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Figure 1: Reserves, federal funds rates, and the reserve demand curve. Panel (a) plots aggregate reserves relative to commercial banks’ assets from January 1, 2010 to March 29, 2021. Panel (b) shows the spread between the volume-weighted average federal funds rates and the IORB rate (in basis points). Panel (c) plots the relationship between spreads and normalized reserves. Each time series excludes one-day windows around month-ends to control for the transient changes in the level of reserves and federal funds rates caused by month-end window-dressing of European banks (see Section 2). Daily data on reserves and federal funds rates are provided by the Markets Group at the Federal Reserve Bank of New York. Weekly data on total assets for commercial banks in the U.S. and for U.S. branches and agencies of foreign banks are publicly available from the Federal Reserve Economic Data, FRED (“TLAACBW027SBOG”). Daily interest on reserve balances is available from FRED (“IOER”).

The reserve demand curve describes the price at which banks are willing to borrow and lend their reserve balances as a function of aggregate reserves in the system. The interest rate at which reserves are borrowed and lent is the federal funds rate, which is also the policy rate targeted by the Federal Open Market Committee (FOMC). The reserve demand function measures banks’ demand for liquidity. Estimating the sensitivity of the federal funds rate to shocks to the level of reserves is of paramount importance for the implementation of monetary policy. Estimating the price sensitivity of the demand for reserve is challenging for three reasons. First, theory predicts that the reserve demand curve is a highly nonlinear function. The demand curve can be divided into three regions (Poole (1968); Ennis and Keister (2008); Afonso et al. (2019)). When reserves are low and close to the aggregate requirements, the demand curve has a steep negative slope reflecting their scarcity value. When aggregate reserves are abundant, the reserve demand curve becomes flat around the interest on reserve balances (IORB) paid by the Federal Reserve. Between these two regions, market frictions generate a smooth transition – an intermediate regime of “ample” reserves where the demand curve exhibits a gentle downward slope. Second, since the 2008 crisis, the demand for reserves has been affected by various structural changes in the regulation and supervision of banks, in banks’ internal risk-management frameworks, and in the structure of the market for reserves itself. As a result, not only is the reserve demand curve highly nonlinear, but it may also have been subject to structural changes over the years. Third, estimation of the demand for reserves is subject to potential endogeneity issues due to high-frequency confounding factors in the demand equation. Although the Federal Reserve no longer targets federal funds rates by adjusting aggregate reserves daily as it did before 2008, it may still respond to sudden dislocations in money-market rates by quickly changing the supply of reserves, as it did in September 2019 and March 2020. Moreover, aggregate reserves also change due to factors that are outside the Federal Reserve’s control and that are correlated with daily money market conditions, such as the balance of the U.S. Treasury’s account with the Federal Reserve and usage of the Federal Reserve’s overnight reverse repurchase agreement facility.