

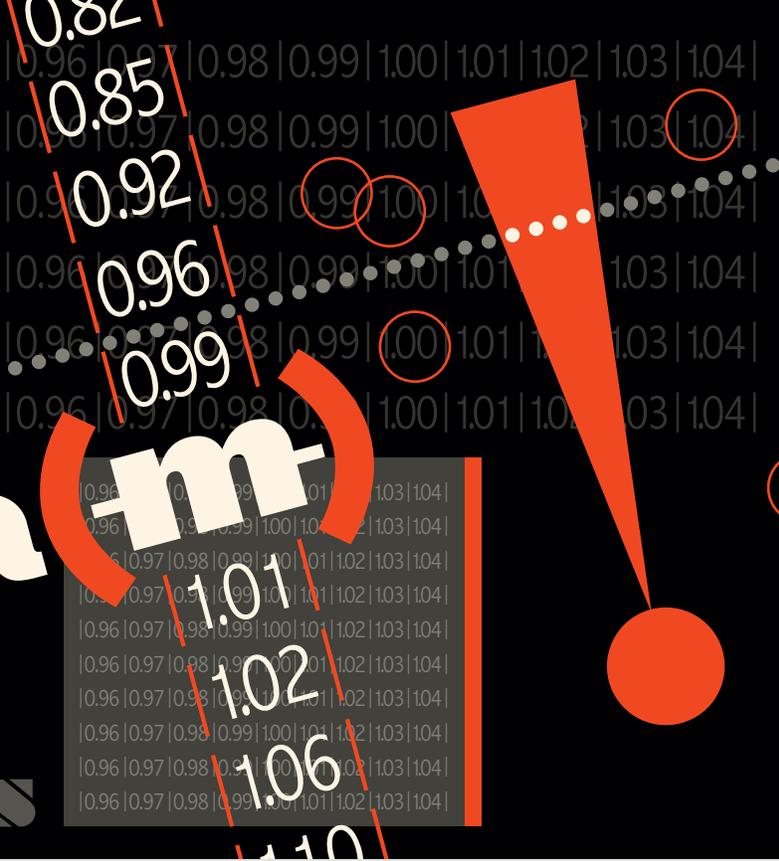
**MPT** [β]  
DATA THEORY ANALYSIS ADVANTAGE OPPORTUNITY  
EFFICIENT FRONTIER

**B**

**Beta**

**(m)**

IBPS



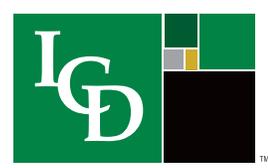
# Beta(m)<sup>™</sup>: A Fresh Look at Tradeoffs & Opportunities in U.S. Money Markets

*In March 2020, U.S. money markets showed their strength as they successfully weathered unprecedented market stress and an overwhelming flight to quality. Companies shifted assets, drew down credit lines and issued debt as they furiously worked to increase the liquidity and safety of their cash. As the dust settled, however, many companies were left sitting on large cash balances, leaving some ready to venture into higher-yielding money instruments.*

*For many corporates considering their next move, two questions remain: Is safety, liquidity and yield still the best way to achieve an efficient portfolio, and What – if any – investment opportunities exist? ICD teamed up with The Carfang Group for a technical deep dive to find out.*

*This whitepaper presents a compelling approach to Modern Portfolio Theory, adapted to money market instruments. The results reveal a stunning confirmation of the efficiency of the money markets, a demonstrable window of opportunity for Prime and FICA instruments, and a new model for assessing tradeoffs and opportunities in money markets going forward.*

WHITEPAPER  
JULY 2020



The  
**Carfang**  
Group

## INTRODUCTION

Never has there been such a profound stress test in U.S. money markets than in March 2020, when the impacts of the COVID-19 global pandemic began to unravel business as we've known it. Within a few short weeks the U.S. Federal Reserve dropped rates 125 basis points, equities lost 35% of their value, commercial paper markets froze, bankruptcies spiked, and most companies removed their earnings guidance. Yet, through it all, banks remained solvent, money funds continued to perform and provide daily liquidity, investment grade commercial paper rebounded, and money market ETFs held up.

Now that the March turmoil is behind us, it's time for corporate treasurers to review what they've learned and re-examine their liquidity management practices. To help this process, ICD teamed up with The Carfang Group to evaluate the risk, return and liquidity tradeoffs in the money markets.

### We addressed two questions:

- *Is safety, liquidity and yield still the best way to achieve an efficient portfolio?*
- *Have any opportunities emerged since the March madness?*

What follows is a new quantitative model for assessing the tradeoffs among money market instruments, an illustration of the complex relationships among money instruments to determine opportunities, and finally, a practical demonstration of optimized portfolios across risk profiles.

