



A preferred habitat for liquidity in term repos: Before, during and after the financial crisis



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ABSTRACT

The money market rates in the United States have exhibited a year-end effect consistent with the preferred habitat for liquidity. We revisit the year-end preferred habitat for liquidity using data on government general collateral repurchase agreements (GC Repos). We find no evidence to suggest a year-end effect during the financial crisis. The result is consistent with liquidity hoarding by investors during a crisis characterized by liquidity and solvency issues. Additionally, our findings suggest that investors manage their year-end liquidity following the crisis even when interest rates are historically low.

1. Introduction

The preferred habitat hypothesis was developed to explain twists in the term structure of interest rates (see, Modigliani and Sutch (1966). Park and Reinganum (1986) find that the last T-bill to mature in a month trades at a lower yield than surrounding T-bills and Ogden (1987) suggests a preferred habitat for liquidity to explain the findings in Park and Reinganum. Griffiths and Winters (1997a, 1997b) find a preferred habitat for liquidity at year-ends in the term-repo market. Griffiths and Winters (2005) find a year-end preferred habitat for liquidity across one-month private issue money market securities. These papers provide strong support for a year-end preferred habitat for liquidity across money market securities using data from 1960s, 1970s and 1980s.

Kotomin (2013) extends the above work with data from 1991 through 2011 on certificates of deposit (CDs), euro-dollars, banker's acceptances (BAs), and commercial paper. Kotomin continues to find a year-end preferred habitat for liquidity in three and six month instruments, but not during or after the crisis. We extend this line of research with term-repo data from 2005 through 2015. It is important to examine repos as Gorton and Metrick (2010) notes that the financial crisis was largely a run on repos. Moreover, it is essential to include the post crisis period in the analysis, as the post crisis period is a period of historical low and actively managed interest rates. During the crisis, the money markets stopped functioning normally as investors/lenders hoarded liquidity. Accordingly, we do not expect to find a year-end preferred habitat for liquidity. Post crisis short-term interest rates were at historically low levels, so it is an empirical question of whether low interest rates reduce the opportunity cost of holding cash enough to discourage year-end liquidity management.

We begin our analysis with a replication of Griffiths and Winters (1997a, 1997b) to ensure our methods function properly and to provide benchmarks for our analysis of the crisis and post-crisis periods. Using their data, which they extended from their original

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sample we are able to replicate their results. With additional repo data from 2005 through 2015, we examine the crisis and post crisis periods. During the crisis period, we find no evidence of a year-end preferred habitat for liquidity. Our crisis results are generally consistent with [Kotomin \(2013\)](#). In the post-crisis period, we find support for the year-end preferred habitat for liquidity in 1-week, 2-week, 3-week, and 1-month government general collateral repos. Our post crisis results suggest that investors manage their year-end liquidity even when interest rates are historically low.

2. Background: calendar-based anomalies

We examine year-end repo rates for a preferred habitat for liquidity. To motivate our analysis we review the calendar-based anomaly literature in this section.

2.1. Turn-of-the-Year anomaly in stocks and bonds

The turn-of-the-year literature began with empirical work and we discuss a small sample of that literature here. [Rozeff and Kinney \(1976\)](#) and [Keim \(1983\)](#) find a turn-of-the-year return pattern in stock prices. [Banz \(1981\)](#) and [Reinganum \(1981\)](#) show that the turn-of-the-year effect is concentrated in small firms after controlling for risk. [Lamoureux and Sanger \(1989\)](#) show that the turn-of-the year effect occurs in organized exchanges and over-the-counter markets.

The empirical evidences of a turn-of-the-year pattern in stock returns leads to three main hypotheses to explain the pattern. [Branch \(1977\)](#) and [Roll \(1983\)](#) provide a tax-selling hypothesis. [Haugen and Lakonishok \(1987\)](#) and [Ritter \(1988\)](#) provide a window-dressing hypothesis. [Ogden \(1987, 1990\)](#) provide a preferred-habitat hypothesis. Empirical work on each hypothesis provides some support for each hypothesis.

[Jordan and Jordan \(1991\)](#) extend the empirical work to daily bond returns and find a turn-of-the-year effect in the Dow Jones Composite Bond Index. [Park and Reinganum \(1986\)](#) find a year-end effect in Treasury bills.

This brief literature review shows that the turn-of-the-year effect is across different securities. It also notes that each of the three hypotheses have some empirical support.

2.2. Year-end effect hypotheses in money markets

[Park and Reinganum \(1986\)](#) find a year-end effect in Treasury bills. [Ogden \(1987\)](#) suggests that the year-end in Park and Reinganum can be explained by a year-end preferred habitat for liquidity. However, with three turn-of-the-year hypotheses in equities we explore tax-selling and window dressing in the money markets in this section to be complete.

We begin with tax-selling. Money market securities trade in two forms: discount and add-on. Discount instruments sell at a price discount and then accrue interest until maturity where the instrument pays the face value. Add-on instruments sell at face value and then pay face value plus accrued interest at maturity. Money market securities are short-term debt with low default risk, which along with accrued interest makes tax loss selling highly unlikely. Park and Reinganum note that tax differences across the year-end cannot explain the year-end effect in Treasury bills.

[Musto \(1997\)](#) suggests year-end window dressing in commercial paper. However, [Musto \(1997\)](#) uses average rates, which obscures daily rate movements across the year-end. [Griffiths and Winters \(1997a, 1997b, 2005\)](#) use daily rates and find that year-end rate changes are consistent with a preferred habitat. [Griffiths and Winters \(1997a, 1997b\)](#) examine short-term repos while [Griffiths and Winters \(2005\)](#) examine one-month private issues money market securities (commercial paper, BAs, CDs, euro-dollars and LIBOR).

[Allen and Saunders \(1992\)](#) examine quarter-end window dressing in banks. Their analysis includes quarter-end increases in the daily fed funds rate, which they conclude supports window dressing. [Kotomin and Winter \(2006\)](#) re-examine bank window dressing. In a later period they show that daily fed funds rates increase at quarter-ends, but decrease at year-ends. The year-end decrease in daily fed funds rate is not consistent with year-end window dressing.

The point of this review is to re-visit the three turn-of-the-year hypotheses from the equity market to determine how they might apply to the money markets. Tax loss selling does not apply in the money markets and evidence suggests that year-end patterns in money markets do not support window dressing. Instead, the year-end pattern across money market securities is consistent with a preferred habitat for liquidity.

2.3. Year-end preferred habitat for liquidity

[Modigliani and Sutch \(1966\)](#) introduced a theoretical model, which they labeled as the “preferred habitat” hypothesis for the term structure. The preferred habitat hypothesis is based on investors having maturity preferences. [Ogden \(1987\)](#) suggests an aggregate preferred habitat in the money markets. Ogden states that standardizations in the payment system should “result in a concentrated flow of funds on or near the last business day of the month”. Ogden suggests that investors manage their money market securities so that these securities mature to return cash to investors in time for standardized payments. Cash for standardized payments creates preferred habitats for liquidity in the money markets.

[Griffiths and Winters \(1997a, 1997b\)](#) find a year-end effect in term repurchase agreements and suggest that the systematic pattern is consistent with the preferred habitat for liquidity hypothesis. [Griffiths and Winters \(1997a, 1997b\)](#) highlight that end of year cash obligations do not necessarily align with the last trading day of the year as pointed out by [Ogden \(1987\)](#). The participation of

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