

Can Statistical Data Contribute to Oversight of Money Markets Funds (MMFs)?¹

Brian Godfrey and Brian Golden²

Abstract

Money Market Funds (MMFs) play a crucial role in the global financial system, acting as an important source of funding and liquidity to other financial intermediaries, particularly the banking sector. MMFs came into particular focus during the financial crisis, having been previously seen as very safe investment options. Many MMFs experienced significant outflows of investor funds in 2008, which further tightened credit markets and heightened fears over potential hidden exposures within the financial system. This paper explores the wider use of statistical data to contribute to the oversight of MMFs, using granular data reported to the Central Bank of Ireland by each individual fund. The paper explores how this granular data can chart varying degrees of risk in Irish MMFs since 2008, with a view to identifying potential indicators that would support financial stability analysis and regulatory monitoring going forward.

¹ This paper will be presented at the Irving Fisher Conference on “Indicators to support Monetary and Financial Stability Analysis: Data Sources and Statistical Methodologies” at the Bank for International Settlements in Basel, Switzerland, 4–5 September 2014.

² The authors are economists in the Statistics Division of the Central Bank of Ireland (email: brian.godfrey@centralbank.ie and brian.golden@centralbank.ie). The views in the paper are those of the authors and do not necessarily reflect the views of the Central Bank of Ireland. The authors are very grateful for the help and support provided by Joe McNeill and Rory McElligott.

1. Introduction

Money market funds (MMFs) act as a critical lending channel within the global financial system through the repo market, connecting banks and other financial intermediaries with daily liquidity. MMFs are also a key source of liquidity for short-term debt markets, investing in short term high quality debt instruments such as commercial paper and certificate of deposits issued by banks. MMFs are generally offered to investors seeking to preserve their initial investment while earning a small rate of return slightly higher than the bank deposit rate. As such, MMFs tend to be seen as substitutes for bank deposit accounts. This is particularly the case for “constant NAV” funds, which commit to maintaining a stable value per share/unit in the fund, such as \$1. MMF investors usually consist of pension funds, insurance companies, other large institutional investors and high net worth individuals.

MMFs contributed to a significant intensification of the financial crisis in the second half of 2008 when the net asset value per share/unit of a number of US MMFs either fell, or threatened to fall, below their net asset value of \$1 (“breaking the buck”). Following the collapse in the value of MMF holdings of Lehman Brothers’ commercial paper and short term debt, concerned investors began to make large withdrawals from certain MMFs, especially those with exposure to commercial paper. This led to “bank like runs”³ on MMFs, which were only stemmed when MMF sponsors, in many cases banks, injected considerable amounts of capital into MMFs. This heightened fears as to hidden exposures within the financial system, particularly for banks, and further credit tightening within financial markets followed, compounding already strained interbank lending and money markets.

The financial crisis revealed the need to monitor the MMF industry on a continuing basis for current and future risks that could threaten the global financial system. This paper examines possible uses of statistical data for monitoring MMFs. The Central Bank of Ireland collects quarterly granular data on MMFs on a per fund basis so as to feed into Irish and euro area aggregate national accounts and balance of payments data. This granular data has been collected on a security-by-security basis, beginning from Q4 2008. Securities data collected, can be cross-referenced against the European Central Bank’s Centralised Statistical Database to gain further security attribute information. Nevertheless, this granular data was not designed to calculate risk indicators and some gaps exist with this purpose in mind.

Building on some existing international research, this paper examines the potential for statistical data to chart the development of risk within Irish MMFs. The paper is structured as follows: Section 2 looks at the structure of the Irish MMF industry. Risk is explored in Section 3 using econometric techniques and analysis of outflows and yields. Section 4 focuses on MMF data that is becoming available and what new indicators will soon be possible, while Section 5 concludes the paper.