## I. THE MODEL - BETA(m)

Market participants evaluate short-term fixed income securities based upon their position on the yield curve. This is very useful for evaluating like instruments with different maturities. There is usually a tightly defined relationship between maturity and return. However, this methodology falls short when evaluating instruments with different pricing, trading and credit characteristics. For example, some instruments trade at net asset value while others trade based on intraday supply and demand. Some are subject to bid/ask spreads while others are not. Some have a constant NAV while others fluctuate. Some settle same day, others next day or even T+2. And some instruments are backed with explicit guarantees, while others are rated by major rating agencies. In the money markets, these technical differences can have a material impact on portfolio performance.

Relying heavily on Modern Portfolio Theory (MPT), ICD and The Carfang Group adapt its application to money market instruments. MPT evaluates the overall securities market, most often using the S&P 500 as a proxy and computes a beta for each portfolio to measure relative risks (volatility of returns). The S&P 500 is accorded a beta of 1.00 (it has a perfect mathematical relationship with itself). Other portfolios are measured against that anchor.

Using a similar measurement of portfolio standard deviations and covariances, we model money market instruments and compute what we refer to as Beta(m)<sup>TM</sup>. There are several types of money market instruments which complicate the calculations. Some are

discounted, others pay interest or dividends, some fluctuate in value, and others trade at par or mature at par. In order to be consistent across all these instruments, we use a 'variance of total return' methodology to construct Beta(m). As a result, we may counterintuitively find a Beta(m) above 1.00 on a deposit instrument that does not fluctuate in face value. That simply means that on a total return basis, it has a slightly higher variance than the anchor security (the one against which all others are measured).

After testing many market instruments over a five-year period, we determined that the one-month T-bill was the most robust representative of overall short-term money market volatility. We measure the volatility of all other instruments against the one-month T-bill which thus has a Beta(m) of 1.00.

For perspective, if measured in this manner, the S&P 500 would have a Beta(m) of 10.5. That's not surprising since the money markets are the most stable element of the capital markets.

We computed Beta(m) based upon monthly variances over the most recent five years through June 4, 2020. This sample period allowed us to test during periods of both rising and falling rates. It also allowed us to see the volatility that resulted from money market regulations taking effect in 2016. Finally, it also illustrated the impact of the March madness stress.

In the equity markets, volatility takes the form of fluctuating stock prices with adjustments for dividends. Since money markets operate differently, we need to make some modifications depending on instrument type:

- Discounted instruments such as T-bills are issued below face value, fluctuate in price and mature at face value. We measure these price fluctuations in computing Beta(m). At the short end of the curve, most investors view these as miniscule. But March madness showed us otherwise. Consider the T-bill maturing on 6/11/20. The charts in Figure 1 show how its price rose as the Fed lowered rates in early March, and how that same security fell during the market stress in mid-late March. An investor that needed to sell in mid-April may have incurred a loss.
- Dollar-in/dollar-out investments trade at par value. These are bank deposits and constant net asset value Treasury and Government money market funds. The rates they pay over time may fluctuate. Thus, the portfolio will grow at a fluctuating rate. We capture this volatility in Beta(m).
- Interest bearing instruments such as Treasury notes and bonds (in a constant maturity portfolio) combine elements of both of the above categories.
- Money Market ETFs have both a fluctuating market price and a fluctuating yield. Similarly, Prime money market funds combine a fluctuating net asset value and a fluctuating rate. These fluctuations are factored together in Beta(m).

We applied this methodology to 14 representative money market instrument classes and computed Beta(m) for each using data from multiple sources including Crane Data, Federal Reserve Bank of St. Louis, ICD and Treasury Direct. As you can see in Figure 2, the 1-month T-bill, our market representative instrument, is at 1.00. The Beta(m), as expected, is much lower for Treasury and Government money funds, given that they trade at a constant net asset value. Also as expected, it's higher for 5- and 10-year Treasuries than for shorter maturities.

ETFs have a slightly higher Beta(m) than their money fund counterparts. The Treas/Govt ETF, a Treasury/Government money fund blend that tracks three specific ETFs, has a Beta(m) of .99 whereas TMMFs are at .82 and GMMFs .85. That's because ETFs trade at a fluctuating net asset value. In addition, there are potential minor liquidity issues as ETFs trade with a slight bid/ask spread and deferred settlement. The Prime ETF category is a blend of seven ETFs which invest in short-term corporate instruments. It has a Beta(m) of 1.51 vs .96 for Prime MMFs.

From these findings, we conclude that the model works as anticipated. Beta(m) scores fall into the expected pattern. Lowest duration, lowest risk instruments have the lowest values, while longer duration and higher risk instruments have the higher betas.

