

Regulation and Environmental Risks in Mortgage Lending

Exploring the interaction of unconventional monetary policy and natural disasters

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Abstract

This project aims to explore the intersection of unconventional monetary policy and natural disasters by considering and analyzing QE3 and Hurricane Sandy as a natural experiment for our study. We exploit the geographical variation of MBS holdings at the bank level to construct a measure of exposure of each three-digit postal zip code to a round of Quantitative Easing (QE): we treat postal zip codes that have historical activities from banks with more MBS holdings as exposed areas and those with less holdings as nonexposed areas. Using Single Family, Fixed rate mortgage level datasets for Freddie and Fannie that contain the amount of lending at the three-digit postal zip code level, we find that exposed areas had a persistent higher level of lending compared to non exposed areas following QE3. We also use data on hurricane wind speed radii, digital elevation and proximity to wetland or coastal areas to identify and visualize all three-digit postal zip codes affected by Hurricane Sandy.

Introduction

Federal National Mortgage Association and Federal Home Loan Mortgage Corporation, commonly known as Freddie Mac and Fannie Mae, are Government Supported Enterprises (GSEs) that deal in the Secondary Mortgage Market for both multifamily and single family homes. All mortgage loans that meet the underwriting standards of Freddie Mac and Fannie Mae may be purchased, packaged and insured against loss of principal and interest in the resulting mortgage backed securities in return for a guarantee fee charged by these GSEs which is pushed to the borrower in the form of a higher interest rate. However, it is important to note that the pricing strategy of GSEs does not vary spatially with the differential ex-ante risk faced by a property by virtue of its geographical location and position. Thus, this study will contribute to a rich literature that studies in the intersection between the MBS market, unconventional monetary policy and natural disasters.

Literature Review

Following are the broad thematic areas that our literature review focuses on:

1. The direct impact of different rounds of quantitative easing on the mortgage lending channels in the US
2. The indirect impact of different rounds of quantitative easing on securitization volumes for MBS as well as effects of income and employment
3. The impact of large (often billion-dollar) natural disaster events on securitization and mortgage credit volumes
4. GSEs as implicit insurers in the mortgage securitization market

Overall, our review revealed the following important insights:

1. Chakraborty et al(2019) [1] find evidence that MBS purchases cause unintended real effects and that Treasury purchases did not cause a large positive stimulus to the economy through the bank lending channel.

2. Luck and Zimmermann(2020) [2] find evidence that banks with higher mortgage-backed securities holdings refinanced relatively more mortgages after the first round of QE, which increased local consumption and employment in the nontradable goods sector. In contrast, banks increased lending to firms and home purchase mortgage origination after the third round of QE, which led to a sizable increase in overall employment.
3. Kahn and Ouazad(2019) [3] suggest that there is a statistically and economically significant increase in securitization volumes at the conforming limit in years following a billion dollar natural disaster event.

Main Objectives

1. Determine the size of 30-year-and-less, fully amortizing, full-documentation, single-family, conventional fixed-rate mortgages fostered by Freddie Mac and Fannie Mae in the United States and understand its geographical distribution at the most granular level (postal zip code) possible
2. Generating a measure of ex-ante exposure of each postal zip code to a round of quantitative easing for all Atlantic states in the US
3. Visualize and assess the total dollar amount of lending in highly exposed vs low exposed areas before and after a round of quantitative easing
4. Exploring unconventional monetary policy tools to foster economic growth and stability in areas directly impacted by natural disasters in the U.S. through the bank lending channel

Methodology

We use data from the Home Mortgage Disclosure Act (HMDA), which provides information regarding home mortgage lending activity. This data set allows us to access the amount of mortgage lending in each census tract annually. Using HUD USPS Zip code Crosswalk files compiled by the Office of Policy Development and Research, we were able to compile the amount of mortgage lending in each postal zip code annually. In addition, FFIEC call report data reports the total assets and total mortgage securities in a balance sheet format at the bank level on a quarterly basis.

Using the above publicly available datasets, we were able to calculate the exposure of each three-digit zip code z to a round of QE j as:

$$\text{Exposure}_z^{(j)} = \sum_b w_{bz}^{(j)} \left(\frac{\text{MBS}}{\text{Total Assets}} \right)_b^j$$

Here, w_{bz} describes the market share of a bank b in postal zip code z prior to QE $_j$, where market share is computed as bank b 's volume of mortgage lending in zip code z prior to QE $_j$ relative to total mortgage lending by all banks active in postal zip code z .

