GIC 2510), with a staggering cumulative abnormal return of 9.4 percent around the QE1 announcement window. It is worth emphasizing that this pattern disappears after the first round of quantitative easing. During QE2 the abnormal returns in three of the five sub-categories are statistically insignificant. Moreover, the automobile and components sector become slightly negative. A similar pattern holds during QE3.

The sector breakdowns also reveal a few surprises. One unexpected result is the strong expected effect on the energy sector during QE1. As shown in Figure 2, the estimated abnormal returns in the energy sector are as high as 4.5 percent for QE1. This anticipation that quantitative easing would benefit energy producers is matched by positive and significant abnormal returns in firms producing electrical equipment

[1] The full results for each regression specification are reported in Tables A.1 through A.7 in the Appendix, below.

(GIC 201040). This anticipated effect on energy appears to have faded out over subsequent quantitative easing announcements: the abnormal returns in the energy sector shrink dramatically during QE2 and become statistically indistinguishable from zero during QE3.

Perhaps the biggest surprise, however, is the lack of a clear pattern of abnormal returns in financial firms throughout the three rounds of QE. Assessing the Financial Industry at the 4 digit level, as in Figure 2, the results indicate that in QE1 commercial banks (4010) were expected to lose profits as a result of QE, while real estate sector finance's returns are not statistically different from 0 (4040). Diversified Financials (4020) and especially insurance, (4030) on the other hand, were expected to benefit. With QE2, all the 4 digit sub-sectors were expected to benefit with the possible exception of commercial banking (4010) which showed positive expectations but they are not significantly different from 0 in statistical terms. By the time QE3 rolls around the situation changes again, with most of the financial subsectors having no expected benefit and some even have negative expected returns. The only exception at the four digit level is real estate finance (4040) which is one of the few 4 digit subsectors in the economy expected to benefit from QE3.

But we can get more insight on the expected impacts of QE on finance by digging down and looking at the 6 digit level of disaggregation. Figure 3 and Tables A.4 through A.6 show the 6 digit results for finance. In QE1, diversified financial firms (402010) and consumer finance firms (402020) are expected to benefit, along with insurance companies (403010). During QE2, all sectors were expected to benefit, except for commercial banks whose expected returns are not significantly different from 0. But thrifts (401020) and all other 6 digit sub-sectors are expected to benefit. But by the time QE3 occurs, only real-estate finance is expected to benefit (404020 and 404030) whereas all other subsectors, except for capital market firms (402030), are expected to be hurt by QE.

Though these 6 digit results are informative, we can get further insight by looking at the expected impacts of QE on these financial firms by size of the bank.