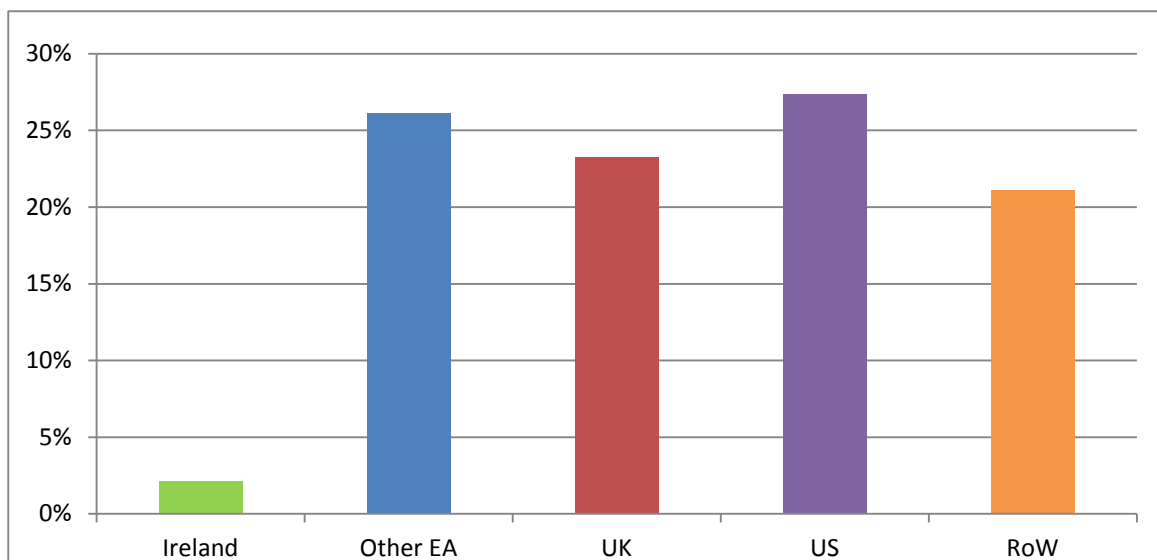
³ As is the case with bank runs, investor withdrawals can become self-perpetuating in that an investor is enticed to make a withdrawal on foot of withdrawals by other investors that, of themselves, threaten the solvency of the fund.

2. Irish MMF Industry

The Irish MMF industry is a substantial but quite distinct portion of the euro area industry as a whole. Irish MMFs were collectively valued at €315.5 billion,⁴ based on net asset value, at the end of 2013. As such, Ireland is a key host for euro area MMFs, which contribute directly to the euro area money supply. Irish MMFs invest in assets from the United States, the United Kingdom and other non-euro area countries to a much greater extent than other euro area MMFs. Irish MMFs also have less relative exposure to their domestic market (Chart 1). Similarly, investors in Irish MMFs were predominately United Kingdom based, with US investors as significant as Ireland and the euro area combined (Chart 2). While the linkages between Irish MMFs and the Irish financial system are quite weak, there is nonetheless a need to monitor Irish MMFs role and links to the international financial system.

MMF Asset Holdings of Debt Securities

Chart 1



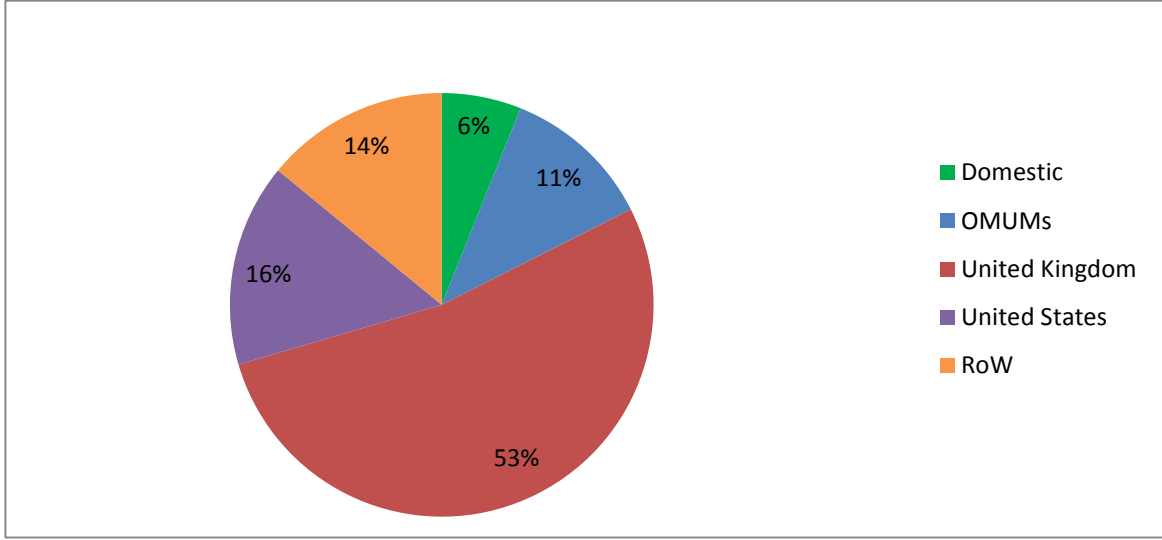
In this context, it is perhaps not surprising that the performance of Irish MMFs has diverged somewhat from those of the euro area as a whole. Irish MMFs remained relatively stable from Q2 2008 to Q2 2011, followed by a short period of growth up to the middle of 2012. Since then, however, the industry has declined, based on net asset value, though this reflects a trend that has been evident in euro area MMFs since Q1 2009 (Chart 3). The low yield environment within the money market and debt securities markets that has persisted since the middle of 2012 has taken its toll on global MMFs, as all MMFs face the challenge of providing a return in excess of deposit rates and expense ratios. In this environment, many Irish MMFs decided to waive their expense fees in order to maintain a positive return for their investors, as average MMF yields declined in 2012 and for the early part of 2013, as highlighted in our yield analysis in section 3.3. In some cases, where net yields were negative, Irish

⁴ The MMF population used for this analysis includes some highly liquid funds, which were reclassified from money market funds to bond funds in the official statistics in December 2011.