Figure 1

FLUCTUATIONS IN T-BILL MARKET PRICE

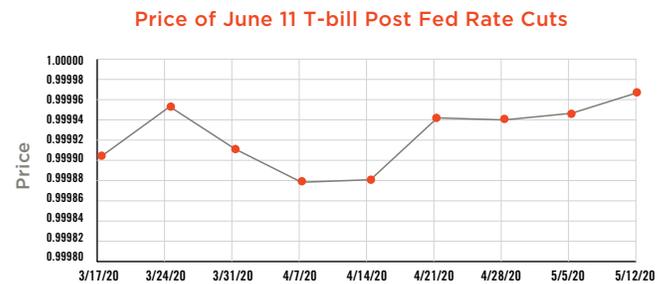
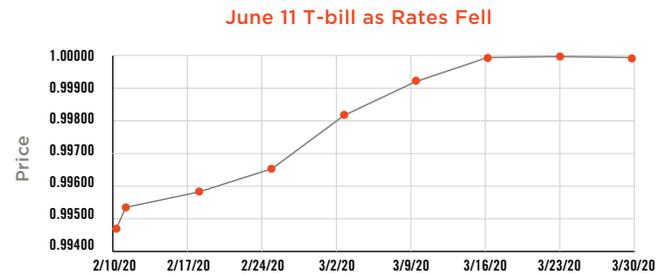


Figure 2

Money Market Instruments  
Beta(m)  
June 2015 - May 2020

Instrument	Beta(m)	Instrument	Beta(m)
Treas MMF	0.82	3 mo T-bill	1.06
Govt MMF	0.85	IOER	1.10
Prime MMF	0.96	1 yr Treas	1.14
Treas/Govt ETF	0.99	90 day CP	1.22
<b>1 mo T-bill</b>	<b>1.00</b>	Prime ETF	1.51
FICA	1.01	5 yr Treas	1.57
Fed Funds	1.02	10 yr Treas	1.81

## II. THE MONEY MARKET EFFICIENT FRONTIER

Modern Portfolio Theory holds that there is a definable tradeoff between risk and return. Lower risks result in a sacrifice of returns, whereas higher returns require more risk on the part of the investor. It further holds that at each level of risk, there exists one portfolio (or instrument) that is superior to all others.

To explore the possibility of a money market efficient frontier, we statistically analyzed the five-year returns of 14 instrument types in our universe. The correlation was remarkable. The low beta instruments indeed had the lowest returns and vice versa. The chart in Figure 3 shows the R-squared degree of fit was over 0.99. This is the **Efficient Frontier**.

The R-squared of 0.99+ is almost a perfect fit. This speaks to the incredible depth and breadth of the U.S. money markets. The ultra-low risk, constant net asset value Treasury money market funds with the lowest Beta(m) also have the lowest return. On the right side of the chart, the long duration 10-year Treasury bond has the highest return. As expected, those instruments investing in corporate debt have higher volatility and returns than their Government and Treasury counterparts. To represent insured bank deposits, we use the FICA solution. We use Interest on Excess Reserves (IOER) and Fed Funds as the proxy for uninsured bank deposits. They also nicely fit the curve.

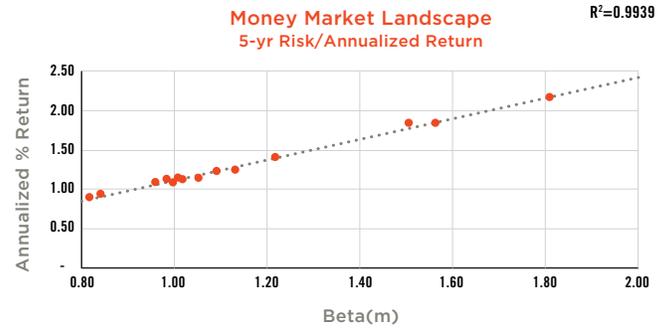
The fact that these instruments fall very close to the regression line speaks to the overall depth and efficiency of the U.S. short-term money markets. We would expect to see very high degrees of fit over most five-year periods. We use the efficient frontier in the money markets as a long-term indicator of the relative risks and returns of classes of instruments.

In a slight departure from how MPT identifies optimal portfolios in the broader capital markets, we use the efficient frontier in the money markets as a long-term indicator of the relative risks and returns of classes of instruments. We expect spread differentials that manifest from time to time. These could be credit spreads, duration spreads, etc. that could move instruments above or below the efficient frontier line for periods of time. This methodology can form the basis of identifying short-term market anomalies. In the next sections, we look at each of the instrument groupings and test them for potential opportunity.

As a final point, this whitepaper is examining the performance of classes of money market instruments. Within each of these classes, there could well be individual securities which perform differently, thus requiring investors to drill down a level before investing.

Figure 3

### RISK/ANNUALIZED RETURN TRADEOFF IN THE MONEY MARKETS - LAST 5 YEARS



Money Market Landscape  
Risk/Annualized Return Tradeoff  
June 2015 - May 2020

Instrument	Beta(m)	Return	Instrument	Beta(m)	Return
Treas MMF	0.82	0.88	3 mo T-bill	1.06	1.13
Govt MMF	0.85	0.92	IOER	1.10	1.21
Prime MMF	0.96	1.07	1 yr Treas	1.14	1.24
Treas/Govt ETF	0.99	1.11	90 day CP	1.22	1.39
1 mo T-bill	1.00	1.07	Prime ETF	1.51	1.82
FICA	1.01	1.13	5 yr Treas	1.57	1.83
Fed Funds	1.02	1.10	10 yr Treas	1.81	2.18