Preliminary results

Constructing the ex-ante exposure measures prior to QE3 for each bank at the county level for all Atlantic states, we obtain the following trends in amount of mortgage lending (measured by the total amount of Unpaid Principal Balance (UPB)), for all loans securitized by Freddie Mac and Fannie Mae respectively, for exposed and non-exposed zip codes. Note that the exposed and non exposed zip codes are divided at the median exposure level for all zip codes in Atlantic States.

Also, note that:

$$\text{Scaled mortgage lending}_t^z = \frac{\text{Total UPB}_t^z}{\text{Total UPB}_{t_{QE3}}^z}$$

where, z is the three digit postal zip code where a bank is located, t is a particular time (at the monthly level) and, t_{QE3} is September 2012; this is the month when QE3 was announced

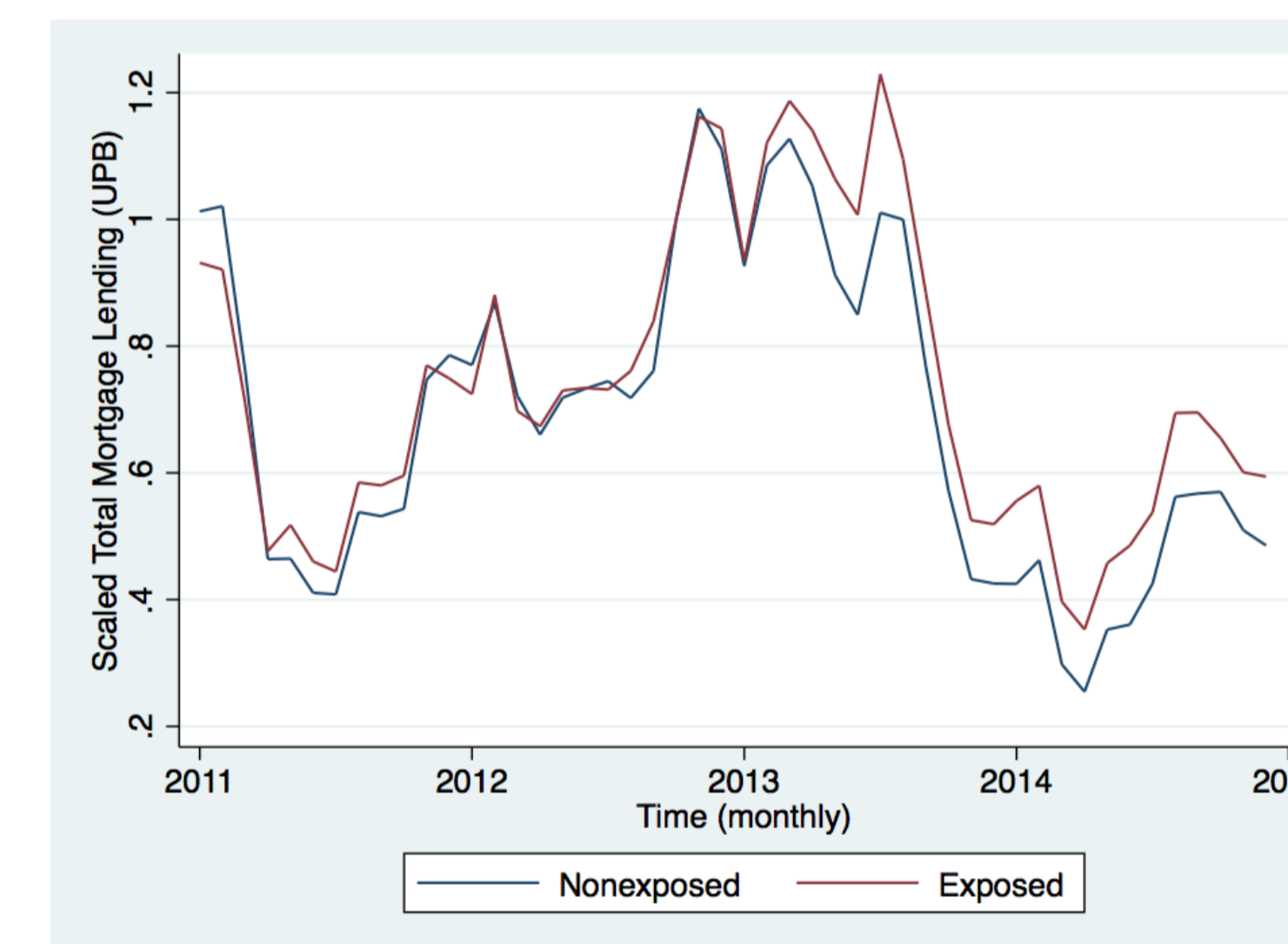


Figure 1: Mortgage lending in exposed vs nonexposed areas (2011-2014) securitized by Freddie Mac