Figure 2: 4-digit Cumulative Abnormal Returns – QE1, QE2, QE3

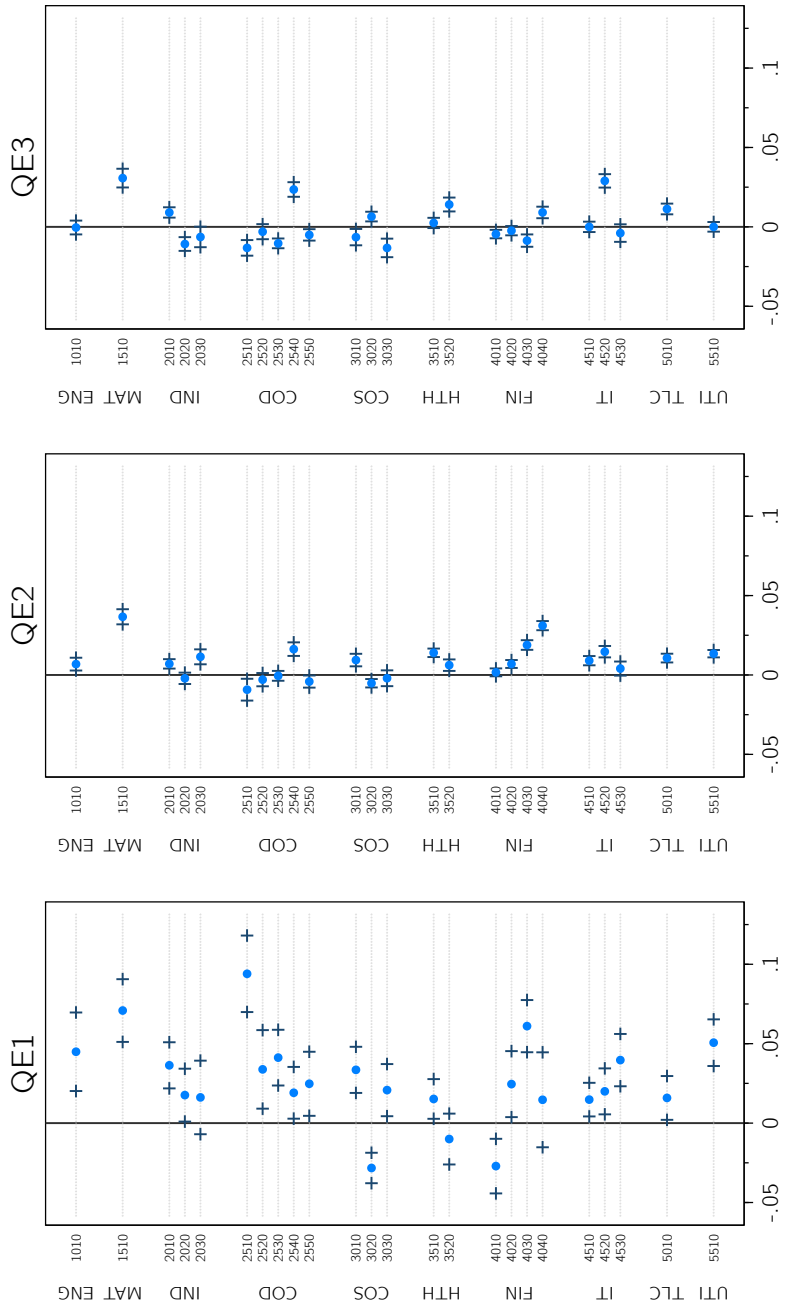
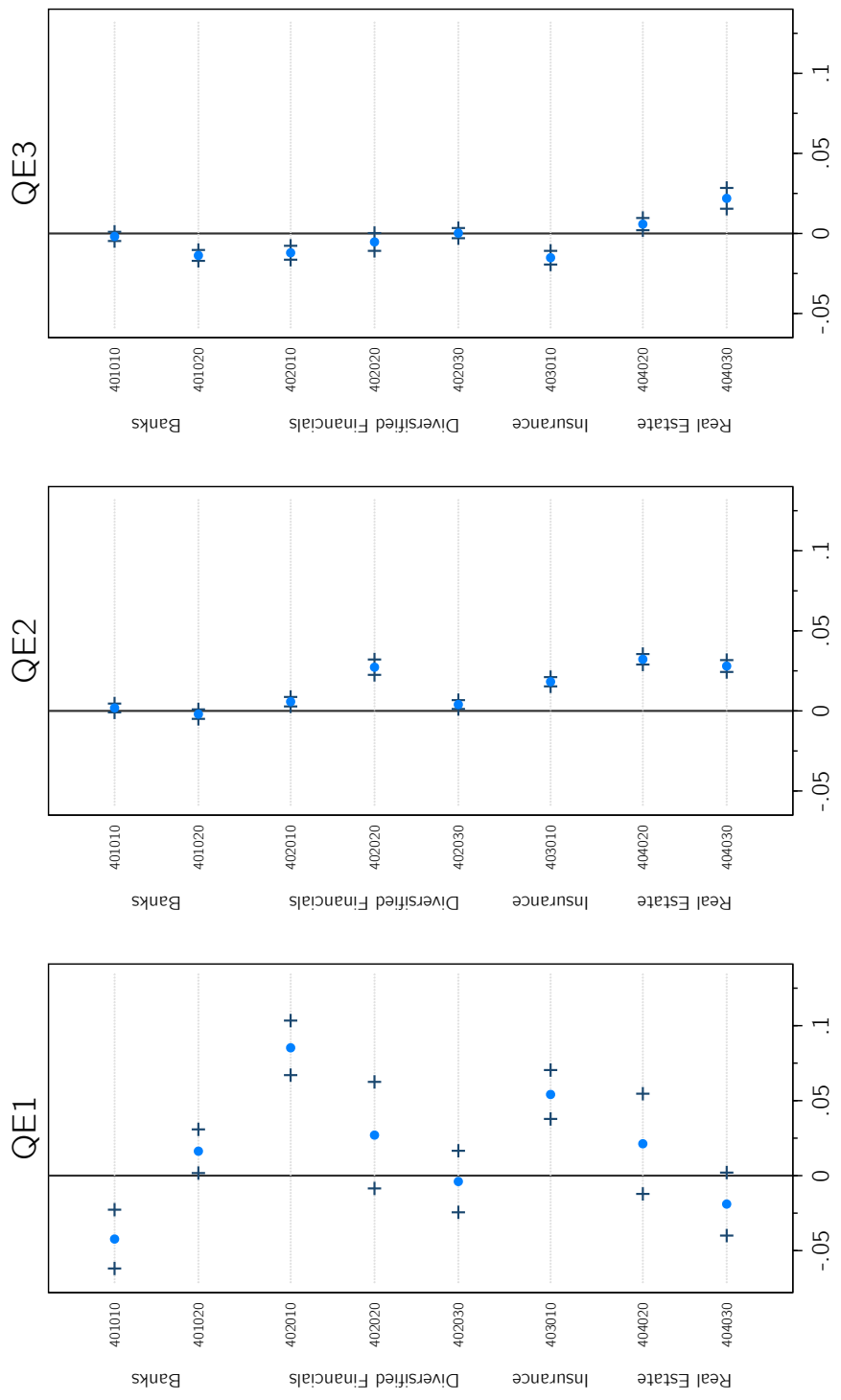