### III. MONEY MARKET INSTRUMENTS

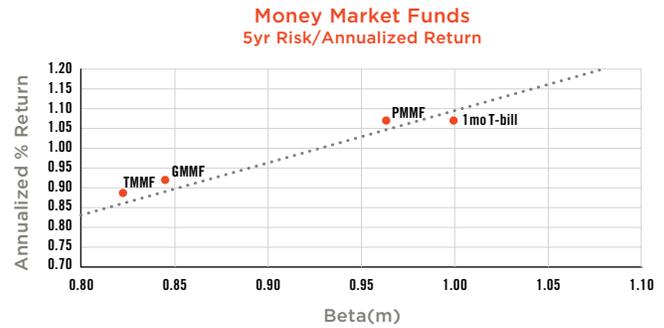
#### 1. Money Market Mutual Funds (MMFs)

These are the most common cash management tools for corporate cash management. They are by far the largest in terms of assets. They are also the most tightly regulated. As a result, they tend to also be the least volatile instruments.

The charts in Figure 4 show how money market funds performed relative to the efficient frontier over the five-year (June 2015-May 2020) and the recent May - June 2020 period. There are a number of important findings.

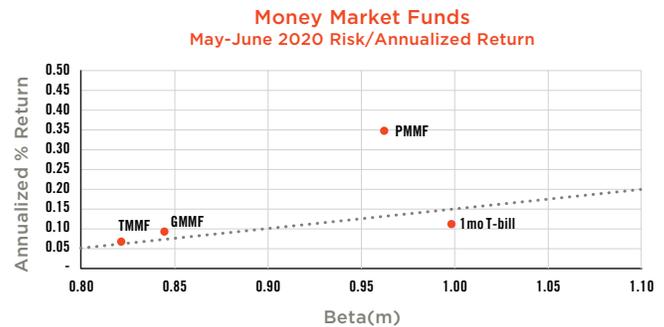
- All three categories, Treasury, Government and Prime have a lower Beta(m) than the 1-month T-bill. That may be the result of regulatory requirements for money funds to keep a high percentage of seven-day liquidity, resulting in lower duration and volatility than even the 1-month T-bill.
- Treasury and Government MMFs hug the efficient frontier line for each time period. That probably speaks to the efficiency of the capital markets and the significant level of assets in these funds.
- Prime MMFs fall above the efficient frontier line for each time period.

Figure 4



**Money Market Funds**  
Risk/Annualized Return Tradeoff  
June 2015 - May 2020

Instrument	Beta(m)	Return
Treas MMF	0.82	0.88
Govt MMF	0.85	0.92
Prime MMF	0.96	1.07
1 mo T-bill	1.00	1.07



**Money Market Funds**  
Risk/Annualized Return Tradeoff  
May-June 2020

Instrument	Beta(m)	Return
Treas MMF	0.82	0.07
Govt MMF	0.85	0.09
Prime MMF	0.96	1.34
1 mo T-bill	1.00	1.11

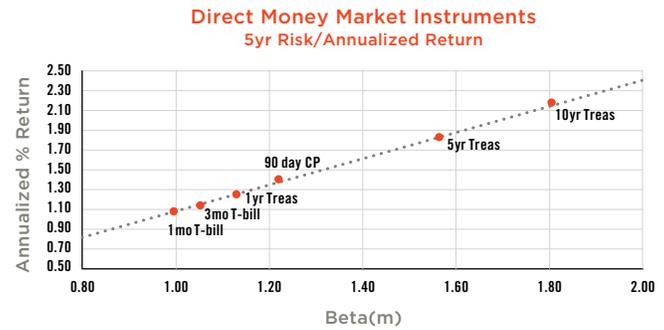
## 2. Direct Money Market Instruments

Some corporate treasury groups choose to purchase instruments directly in the money markets and construct their own portfolios. Typically, the instruments are held to maturity. Often, corporates ladder the maturities so that the portfolio will generate a regular stream of cash. This strategy works for a pool of cash that is stable or has a specific drawdown schedule. If the cash flow stream is volatile, treasurers prefer some of the other options described in this paper.

The charts in Figure 5 show how money market direct instruments performed relative to the efficient frontier over the five-year and the recent May - June time frames. Several observations:

- U.S. money markets are the broadest and deepest in the world. It's no surprise that the risk/return tradeoffs fall tightly along the efficient frontier, especially over longer time horizons.
- Over the shorter time horizon of May - June 2020, all of these instruments except the 10-yr Treasury and the 90-day CP fell below the line. That's probably because money market mutual funds were able to maintain returns while reducing Beta(m) to a level below the Beta(m) of the individual securities that comprise the portfolio.
- While the 10-year Treasury provided the best risk/return tradeoff, the high Beta(m) makes it unattractive as a short-term cash management tool.