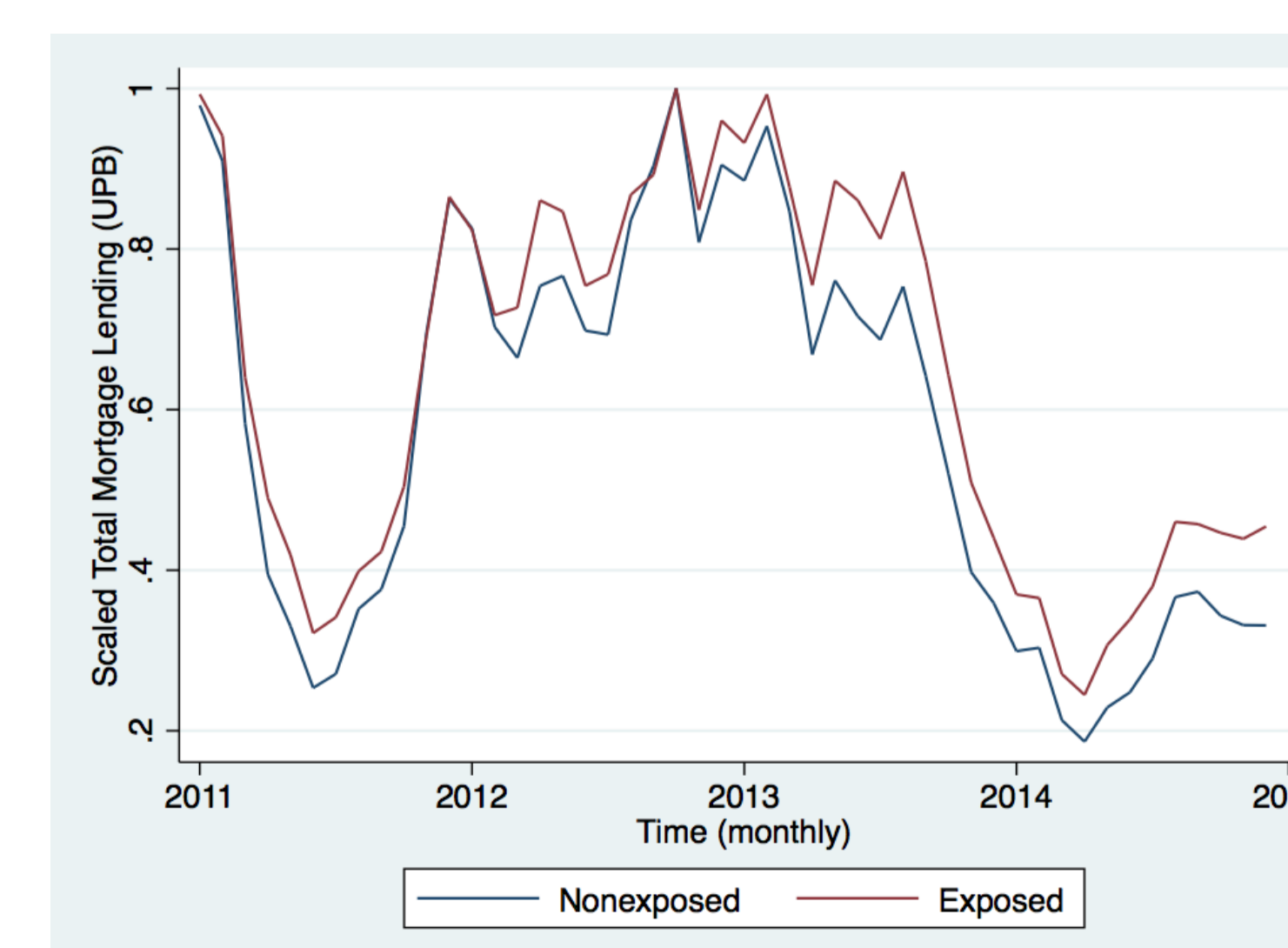


Figure 2: Mortgage lending in exposed vs nonexposed areas (2011-2014) securitized by Fannie Mae



Figure 3: The shaded area shows all zip code areas affected by Hurricane Sandy, as predicted by hurricane wind speed radii

Forthcoming Research

As a next step, we aim to understand whether there exists a difference between mortgage lending behavior and patterns in areas affected by Hurricane Sandy and those not affected, further differentiated by their level of exposure to a round of QE, before and after the announcement of QE3 on 13 September 2012.

References

- [1] Indraneel Chakraborty et al. Monetary stimulus and bank lending. 2020.
- [2] Stephan Luck and Tom Zimmermann. Employment effects of unconventional monetary policy: Evidence from qe. 2020.
- [3] Amine Ouazad and Matthew E. Kahn. Mortgage finance in the face of rising climate risk. 2019.