Figure 3: Financial sector cumulative abnormal returns at the 6-digit level – QE1, QE2, QE3



3.3 Financial Firm Size Analysis

We can lean more about which financial institutions were expected to be helped or hurt by the various rounds of QE by looking at the impacts by size of financial institution. Our earlier paper (Montecino and Epstein, 2014) suggested the largest financial institutions that served as dealers of Asset Backed Securities benefited from the QE asset purchases. Here we assess whether the expected benefits accruing to finance also accrued to the largest financial institutions, and did they last through all three rounds of QE. We pursue this question by constructing stock return portfolios stratified by the size of each financial institution. In particular, we construct portfolios based on the total assets of financial firms. Data on total assets were obtained from Compustat. All financial firms are divided into separate portfolios based on their total assets percentiles. For example, the largest financial firm portfolio consists of the equally weighted returns of all firms with assets greater than the 90th percentile. Similarly, the portfolio for the smallest financial firms includes all firms with assets equal or below the 10th percentile. The asset size percentiles for each category and each sample period are reported in Table 1.

Table 1: Asset size percentile cutoffs – millions of dollars

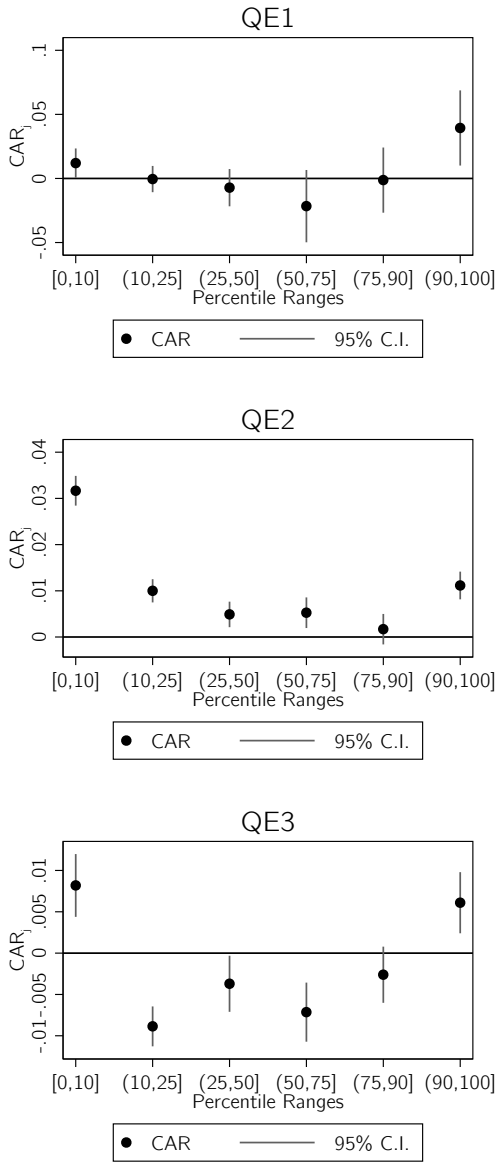
	QE1	QE2	QE3
10th pct	256	138	224
25th pct	583	538	520
50th pct	1,579	1,476	1,405
75th pct	7,281	6,716	7,180
90th pct	55,092	65,816	65,816