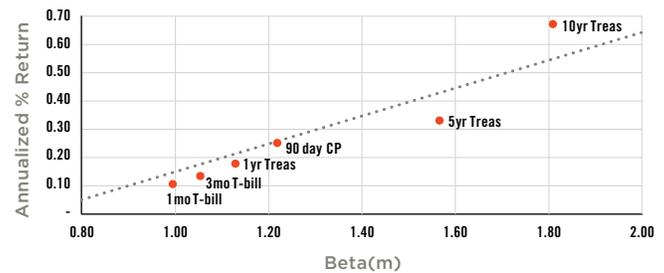
Figure 5



Direct Money Market Instruments Risk/Annualized Return Tradeoff June 2015 - May 2020

Instrument	Beta(m)	Return
1 mo T-bill	1.00	1.07
3 mo T-bill	1.06	1.13
1 yr Treas	1.14	1.24
90 day CP	1.22	1.39
5 yr Treas	1.57	1.83
10 yr Treas	1.81	2.18

Direct Money Market Instruments May-June 2020 Risk/Annualized Return



Direct Money Market Instruments Risk/Annualized Return Tradeoff May - June 2020

Instrument	Beta(m)	Return
1 mo T-bill	1.00	0.11
3 mo T-bill	1.06	0.13
1 yr Treas	1.14	0.18
90 day CP	1.22	0.25
5 yr Treas	1.57	0.32
10 yr Treas	1.81	0.66

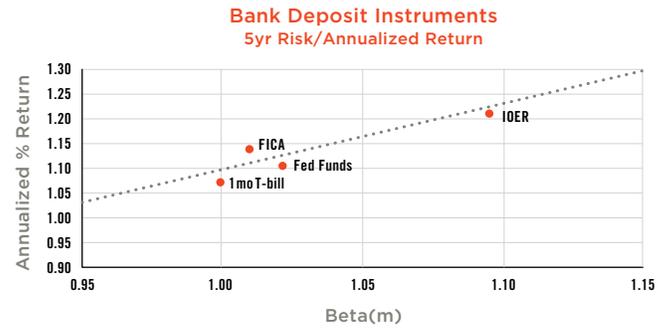
### 3. Bank Deposits

Corporates may place short-term cash in bank deposits. Deposits are insured by the FDIC up to \$250,000 per tax ID. Generally, the rates and terms are negotiated.

- Overnight Interest-Bearing Bank Deposits - In an environment where banks are holding trillions in excess reserves at the Fed, The Fed Funds rate and the Fed’s IOER represent an upper bound on what a bank can pay on an overnight deposit without maturity transformation. (For relationship or other business reasons, a bank may offer a specific customer a higher rate.) Terms are negotiable. If a bank is paying a rate materially above Fed Funds or IOER, it may be expecting that the deposit balance will not fluctuate widely. That raises the question of how suitable these deposits might be for short-term corporate investments.
- Insured Deposit Programs - Treasurers can also avail themselves of FDIC insured deposit products. Service providers will accept a large deposit on behalf of a corporate customer and place it in insurable increments (< \$250,000) at multiple banks. There may be a limit on the amount of funds that these providers can place. In this analysis, we look at the StoneCastle FICA solution as a proxy for the insured deposit asset class.

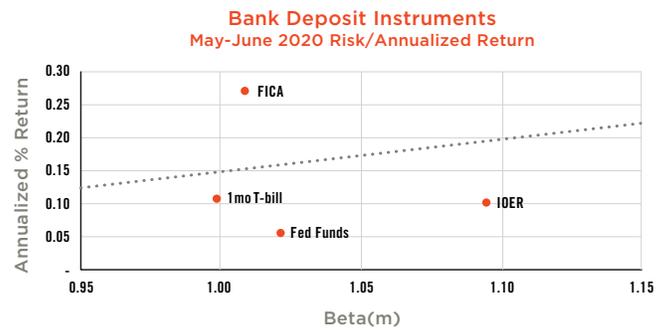
The charts in Figure 6 show these deposit instruments, again compared with the benchmark 1-month T-bill for 2020 year-to-date and for May and June 2020. In all three time periods, the rates on the FICA solution are superior to the 1-month T-bill and the bank proxies on a risk/return basis. That likely indicates that the banks paying these rates are expecting some maturity transformation and are not looking at these deposits as overnight funds.

Figure 6



Bank Deposit Instruments Risk/Annualized Return Tradeoff June 2015 - May 2020

Instrument	Beta(m)	Return
1 mo T-bill	1.00	1.07
FICA	1.01	1.13
Fed Funds	1.02	1.10
IOER	1.10	1.21



Bank Deposit Instruments Risk/Annualized Return Tradeoff May - June 2020

Instrument	Beta(m)	Return
1 mo T-bill	1.00	0.11
FICA	1.01	0.27
Fed Funds	1.02	0.06
IOER	1.10	0.10

