

margin and the balance sheet retention margin work to offset the adverse impact. For policies which tighten the secondary loan market, the shadow bank migration margin exacerbates the effect: lending contracts for shadow banks leading to a large overall decline in lending. For example, if quantitative easing increases GSE financing costs by 100 basis points, bank lending actually *increases* by \$53 billion while shadow bank lending *decreases* by \$300 billion. Thus policy analysis, which ignores the role of bank balance sheet adjustment and shadow bank lending, would result in incorrect qualitative and quantitative predictions.

The third insight is that interventions aimed at bank stability differ in their redistributive consequences. For example, increasing capital requirements achieves bank stability by decreasing on-balance-sheet lending, i.e., reducing jumbo mortgages. Therefore, the cost of bank stability is mainly borne by higher-income borrowers. An expansion of GSE funding increases the appeal of securitization, also shifting loans from bank balance sheets and increases bank stability. It does so while expanding lending and benefiting consumers across the income spectrum, but it comes at the cost of taxpayers subsidizing GSE lending.

These insights generate implications for regulation that go beyond the U.S. market. For instance, the Basel regulatory framework proposes a uniform treatment of capital requirements across countries. The U.K., for example, does not have a large and liquid secondary market for mortgages (Benetton 2019). Our analysis suggests that increasing capital requirements in the U.K. would result in a substantially higher contraction in lending than in the U.S. due to the absence of bank retention margin. More generally, regulatory policy response in different economies needs to consider the two margins of adjustment we highlight above.

More broadly, our work speaks to the theories of banking in the presence of shadow banks (see Sunderam (2015) and Kojien and Yogo (2016)). The traditional view of banks is that they use deposits to make loans, which they retain on their balance sheet. Our paper suggests that banks' choice of business model depends on both their capitalization and their equilibrium interaction with shadow banks. On one end of the spectrum are well capitalized banks, which dominate the market for loans that are retained on the balance sheet. At the other end are shadow banks, which originate to distribute (OTD). In the middle are poorly capitalized banks with limited balance sheet capacity, whose participation in the market for retained loans is limited. Thus, we argue that a complete policy analysis must incorporate the industrial organization of the credit market and the equilibrium interaction of banks and shadow banks.

## **Section II: Institutional Setting and Data**

### *II.A U.S. Residential Mortgage Market*

The residential mortgage market is the largest consumer finance market in the U.S. As of 2018 there have been more than 50 million residential properties that have a mortgage with a combined outstanding debt of about \$10 trillion (Source: Corelogic Data). In the U.S., the process by which a mortgage is secured by a borrower is called origination. This involves the borrower submitting a loan application and documentation related to his or her financial history and/or credit history to the lender.