$$u_{ijctg} = \underbrace{-\alpha_i r_{jctg}}_{rate}. \\ - \underbrace{\beta_i (I(F_i^* < F_i)}_{size} \\ + \underbrace{\underbrace{\gamma_i I\left(F_i^* < \overline{F_{ict}}\right)}_{conforming\ convenience} + \underbrace{q_{jt} + \xi_{jct} + \epsilon_{ijctg}}_{lender\ service}}_{service\ and\ convenience} \tag{D.2}$$

A consumer's utility declines in the mortgage rate $\alpha_i r_{jctg}$, with α_i measuring the consumer-specific sensitivity to interest rates.

Borrower i's mortgage amount F_i^* can be smaller than her ideal mortgage size, F_i. If that is the case, she suffers a disutility $\beta_i I(F_i^* < F_i)$,[10] where the borrower-specific coefficient β_i measures the extent of disutility and I is the indicator function. This can occur when the borrower's ideal mortgage is a jumbo $F_i > \overline{F_{ict}}$, but the borrower chooses a mortgage under the conforming limit $I\left(F_i^* < \overline{F_{ict}}\right) I\left(F_i > \overline{F_{ict}}\right)$, or when a binding LTV constraint prevents the borrower from obtaining their ideal jumbo mortgage $I\left(F_i^* > \overline{F_{ict}}\right) I(F_i > \overline{LTV} \times P_i)$.

Consumers also value mortgages on dimensions other than size and price. For example, conforming mortgage approval and administrative procedures differ from those of jumbo mortgages. We allow consumers to have different preferences over these non-rate attributes of conforming relative to jumbo mortgages, captured by γ_i. Consumers also value lenders' convenience and/or service quality. Intuitively, consumers like to borrow from fintech shadow banks such as Quicken Loans because they offer a convenient way to interact online. $q_{jt} + \xi_{jct}$ measures convenience differences between lenders. q_{jt} is the year-lender type invariant quality difference,[11] and ξ_{jct} is a year-lender market-specific unobservable. q_{jt} is estimated as a year-lender type fixed effect, and is thus observable by the researcher, while ξ_{jct} is not. Last, borrowers' preferences over lenders differ idiosyncratically, which is captured in the i.i.d. T1EV borrower-specific utility shock ϵ_{ijctg}. For example, some borrowers prefer to borrow from JPMorgan Chase over Quicken because they have a bank account with the former, making it easier to transact.

The ideal mortgage size, interest rate sensitivity, relative preference for a conforming loan, as well as the cost of departing from the ideal mortgage size are consumer specific. Consumers' preferences are drawn from a distribution, where the distribution is a function of income and house prices in a market. Specifically, let $\mathrm{B}_i \equiv (\alpha_i, \beta_i, \gamma_i, F_i)'$ describe consumer preferences, then:

$$\mathrm{B}_i = \overline{\mathrm{B}} + \Pi(D_{ict} - \overline{D}) + \Sigma \nu_i \tag{D.3}$$

[10] A consumer will never choose a mortgage which is too large.

[11] Because of large changes in the quality of fintech providers over time, we allow the quality of fintech shadow banks to evolve over time as well.