#### 4. Money Market Exchange Traded Funds (ETFs)

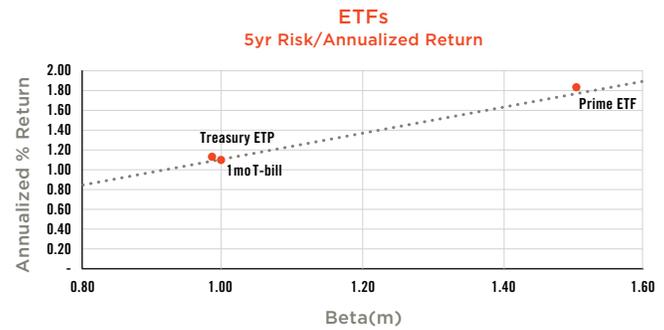
Exchange traded funds are short-term investment pools which are traded on exchanges. We put them into two categories. Treasury/Government ETFs invest in a portfolio of Treasury and/or Government instruments with maturities of under one year. Prime ETFs invest in corporate debt instruments, also with maturities under one year. Unlike the tightly regulated money market funds, these pools have much more latitude and are not subject to liquidity ratios or duration limits. These factors can boost returns and add to volatility, depending on the strategy of the portfolio manager.

We mentioned earlier in this paper that money market ETFs differed from other money market instruments in some important ways. To be more specific:

- Money market ETFs trade on exchanges and are subject to a bid/ask spread which can impact returns.
- Most have a settlement period that can extend beyond the same day or next day settlement of other money market instruments. That may make them difficult to use as a cash management tool.
- Shares are created via a network of market makers. Even for those ETFs which support intra-day creation or cancellations of shares, discrepancies between an ETF's market price and net asset value can arise, distorting returns in either direction.

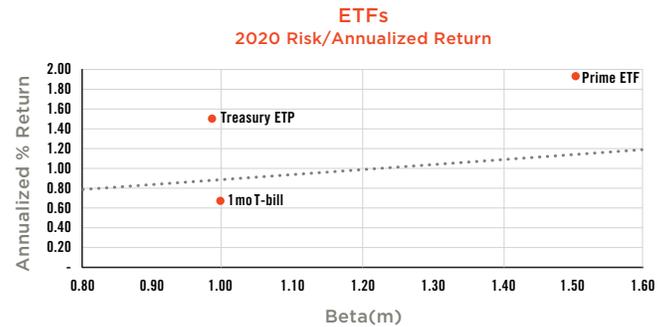
The charts in Figure 7 show performance over the past five years and year-to-date. We do not yet have returns for May and June 2020. The Prime ETFs significantly outperformed on a risk/return basis. We note, though, that was the result of having a longer duration during the recent unprecedented rate cuts in March. That performance may or may not be representative of what a corporate investor could expect.

Figure 7



ETFs Risk/Annualized Return Tradeoff June 2015 - May 2020

Instrument	Beta(m)	Return
Treas/Govt ETF	0.99	1.11
1 mo T-bill	1.00	1.07
Prime ETF	1.51	1.82



ETFs Risk/Annualized Return Tradeoff 2020 YTD

Instrument	Beta(m)	Return
Treas/Govt ETF	0.99	1.49
1 mo T-bill	1.00	0.65
Prime ETF	1.51	1.92

## IV. LIQUIDITY AND CREDIT QUALITY

In addition to the risk and return discussed above, liquidity is the third leg of the stool. This refers to the ability to quickly and efficiently move large amounts of money into or out of investments without distorting the price of the security in the process.

In this section we will study the liquidity dimensions of each of the asset types discussed in this paper.

It's important to point out that within the money market fund and ETF categories, liquidity is, in part, a function of the size of the fund. Larger funds can more easily handle large cash flows than smaller funds. Thus, within each category, liquidity can vary by fund.

**Treasury securities** are the definition of liquidity. In this category, we obviously place the 1-month, 3-month, 1-yr, 5-yr and 10-yr Treasuries. We also include Fed Funds and IOER since they are actually liabilities of the U.S. Federal Reserve. These are backed by the full faith and credit of the U.S. government either explicitly or implicitly.

**Money market funds** are also deemed to be extremely liquid, almost approaching the level of Treasuries. Regulatory liquidity requirements require funds to maintain a high percentage of daily and weekly liquid assets to meet redemptions. Treasury and Government MMFs hold government securities and therefore can handle large transactions without moving the market. Prime MMFs are highly liquid due to the regulatory considerations mentioned above. Their Boards are required to consider redemption gates or liquidity fees under certain circumstances. However, they have never been exercised, even during the extreme stress that occurred in March 2020. In addition to holding high quality securities, these funds generally carry a AAAM highest rating.

**Bank deposits** come in several forms:

- Demand deposits, insured up to \$250K, have same day liquidity but do not pay interest. Companies use these as an operating tool for payments rather than as an investment.

- Interest bearing deposits, insured up to \$250K, are negotiated instruments between a corporation and its bank. Terms and liquidity conditions can vary. Credit quality can differ from bank to bank. However, all uninsured bank deposits carry some additional exposure due to single credit counterparties.
- Insured bank deposit programs are those in which a third party spreads a large corporate deposit among multiple banks in order to qualify for FDIC insurance. These generally trade with next day settlement. Because of the mechanics involved with fragmenting a large corporate investment into insured deposits at dozens or hundreds of banks in increments <\$250,000, frequent large flows are sometimes discouraged via investment rate thresholds of \$50 million and \$100 million. Technically, an insured deposit at a bank that fails, could cause a payout delay, although in practice that has never happened.