The financial sector abnormal returns by asset size are shown in Figure 3 for each round of quantitative easing. Each dot represents the estimated abnormal return while the line range shows the 95 percent confidence interval. There appears to be a large amount of heterogeneity in the abnormal returns across asset size percentiles. Nevertheless, a clear pattern is discernable: the abnormal returns exhibit a kind of "U-shape" across asset size. That is, the estimated positive abnormal returns are largest for both the smallest and largest financial firms but far smaller or even negative for firms with intermediate asset sizes.

During QE1 only financial firms with assets below the 10th percentile and above the 90th percentile have very large and significant returns. (Note that the scales on the y axes are different in the three graphs.) The returns for all the other asset size portfolios are not significantly different from zero. During QE2, almost all of the size portfolios had positive and significant abnormal returns, with the exception of (75,90] portfolios. Consistent with the patterns observed during QE1, the smallest and largest financial firms had greater returns than those in the intermediate range. Finally, during QE3 the "U-shape" is even more pronounced. The abnormal returns of portfolios for asset sizes ranging from the 10th to the 75th percentiles are actually negative and significant at the 5 percent level, while the portfolios for small and large financial firms have significantly positive returns.

These results are consistent with the proposition that financial markets expected larger financial firms to be the clear beneficiaries of QE. These financial firms include the household names associated with the financial crisis: JP Morgan, Duetsche Bank, Bank of America, Citicorp and so on. What might be more surprising, however, are the consistently positive estimated CARs for the smallest financial firms in the sample. A closer examination of these financial firms helps to explain why their expected excess returns are similar in sign to those of the largest financial firms. Like the group of largest financial firms, the smallest financial firms in the sample are dominated by firms operating in the capital markets: mostly asset management firms of varying stripes. In particular, 21 out of 60 of the firms in the 10th percentile are in asset management. Another 13 out of 60 are in real estate financial services. In other words, these smaller banks are not primarily small, local commercial banks but, rather, conduct business similar to that of the largest banks but, of course, at a much smaller scale.

Figure 4: Financial sector cumulative abnormal returns by firm size – QE1, QE2, QE3



4 Conclusions

Distributional and political economy questions have become more salient in discussions of monetary policy since the onset of the Great Financial Crisis, as they often do at times of financial distress especially when the central bank plays a large role. As we showed in Montecino and Epstein (2014), during the first round of Large Scale Asset Purchases (LSAPs) (i.e., QE1) the profits of large U.S. banks, especially (but not exclusively) those that acted as counterparties to the Federal Reserve, increased by more than those that did not participate or did not have significant holdings of mortgage backed securities. In short, we showed that some the largest US banks benefited from QE1.

In the current paper, we extend the analysis to encompass all three rounds of QE, and we study the impacts of these rounds on the expected profitability of all sectors of US business. For this purpose, we undertake an event study to assess whether there were cumulative excess returns around the windows of the announcements of the rounds of QE. We find that in QE1, investors' expectations were quite dispersed but that, as in our previous study, large financial firms were expected to benefit from QEI, as were several other key business sectors, including energy, construction and autos. By the time of QE2, investor expectations were less dispersed, and once again some financial sectors, along with many other sectors were expected to benefit, as judged by abnormal returns. But, during QE2 the mean expected benefits for all firms were reduced somewhat relative to those expected in QE1. By QE3, only a few sectors, including some subsectors of finance, were expected to benefit, while a non-trivial set of sectors were actually expected to be harmed by QE3. The mean expected benefit was very small, compared with the previous two rounds.

These declining expected benefits and more negative expected impacts suggest that a kind of QE fatigue might have set in with respect to US business over all. And even with respect to finance, the expected benefits were more dispersed and smaller than in previous rounds. This might be partly due to the fact that balance sheet adjustments to the financial crisis had gotten to the point that the longer-term relationship between higher interest rates and bank profits was reasserting itself, thereby reducing banker support for a continuation of QE. (Epstein and Ferguson, 1984; Borio, et. al., 2015.) Nonetheless, even in QE3, the largest banks and even smaller banks operating in the capital markets were expected to benefit modestly from QE.