MMFs chose to absorb the income losses by redeeming fund units at zero through compulsory redemptions.⁵ In addition, bond price volatility saw significant investor outflows from Irish MMF in the middle of 2013, as investors reacted to the prospect of a reduction in quantitative easing by the US Federal Reserve.

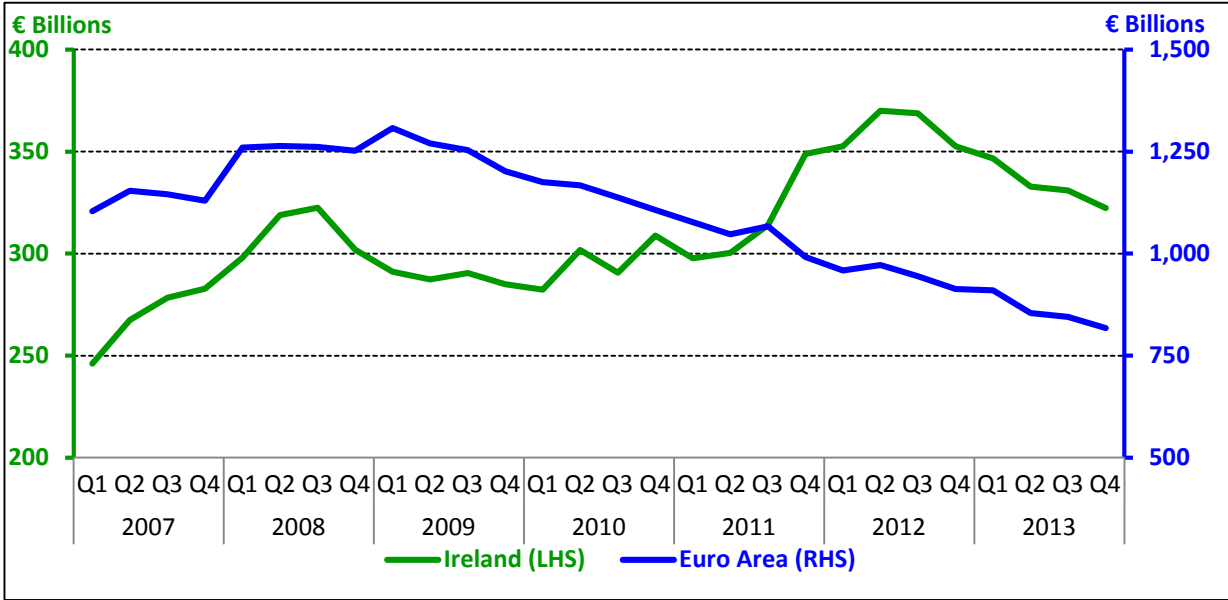
Investor Profile in Irish MMFs by Region

Chart 2



Irish¹ and Other Euro Area MMFs

Chart 3



¹ Irish MMF data has been smoothed for a reclassification that took place in Q4 2011.

The following sections look at these trends using our granular data to assess the potential for developing risk indicators for MMFs.

⁵ Irish Central Bank Macro-Financial Review 2014.1, which can be found at <http://www.centralbank.ie/publications/Pages/MacroFinancialReviews.aspx>.

3. Risk Analysis

We conducted risk analysis under three headings: econometric analysis on investor outflows, non-econometric outflow analysis, and yield analysis using granular data for 2010–13 and more basic data for 2008 and 2009.

3.1 Econometric Analysis

Our econometric analysis draws on McCabe (2010),⁶ which focused on the particularly sharp outflows from US MMFs in both 2007 and, especially, 2008. McCabe found for 2008, yield evolved as a key indicator, with higher yielding funds in the run up to September significantly more likely to experience large outflows. The size of the fund was also significant, which is also supported by findings from Kacperczyk and Schnabl (2013)⁷ that larger funds with more financial strength took on more risk and suffered runs as a result. An institutional investor base was also a key driver, with institutional investors having better access to information than retail investors and reacting to negative events more rapidly. Sponsor risk was also significant, reflecting the perceived likelihood of sponsor support for the MMF in the event of stress.