**Money market ETFs** have the major drawback of a two-business day settlement window. That is a function of the rules of the exchanges on which they trade and not a reflection of the quality of the instruments themselves. However, because they are exchange traded, there is a bid/ask spread, generally negligible, that can be an issue. Unlike MMFs, these ETFs create and redeem shares through market makers. The creation process is designed to balance supply and demand but could result in prices deviating slightly from net asset value.

**90-day commercial paper** is the least liquid of the instruments presented in this whitepaper. Most of this short-term paper is held to maturity. There is a secondary market but that is subject to bid/ask spreads and transaction costs. Secondary market liquidity may also be issuer or underwriter specific.

Figure 8

Liquidity Summary Table

Instrument	Settlement*	Pricing	Bid-Ask Spread	Guarantee	Liquidity Score**
Treasury securities	Same day	Market	Infinitesimal	Explicit	Highest
Government securities	Same day	Market	Infinitesimal	Implicit	Highest
Treasury MMFs	Same day	CNAV	None	Derived	Highest
Government MMFs	Same day	CNAV	None	Derived	Highest
Prime MMFs	Same day	FNAV	None	None	Very High
FDIC Insured deposits (FICA)	Next day	Face Value	None	Explicit	Very High
Bank deposits w/interest	Negotiable	Face Value	None	up to \$250k	Negotiable
Commercial Paper	Same day	Market	Moderate	None	High
TR/Govt ETFs	Two day	Market	Low	Derived	Medium
Prime ETFs	Two day	Market	Moderate	None	Medium

\*Assumes noon cutoff

\*\* Keep in mind that these are the highest quality instruments in the market. These scores are only in relation to each other, not the overall market.

## V. DISCOVERING CURRENT MARKET OPPORTUNITIES

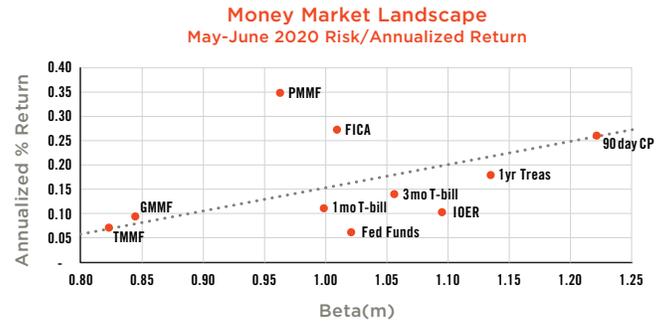
Astute corporate treasury professionals will use this framework to identify securities that move away from the efficient frontier. If a security moves above the line, and assuming there is no credit downgrade, its asset allocation should increase. Similarly, if a security falls below the line, a treasurer should reduce exposure and move to securities on the efficient frontier.

With that in mind, let's look at the May 2020 and current June 2020 returns. We've removed the 5-year and 10-year Treasuries and the ETFs from the chart to zero-in on the shortest and most liquid instruments.

In the May - June 2020 period, Prime MMFs yielded substantially more than all the other short-term instruments on a Beta(m) adjusted basis. Their total return exceeded the efficient frontier line by 21 basis points. That represents annualized excess risk adjusted earnings of \$210,000 on a \$100 million portfolio.

The FDIC insured bank product, which is a managed rate, was also above the efficient frontier line. It was 11 bps above.

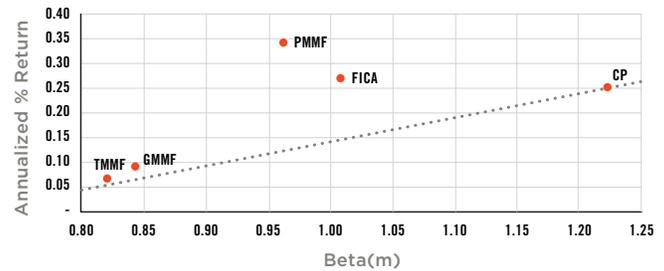
Figure 9



Money Market Landscape  
Risk/Annualized Return Tradeoff  
May - June 2020

Instrument	Beta(m)	Return	Instrument	Beta(m)	Return
Treas MMF	0.82	0.07	Fed Funds	1.02	0.06
Govt MMF	0.85	0.09	3 mo T-bill	1.06	0.13
Prime MMF	0.96	0.34	IOER	1.10	0.10
1 mo T-bill	1.00	0.11	1 yr Treas	1.14	0.18
FICA	1.01	0.27	90 day CP	1.22	0.25

"Above the Line" Instruments  
May-June 2020 Risk/Annualized Return



"Above the Line" Instruments  
Risk/Annualized Return Tradeoff  
May - June 2020

Instrument	Beta(m)	Return
Treas MMF	0.82	0.07
Govt MMF	0.85	0.09
Prime MMF	0.96	0.34
FICA	1.01	0.27
90 day CP	1.22	0.25