We conjecture that this "QE fatigue" by the third round helps to explain the Federal Reserve's decision to end QE in the fall of 2014. Of course, this is only a conjecture in the absence of qualitative evidence based in interviews with bankers and other businesses, and, especially with decision makers at the Federal Reserve. Pursuing this more qualitative work would be worthy of future research efforts.

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A Additional tables

Table A.1: 4-digit Regressions – QE1

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Energy	1010	0.045***	(0.013)	1.197***	(0.062)	395	0.699
Materials	1510	0.071***	(0.010)	0.985***	(0.051)	395	0.622
Industrials							
Capital goods	2010	0.036***	(0.007)	1.043***	(0.035)	395	0.847
Commercial & professional services	2020	0.018**	(0.008)	0.869***	(0.040)	395	0.755
Transportation	2030	0.016	(0.012)	1.176***	(0.059)	395	0.707
Consumer Discretionary							
Automobiles & Components	2510	0.094***	(0.012)	1.230***	(0.062)	395	0.736
Durables & Apparel	2520	0.034***	(0.013)	1.043***	(0.060)	395	0.736
Services	2530	0.041***	(0.009)	0.948***	(0.042)	395	0.771
Media	2540	0.019**	(0.008)	0.923***	(0.041)	395	0.729
Retailing	2550	0.025**	(0.010)	0.968***	(0.049)	395	0.679
Consumer Staples							
Food & staples retailing	3010	0.034***	(0.007)	0.807***	(0.035)	395	0.693
Food, beverage & tobbacco	3020	-0.028***	(0.005)	0.695***	(0.023)	395	0.786
Household & personal products	3030	0.021**	(0.008)	0.651***	(0.043)	395	0.513
Health Care							
Equipment & services	3510	0.015**	(0.006)	0.705***	(0.032)	395	0.741
Pharma, biotech & life sciences	3520	-0.010	(0.008)	0.703***	(0.041)	395	0.660
Financials							
Banks	4010	-0.027***	(0.009)	0.828***	(0.043)	395	0.749
Diversified Financials	4020	0.025**	(0.011)	1.341***	(0.051)	395	0.845
Insurance	4030	0.061***	(0.008)	1.224***	(0.043)	395	0.847
Real Estate	4040	0.015	(0.015)	1.409***	(0.075)	395	0.771
Information Technology							
Software & services	4510	0.015***	(0.005)	0.861***	(0.025)	395	0.845
tech hardware & equipment	4520	0.020***	(0.007)	0.849***	(0.034)	395	0.789
semi-conductors	4530	0.040***	(0.008)	0.988***	(0.040)	395	0.752
Telecommunications services	5010	0.016**	(0.007)	0.999***	(0.033)	395	0.850
Utilities	5510	0.051***	(0.007)	0.777***	(0.037)	395	0.771

Table A.2: 4-digit Regressions – QE2

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Energy	1010	0.002	(0.003)	1.155***	(0.041)	391	0.697
Materials	1510	0.022***	(0.003)	1.249***	(0.047)	391	0.657
Industrials							
Capital goods	2010	0.007***	(0.002)	1.231***	(0.029)	391	0.828
Commercial & professional services	2020	0.000	(0.003)	1.032***	(0.035)	391	0.700
Transportation	2030	0.002	(0.004)	1.221***	(0.041)	391	0.645
Consumer Discretionary							
Automobiles & Components	2510	-0.023***	(0.005)	1.464***	(0.056)	391	0.565
Durables & Apparel	2520	0.006**	(0.003)	1.332***	(0.042)	391	0.747
Services	2530	-0.009***	(0.002)	1.003***	(0.029)	391	0.746
Media	2540	0.010***	(0.003)	1.076***	(0.045)	391	0.651
Retailing	2550	-0.003	(0.003)	1.115***	(0.038)	391	0.699
Consumer Staples							
Food & staples retailing	3010	0.012***	(0.003)	0.860***	(0.040)	391	0.569
Food, beverage & tobbacco	3020	-0.014***	(0.002)	0.740***	(0.031)	391	0.678
Household & personal products	3030	0.009**	(0.004)	1.041***	(0.054)	391	0.557
Health Care							
Equipment & services	3510	0.007***	(0.002)	0.896***	(0.033)	391	0.761
Pharmaceuticals , biotech & life sciences	3520	-0.000	(0.003)	1.009***	(0.042)	391	0.683
Financials							
Banks	4010	0.004**	(0.002)	0.741***	(0.026)	391	0.713
Diversified Financials	4020	0.008***	(0.002)	1.241***	(0.026)	391	0.870
Insurance	4030	0.017***	(0.002)	1.051***	(0.032)	391	0.785
Real Estate	4040	0.033***	(0.002)	1.036***	(0.028)	391	0.782
Information Technology							
Software & services	4510	0.007***	(0.002)	0.961***	(0.028)	391	0.748
tech hardware & equipment	4520	0.013***	(0.003)	1.104***	(0.034)	391	0.723
semi-conductors	4530	-0.004	(0.003)	1.385***	(0.043)	391	0.729
Telecommunications services	5010	0.007***	(0.002)	0.930***	(0.030)	391	0.750
Utilities	5510	0.021***	(0.002)	0.812***	(0.022)	391	0.776