We compiled and tested various indicators (Table 1) to replicate McCabe's analysis on Irish MMFs from Q1 2010 to Q4 2013, using security-by-security data from quarterly reporting forms. These data cover a period of mild stress in financial markets, in contrast to the McCabe analysis, and the below results must be interpreted with this in mind. Data were also obtained from a one-off survey of all Irish MMFs (Table 1). Both sponsor credit default swaps (CDS) and bank affiliation were used as proxies for sponsor risk, with a bank sponsor seen as generally more likely to support a stressed MMF for reputational reasons. Investor outflows and yield, using internal calculations of yield to maturity, were both tested separately as dependant variables, while the remaining indicators were used as explanatory variables. Yield as a dependant variable was not found to be statistically significant to any of the explanatory variables. This result is unsurprising as McCabe found that yield dominated as the explanatory variable, thus rendering most of the other variables insignificant.

We focused on the size of investor outflows per month⁸ as our dependent variable and, using a Probit model, we found that, during a period with no episodes of extreme stress, smaller funds where investors were predominantly non-retail were the most likely to experience larger outflows (Table 2). This result, significant at the 95 per cent confidence interval, contrasts somewhat with McCabe's results which suggested large funds dominated by institutional investors were most vulnerable to large outflows during a period of financial crises. The weighted average maturity (WAM) of a fund was also significant, with funds whose assets had longer average maturities more likely to experience investor outflows. In addition, if an MMF has a triple-A credit rating, it was significantly less likely to experience outflows. Both the WAM and credit rating results were significant at the 90 per cent confidence interval.

⁶ McCabe 2010, "The Cross Section of Money Market Fund Risks and Financial Crises".

⁷ Kacperczyk and Schnabl 2013, "How Safe are Money Market Funds?".

⁸ Investor outflows were defined as an outflow of greater than 10 per cent of a MMFs net asset value (NAV).

Overall, our results may indicate that while large institutional funds deserve attention in terms of crisis prevention, as McCabe’s and the literature suggests, smaller institutional funds may be more volatile during non-crisis periods.

Various indicators used in analysis of Irish MMFs from Q1 2010 to Q4 2013

Table 1

Indicator		Indicator	
Asset holdings	CBI* Data	Expense ratios	Survey
Investor outflows	CBI* Data	Sponsor CDS	Survey
Fund size	CBI* Data	Yield	Calculated
Institutional or retail investors	Survey	Weighted average maturity	Calculated
Investment ratings	Survey	Investor flow volatility	Calculated
Bank affiliation	Survey		
* Central Bank of Ireland			

What caused investor outflows from Irish MMFs from 2010 – 2013?

Table 2

Dependant variable: 1 if outflows > 10% of NAV	Probit regression 1		Probit regression 2	
	Co-efficient	Z-Stat	Co-efficient	Z-Stat
NAV (euro)	-6.3	-4.64*	-8.29	-4.44*
Yield	-4.37	-0.5	-13.7	-1.39
WAM	0.1	1.79^	0.04	0.6
Retail	-0.84	-2.91*	-0.67	-2.23*
Bank	-0.17	0.08	-0.02	-0.17
Rating			-0.23	-1.67^
Govt			1.38	1.46
VIX			-0.01	-0.95
* 95% confidence, ^ 90% confidence				