0 | 0.85 | 0.92 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.06 | 1.10 | 1.14 | 1.22 |  
 0 | 0.85 | 0.92 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.06 | 1.10 | 1.14 | 1.22 |  
 0 | 0.85 | 0.92 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.06 | 1.10 | 1.14 | 1.22 |  
 0 | 0.85 | 0.92 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.06 | 1.10 | 1.14 | 1.22 |  
 0 | 0.85 | 0.92 | 0.96 | 0.97 | 0.98 | 0.99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.06 | 1.10 | 1.14 | 1.22 |

## VI. CONSTRUCTING AN EFFICIENT PORTFOLIO FOR SHORT-TERM CASH

This paper set out a comprehensive methodology for evaluating the risk/return/liquidity tradeoffs in the U.S. money market. Now, consider how to put them in practice with a hypothetical investment policy and three scenarios: aggressive, moderate and conservative.

Let's assume that investment policies require that no more than 60% of the portfolio be invested in any one asset class and that 50% must have same day liquidity. Further assume that our universe is limited to those instruments that are at or above the efficient frontier line. That is, we are being adequately compensated for risk. That leaves us with the following options:

**Aggressive** – In this scenario, we would place our 60% maximum allocation in the highest return instrument and the remaining 40% in the next highest. That would be 60% in Prime MMFs and 40% in the FICA insured deposit. The resulting portfolio would have an expected return of 31 bps and a Beta(m) of 0.99. Sixty percent of the portfolio would have same day liquidity.

**Moderate** – A moderate strategy might be to place 50% in the instrument with the highest return and 50% with the lowest Beta(m). That would place half in Treasury MMFs and half in Prime MMFs, resulting in an expected return of 20 bps and a Beta(m) of .89. One hundred percent of the portfolio would have same day liquidity.

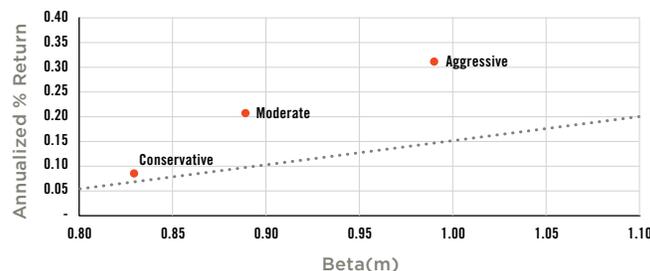
**Conservative** – In this scenario, we would place our 60% maximum allocation into the lowest Beta(m) instrument and the remaining 40% in the next lowest. That would be 60% in Treasury MMFs and 40% in Government MMFs. The resulting portfolio would have an expected return of 8 bps and a Beta(m) of 0.83. One hundred percent of the portfolio would have same day liquidity.

Figure 10

Liquidity Summary Table

Strategy	Portfolio	Beta(m)	Expected Return	Same Day Liquidity
Aggressive	60% PMMF, 40% FICA	0.99	0.31	60%
Moderate	50% TMMF, 50% PMMF	0.89	0.20	100%
Conservative	60% TMMF, 40% GMMF	0.83	0.08	100%

Model "Efficient" Portfolios  
 May-June 2020 Risk/Annualized Return



0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22
0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22
0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22
0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22
0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22
0	0.85	0.92	0.96	0.97	0.98	0.99	1.00	1.01	1.02	1.03	1.04	1.06	1.10	1.14	1.22

**CONCLUSION**

We began this analysis by asking two questions:

***Is safety, liquidity and yield still the best way to achieve an efficient portfolio?***

Yes. Our modeling shows that the magnitude of the tradeoffs is always in flux. The coefficients of the general equations change with each day’s new data. However, there was no evidence that the core concepts are any less reliable as a result of the recent market tumult. In fact, the concepts appeared to have captured the market activity well.

***Have any opportunities emerged since the March madness?***

Yes. We expect instruments to move above or below the long-term efficient frontier line over market cycles, and corporate treasurers must be diligent in monitoring the opportunities.

In the two months immediately following the turmoil, the risk/return tradeoff for two instruments moved well above the line.

- Prime MMFs were superior to other money market instruments, rising well above the long-term efficient frontier line. Since PMMFs generally enjoy the same day liquidity attributes as other money funds and Treasury instruments, we can say that for the study period, they had emerged as a market opportunity.
- FDIC insured deposits, a next-day liquidity instrument, also moved above the efficient frontier line.

Further, at a portfolio level, combinations of instruments can be constructed to more precisely match a treasurer’s risk/return/liquidity requirements.

ICD and The Carfang Group created Beta(m) from the core concepts of Modern Portfolio Theory, adapted for money markets and viewed through the lens of a corporate treasurer. We were able to measure the efficient frontier for short-term money markets, allowing corporate investment professionals to make decisions optimizing their return based on risk tolerance.

***If you found this whitepaper insightful, you can request a free consultation to learn how you can leverage Beta(m) to make more informed investment decisions.***

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