Table A.3: 4-digit Regressions – QE3

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Energy	1010	-0.000	(0.002)	1.250***	(0.054)	353	0.819
Materials	1510	0.031***	(0.003)	1.254***	(0.066)	353	0.704
Industrials							
Capital goods	2010	0.011***	(0.002)	1.265***	(0.030)	353	0.885
Commercial & professional services	2020	-0.011***	(0.002)	1.109***	(0.043)	353	0.764
Transportation	2030	-0.006*	(0.003)	1.165***	(0.052)	353	0.616
Consumer Discretionary							
Automobiles & Components	2510	-0.013***	(0.003)	1.374***	(0.041)	353	0.789
Durables & Apparel	2520	-0.007***	(0.002)	1.178***	(0.046)	353	0.759
Services	2530	-0.010***	(0.002)	1.039***	(0.027)	353	0.844
Media	2540	0.020***	(0.002)	1.054***	(0.045)	353	0.723
Retailing	2550	-0.010***	(0.002)	1.071***	(0.033)	353	0.810
Consumer Staples							
Food & staples retailing	3010	-0.006**	(0.003)	0.777***	(0.050)	353	0.519
Food, beverage & tobbacco	3020	0.009***	(0.002)	0.765***	(0.038)	353	0.783
Household & personal products	3030	-0.018***	(0.003)	1.158***	(0.049)	353	0.644
Health Care							
Equipment & services	3510	0.002	(0.002)	1.058***	(0.037)	353	0.848
Pharmaceuticals , biotech & life sciences	3520	0.011***	(0.002)	1.044***	(0.048)	353	0.747
Financials							
Banks	4010	-0.005***	(0.001)	0.755***	(0.030)	353	0.801
Diversified Financials	4020	-0.002	(0.001)	1.188***	(0.027)	353	0.890
Insurance	4030	-0.015***	(0.002)	1.150***	(0.037)	353	0.780
Real Estate	4040	0.009***	(0.002)	1.033***	(0.047)	353	0.806
Information Technology							
Software & services	4510	-0.000	(0.002)	1.074***	(0.028)	353	0.839
tech hardware & equipment	4520	0.029***	(0.002)	1.166***	(0.042)	353	0.794
semi-conductors	4530	-0.004	(0.003)	1.293***	(0.046)	353	0.726
Telecommunications services	5010	0.011***	(0.002)	1.025***	(0.027)	353	0.825
Utilities	5510	0.000	(0.002)	0.739***	(0.047)	353	0.767

Table A.4: 6-digit Finance Regressions – QE1

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Banks	**4010**						
Commercial banks	401010	-0.042***	0.010	0.905***	0.049	395	0.743
Thrifts & mortgage finance	401020	0.018**	0.007	0.621***	0.036	395	0.631
Diversified financials	**4020**						
Div. financial services	402010	0.085***	0.009	1.289***	0.045	395	0.830
Consumer finance	402020	0.030*	0.017	1.461***	0.081	395	0.666
Capital markets	402030	-0.004	0.010	1.337***	0.051	395	0.824
Insurance	**4030**	0.062***	0.008	1.223***	0.043	395	0.840
Real Estate	**4040**						
Investment trusts	404020	0.021	0.017	1.529***	0.084	395	0.745
Management & development	404030	-0.020*	0.011	0.965***	0.050	395	0.663