3.2 Outflow Analysis

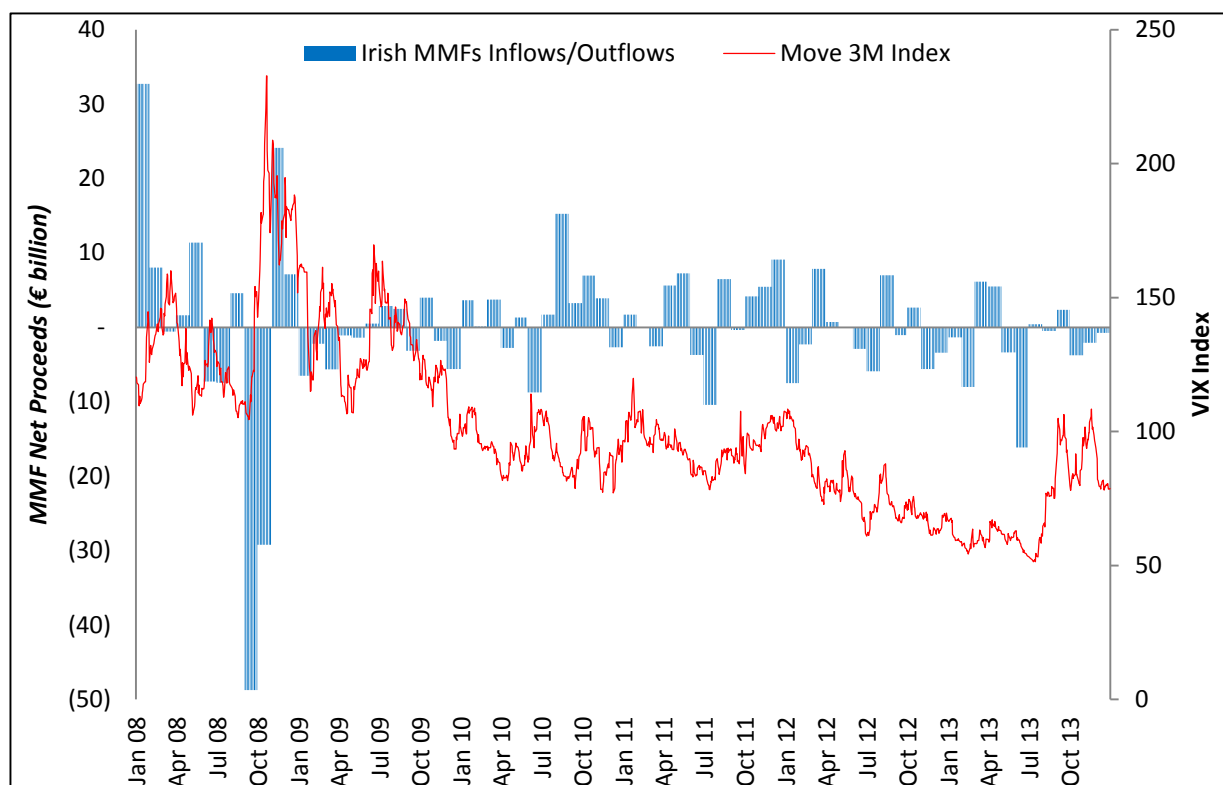
Our analysis on the more limited data we have on the 2008 period confirms literature findings that larger, institutional funds were most vulnerable. Outflows from Irish MMFs in September/October 2008 were on average 22 per cent of net asset values, though some MMFs suffered much stronger outflows, which was partly offset by

inflows into other MMFs, such as those largely invested in government securities. Both the average decline in net asset values of Irish MMFs and the pattern of flows between MMFs were very similar to the experience of US MMFs at the time. Consistent with McCabe and other literature findings, larger Irish MMFs and those with the highest investor inflows in the preceding period experienced the biggest outflows during 2008 (Table 3). Irish MMFs with an average size of €4.8 billion suffered from redemptions of over 30 per cent, with a bias towards an institutional investor base. Smaller Irish MMFs experienced lesser investor outflows, while some Irish MMFs, with an average size of €1.6 billion and with less of an institutional bias, actually experienced investor inflows over the same period.

Sept-Oct 2008	No. of funds (€ bn)	Average size	Institutional Weight
Over 30% outflow	25	4.75	93%
10–30% outflow	28	2.2	83%
Flows +/- 10%	32	2.06	91%
Over 10% inflow	19	1.64	78%

Looking at the period beyond 2008, Irish MMFs withstood periods of market stresses in 2010 and 2011 relatively well (Chart 4), with no further evidence of substantial investor redemptions during this period. As the MOVE volatility index⁹ shows, significant market stresses occurred in 2010 and 2011 and early 2012 related to the euro area debt crisis, albeit on a much smaller scale than 2008. This suggests that the MMF industry is quite resilient even in the event of significant market stress, despite this not being true at height of the global financial crisis. This would reinforce the view held in years preceding the financial crisis when MMFs were regarded as extremely safe investments. The fact that the euro area debt crisis had a relatively limited impact on investor flows provides some reassurance.

⁹ The MOVE 3M volatility index is used to measure stress in the market and is constructed from a yield curve weighted index of the normalised implied volatility on 3 month Treasury options.