Table A.5: 6-digit Finance Regressions – QE2

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Banks	**4010**						
Commercial banks	401010	0.002	0.001	0.840***	0.027	393	0.716
Thrifts & mortgage finance	401020	0.004***	0.002	0.502***	0.032	393	0.451
Diversified Financials	**4020**						
Div. financial services	402010	0.006***	0.002	1.108***	0.031	393	0.793
Consumer finance	402020	0.027***	0.002	1.275***	0.046	393	0.661
Capital markets	402030	0.004***	0.001	1.267***	0.029	393	0.850
Insurance	**4030**	0.014***	0.001	1.084***	0.032	393	0.794
Real Estate	**4040**						
Investment trusts	404020	0.032***	0.002	1.099***	0.034	393	0.755
Management & development	404030	0.028***	0.002	0.810***	0.048	393	0.559

Table A.6: 6-digit Finance Regressions – QE3

	GIC	CAR_j	std. err.	R_t^m	std. err.	Obs	R^2-adj
Banks	**4010**						
Commercial banks	401010	-0.002	0.001	0.877***	0.031	353	0.822
Thrifts & mortgage finance	401020	-0.011***	0.002	0.478***	0.029	353	0.520
Diversified Financials	**4020**						
Div. financial services	402010	-0.012***	0.002	1.078***	0.033	353	0.757
Consumer finance	402020	-0.005*	0.003	1.057***	0.067	353	0.651
Capital markets	402030	0.000	0.002	1.235***	0.030	353	0.878
Insurance	**4030**	-0.013***	0.002	1.141***	0.037	353	0.791
Real Estate	**4040**						
Investment trusts	404020	0.006***	0.002	1.080***	0.052	353	0.796
Management & development	404030	0.022***	0.003	0.842***	0.060	353	0.438

Table A.7: Event regressions for financial sector stocks, stratified by firm total assets.

	(1)	(2)	(3)	(4)	(5)	(6)
Percentiles	[0, 10]	(10, 25]	(25, 50]	(50, 75]	(75, 90]	(90, 100]
				QE1		
CAR_j	0.010	-0.000	-0.007	-0.023	-0.001	0.039***
	(0.006)	(0.005)	(0.007)	(0.014)	(0.013)	(0.015)
R_t^m	0.472***	0.509***	0.780***	1.343***	1.550***	1.746***
	(0.029)	(0.026)	(0.037)	(0.071)	(0.063)	(0.073)
Constant	-0.001	-0.001**	-0.001**	-0.001	-0.001	-0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	395	395	395	395	395	395
R-squared	0.483	0.674	0.765	0.781	0.820	0.823
				QE2		
CAR_j	0.032***	0.010***	0.004***	0.007***	0.002	0.011***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
R_t^m	0.613***	0.473***	0.730***	1.191***	1.223***	1.430***
	(0.034)	(0.026)	(0.028)	(0.032)	(0.029)	(0.029)
Constant	-0.000	-0.000	-0.000	-0.000	0.000	-0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	393	393	393	393	393	393
R-squared	0.522	0.498	0.660	0.789	0.794	0.862
				QE3		
CAR_j	0.008***	-0.009***	-0.003*	-0.007***	-0.003	0.006***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
R_t^m	0.736***	0.466***	0.773***	1.154***	1.271***	1.548***
	(0.038)	(0.020)	(0.037)	(0.041)	(0.035)	(0.037)
Constant	-0.000	-0.000	-0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	353	353	353	353	353	353
R-squared	0.650	0.646	0.724	0.827	0.875	0.891

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

B Data Appendix

B.1 QE Sample Periods

Estimates for each round of QE were conducted using three distinct sample periods. These were chosen to provide roughly over a year of time before each QE event in order to accurately estimate the portfolio's normal returns. The three sample periods for each round of QE are the following:

- QE1 – Jan 2, 2008 to Jul 31, 2009
- QE2 – Jan 4, 2010 to Jul 29, 2011
- QE3 – Aug 1, 2011 to Dec 28, 2012

B.2 Stock Portfolios

As discussed above, the event regressions are carried using portfolios containing the average daily stock returns of a large number of firms. These were constructed along two major dimensions: GIC industries and total financial assets.

(a) Industry portfolios

The industry portfolios consist of the averaged daily returns of all firms within a given industry group. For example, at the 4-digit level of detail each individual portfolio includes all firms within each industry group.

(b) Asset-size portfolios

These portfolios were constructed by first sorting financial sector stocks by their total assets at the beginning of the sample period. Firms were then assigned a group depending on their asset size ranking. In particular, we created six asset size bins based on percentile cutoffs. These were:

- Bin 1: [0,10]
- Bin 2: (10,25]
- Bin 3: (25,50]
- Bin 4: (50,75]
- Bin 5: (75,90]
- Bin 6: (90,100]

B.3 Global Industry Classification Codes

Table B.8 shows the full structure of S&P's GIC codes along with descriptions of every major category.

Table B.8: GIC Codes

Sector (2-digit)		Industry Group (4-digit)		Industry (6-digit)	
Energy	10	Energy	1010	Energy Equipment & Services	101010
				Oil, Gas & Consumable Fuels	101020
Material	15	Materials	1510	Chemicals	151010
				Construction Materials	151020
				Containers & Packaging	151030
				Metals & Mining	151040
				Paper & Forest Products	151050
Industrails	20	Capital Goods	2010	Aerospace & Defense	201010
				Building Products	201020
				Construction & Engineering	201030
				Electrical Equipment	201040
				Industrial Conglomerates	201050
				Machinery	201060
				Trading Companies & Distributors	201070
		Commercial & Professional Services	2020	Commercial Services & Supplies	202010
				Professional Services	202020
		Transportation	2030	Air Freight & Logistics	203010
				Airlines	203020
				Marine	203030
				Road & Rail	203040
				Transportation Infrastructure	203050
Consumer Discretionary	25	Automobiles & Components	2510	Auto Components	251010
				Automobiles	251020
		Consumer Durables & Apparel	2520	Household Durables	252010
				Leisure Equipment & Products	252020
				Textiles, Apparel & Luxury Goods	252030
		Consumer Services	2530	Hotels, Restaurants & Leisure	253010
				Diversified Consumer Services	253020
		Media	2540	Media	254010
		Retailing	2550	Distributors	255010
				Internet & Catalog Retail	255020

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Table B.8: (continued)

Sector (2-digit)		Industry Group (4-digit)		Industry (6-digit)	
				Multiline Retail	255030
				Specialty Retail	255040
Consumer Staples	30	Food & Staples Retailing	3010	Food & Staples Retailing	301010
		Food, Beverage & Tobacco	3020	Beverages	302010
				Food Products	302020
				Tobacco	302030
		Household & Personal Products	3030	Household Products	303010
				Personal Products	303020
Health Care	35	Health Care Equipment & Services	3510	Health Care Equipment & Supplies	351010
				Health Care Providers & Services	351020
		Pharmaceutical, Biotechnology & Life Sciences	3520	Biotechnology	352010
				Pharmaceuticals	352020
				Life Sciences Tools & Services	352030
Financials	40	Banks	4010	Commercial Banks	401010
				Thrifts & Mortgage Finance	401020
		Diversified Financials	4020	Diversified Financial Services	402010
				Consumer Finance	402020
				Capital Markets	402030
		Insurance	4030	Insurance	403010
		Real Estate	4040	Real Estate Investment Trusts	404020
				Real Estate Management & Development	404030
Information Technology	45	Software & Services	4510	Internet Software & Services	451010
				IT Services	451020
				Software	451030
		Technology Hardware & Equipment	4520	Communications Equipment	452010
				Computers & Peripherals	452020
				Electronic Equipment & Components	452030
				Office Electronics	452040

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Table B.8: (continued)

Sector (2-digit)		Industry Group (4-digit)		Industry (6-digit)	
		Semiconductors & Equipment	4530	Semiconductors & Equipment	453010
Telecommunication Services	50	Telecommunication Services	5010	Diversified Telecommunication Services	501010
				Wireless Telecommunication Services	501020
Utilities	55	Utilities	5510	Electric Utilities	551010
				Gas Utilities	551020
				Multi-Utilities	551030
				Water Utilities	551040
				Intependent Power Producers & Traders	551050