3.3 Yield analysis

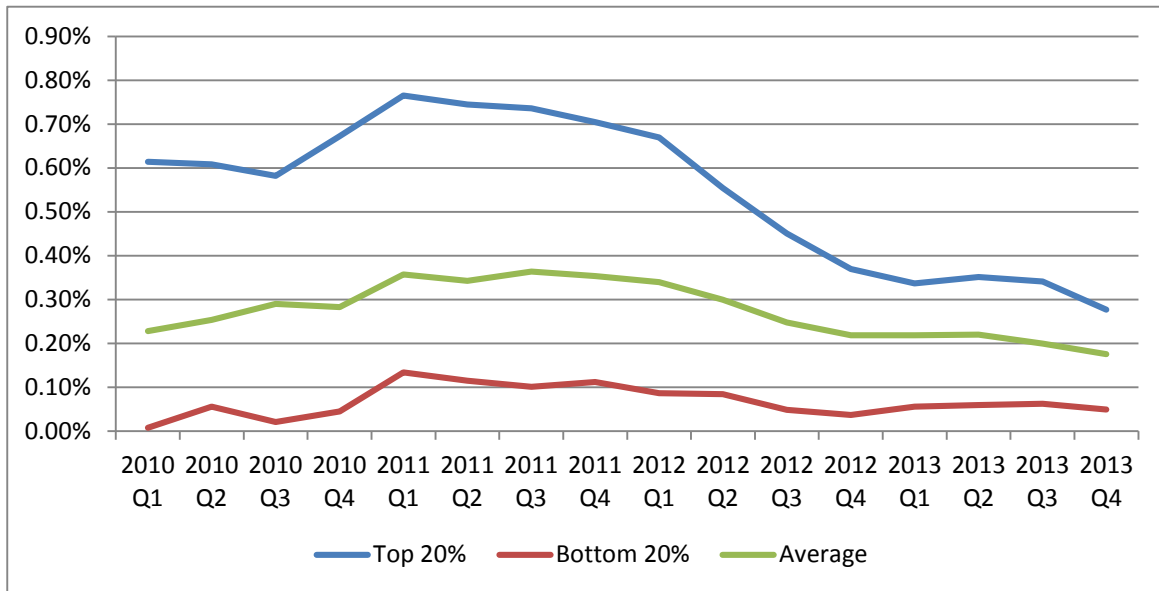
Yields tell an important story on MMF behaviour from Q1 2010 to Q4 2013, even if not significant in our econometric analysis. The following analysis looks at the yield of funds which were active at beginning of 2010 and still operating at end-2013. We found that the funds with average yields in the top 20 per cent of Irish MMFs at the start of 2010 saw their yields decline steadily since early 2011 (Chart 5), from a peak of almost 0.8 per cent to less than 0.3 per cent. The MMFs in the lowest 20 per cent in terms of average yield remained at low yields of around 0.10 per cent for the majority of this period. This pattern suggests that the higher yielding funds attempted, for a time, to maintain and even improve on their average yields until early 2011. After Q1 2011, higher yielding MMFs saw their yields decline and converge towards market averages. This either reflects a more conservative investment strategy or the lack of opportunities arising from the low interest environment.

The suggestion of a more conservative approach from the higher yielding MMFs can also be found in an analysis of weighted average maturities, although MMFs across the board appeared to have taken some limited action to maintain yields. The average WAM of higher yielding MMFs declined from between 0.30 and 0.35 years up to 2011 to around 0.16 by Q4 2011, before recovering somewhat to between 0.20 and 0.25 years (Chart 6). The lowest yielding MMFs, after initially falling to a low of 0.10 years in Q4 2010, increased in 2011 and their WAMs stayed in the range of 0.20 and 0.30 years up to end-2013. This convergence of WAMs suggests that, while the

highest yielding MMFs WAM declined the most, all MMFs took some action to maintain minimum sustainable levels of yield.

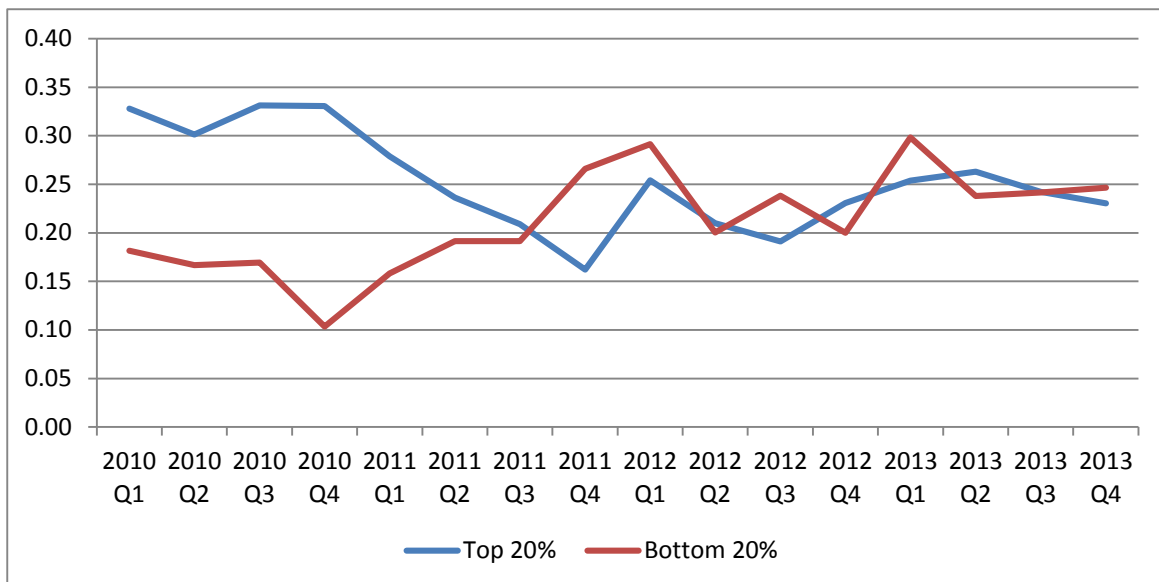
The Top & Bottom 20 per cent Performing Irish MMFs by Yield

Chart 5



Convergence of WAM of highest and lowest yielding Irish MMFs

Chart 6

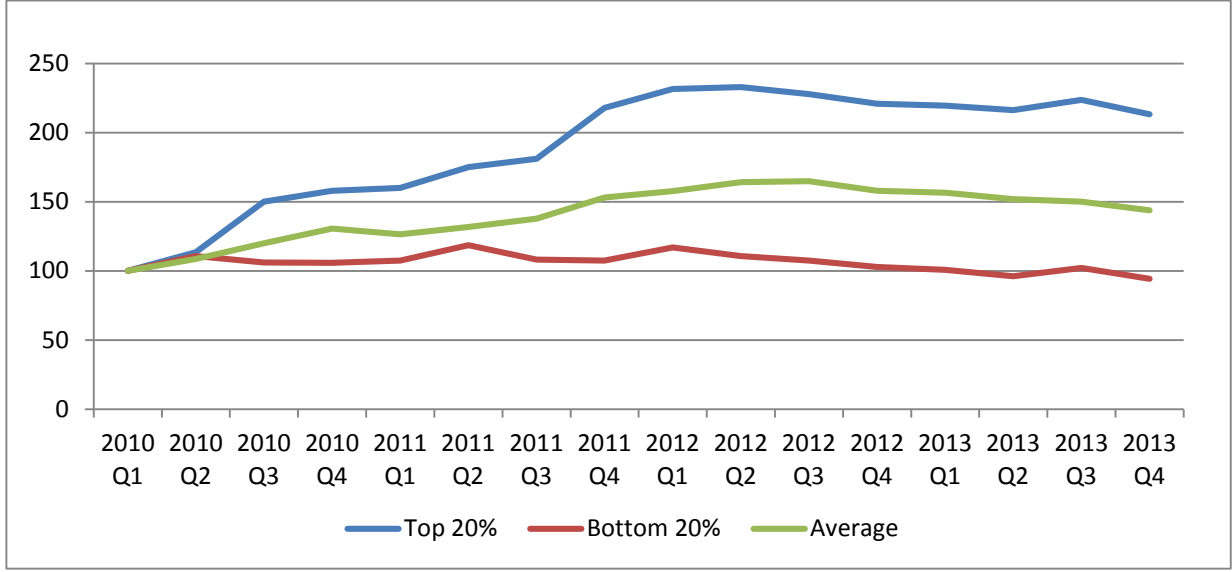


The unsurprising finding that higher yielding funds attracted significantly greater investor inflows could simply reflect better performing funds though it is also consistent with higher levels of risk. McCabe and others found that the MMFs suffering the largest outflows in 2008 were both higher yielding and had attracted

higher investor inflows in the preceding period. As Chart 7 shows, the top 20 per cent in terms of higher yielding MMFs in early 2010 experienced growth over the following two years, with a doubling in their NAVs. Furthermore, this growth tapered off once these MMFs saw their average yields decline. In contrast, the bottom 20 per cent performing MMFs saw very little change up to 2012, and started to decline in size from Q1 2012 to Q4 2013.

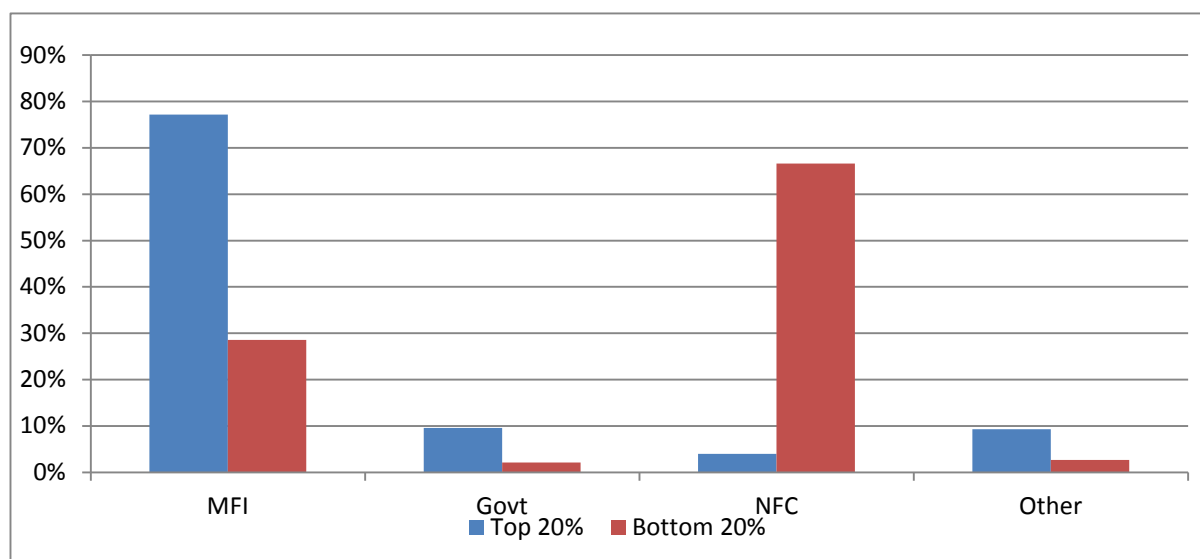
Index of NAV growth of the Top & Bottom Performing Irish MMFs by Yield

Chart 7



One way of distinguishing whether higher yielding funds simply perform better or take on more risk is to look at asset composition. In other words, do higher yielding funds invest in different sectors, geographies and maturities that might indicate a different risk profile? We found that the higher yielding MMFs invested 50 per cent more in banking debt than the lower yielding MMFs in Q4 2013 (Chart 8), while also investing slightly more in government debt. On the other hand, the lowest yielding MMFs invested over 60 per cent more in non-financial corporate debt than the higher yielding MMFs though at the very short end of the yield curve. This is not a clear-cut result but it would appear that higher yielding funds may have taken on bank debt and extended maturities on government debt. Meanwhile, lower yielding funds focused on very short maturities but within the NFC sector so as to preserve a modicum of yield.

Overall, the Irish MMF industry appears to have adopted a hunker-down attitude to the low-yielding environment, largely eschewing the option of taking on additional risk to compensate for declining yields. This is supported by the convergence in MMF yields, as seen in section 3.3.



3.4 Asset holdings

The weight of particular assets in MMF portfolios may also be an indicator of risk. For example, Chernenko and Sundaram (2013)¹⁰ find that US MMFs with large exposures to euro area banks suffered significant outflows between June and August 2011. Unfortunately, our data was insufficient up to Q4 2013 to distinguish between prudent and forced selling of asset positions and so no concrete analysis could be undertaken. Further research would benefit from data on the times and prices at which positions were rapidly unwound. The next section looks at our new MMF dataset collected from Q1 2014, which looks to address some of the data gaps that have been identified in our analysis.

4. Development of Risk Indicators from a new MMF dataset

More detailed and granular data has been collected from Irish MMFs since Q1 2014, and from Q4 2014 this data will be collected monthly rather than quarterly. This new data will fill some data gaps, provide richer indicators and will allow for a greater analysis of risks emanating from the Irish MMF industry. The extra granularity of data includes:

- A liquidity measure of total assets.¹¹
- The identification of which debt/equity securities are used in securities lending/borrowing and the amounts involved.

¹⁰ Chernenko and Sundaram (2013), "Frictions in Shadow Banking: Evidence from the Lending Behaviour of Money Market Mutual Funds".

¹¹ This measures the amount of assets of a MMF that can be liquidated within 7 days, from 7 days up to 1 month, and over 1 month.

- More granular detail of debtor/creditor counterparties.
- Reporting of different instrument types.
- Detailed information on repo and reverse repo type transactions.
- Identification of securities used in re-hypothecation.
- Maturity dates of securities held.
- Derivatives reported by their instrument types and underlying asset/liability types.

While it will take a number of quarters for this data to bed down, possible new risk indicators can be developed from this new data set. In particular, the data will allow for measures of maturity and liquidity mismatch on both sides of the balance sheet. More detail on activities in the repo market will shed light on the liquidity provided by MMFs to other financial entities, while more granular data will assess the extent to which derivatives might mitigate or, potentially, exacerbate risk. These new indicators will allow for greater measurement of risks posed by Irish MMFs to the Irish economy as well as the wider financial system.

5. Conclusion

This paper suggests that granular financial data collected by the Central Bank can contribute to risk indicators for MMFs. Our more limited data for 2007 and 2008 is consistent with the existing literature which points to average yield per fund, larger funds during times of financial crises, asset growth and the investor base as risk indicators. More detailed data for the most recent period does not contain sharp investor outflows from MMFs. Nevertheless, our findings suggest that smaller funds with an institutional investor base may be more volatile outside periods of extreme stress. Furthermore, while we could not detect econometric relationships for yield, there are clear differences in behaviour when MMFs are split by their average yield, which supports the view that average yield per fund deserves close attention.

There is considerable scope for further work in this area and we see our work to date as a preliminary step. Our new reporting forms will provide significant scope for additional indicators, while the characteristics of those MMFs holding relatively large amounts of certain asset classes suggests that more detail on the timing and price of asset sales can provide better insights into the behaviour of funds. In summary, there is huge potential to expand the use of granular data collected for statistical purposes for monitoring of risk of money market funds and the wider financial system.