



Can creditor bail-in trigger contagion? The experience of an emerging market

Roy Havemann

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Abstract

The successful bail-in of creditors in African Bank, a small South African monoline lender, provides an opportunity to evaluate the intended and unintended consequences of new resolution tools. Using a data set that matches quarterly, daily and financial-instrument level data, I show that the bail-in led to money-market funds ‘breaking the buck’, triggering significant redemptions and some financial contagion. To limit potential systemic effects, the authorities used complementary interventions, including imposing discretionary liquidity restrictions on mutual funds and market-making facilities for affected financial instruments. This supported a sustainable restructuring of the bank and reduced financial spillovers. The lesson is that future interventions using these new resolution tools should take into account the potential unintended systemic implications, particularly in smaller jurisdictions where there is a high degree of interconnectedness between bank and non-bank financial institutions.

G11, G23, G38 money-market fund, bail-in, co-co bonds, bank resolution

1 Introduction

Global regulatory reforms have focused on ‘burden-sharing arrangements’, which aim to share the costs of bank failures between creditors and government. These reforms include ‘creditor bail-in’ and ‘contingent convertible bonds’. The former is a mechanism to write-down the claims of creditors during the bank resolution process. The latter creates powers to convert debt to equity, contingent on a specified event. The resolution of African Bank,¹ a small monoline South African lender, presents a unique opportunity to study the spillover effects of using these new tools. The bank was almost exclusively funded by wholesale

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¹Throughout the text, African Bank refers to African Bank Ltd, registered as a bank. References to the broader group are African Bank Investments Ltd.

(i.e. not retail) funding, with a notable portion (6.9%) of its funding from mutual funds, particularly money-market funds. It is one of the first emerging market bank resolutions that included the bail-in of creditors, and, following the bail-in, there were substantial money-market fund redemptions, with potential contagion through financial interlinkages.² All affected money-market funds ‘broke the buck’, the most significant such episode since the breaking of the buck by Reserve Primary Fund on September 16, 2008.

The paper exploits a unique data set, containing both daily and quarterly frequencies, including data down to mutual fund holdings at financial-instrument level. Controlling for other factors which may influence redemption patterns, I show that redemptions occurred disproportionately in money-market funds with African Bank exposure. There is evidence of financial spillovers to the rest of the financial system, albeit limited. A larger failure, a larger haircut, or a poorly-designed resolution could potentially have triggered broader spillover with possible systemic consequences, including contagion to other banks.

The impact on constant net asset value money-market funds is compared to that of variable net asset value income funds.³ Outflows from the latter were smaller, adding to evidence that constant net asset value funds are a source of risk themselves.

The implication is that creditor bail-in is a potentially useful resolution tool, but needs to be used carefully. The systemic consequences can be reduced through a transparent and clear ex ante bail-in framework, supported by enhanced regulation of mutual funds, particularly money-market funds, to reduce their fragility. Regulatory reforms can reduce the systemic risk posed by money-market funds, e.g. phasing out constant net asset value and introducing powers to impose discretionary liquidity restrictions and suspend convertibility.

In section 2, I highlight how this paper contributes to the related literature, particularly the literature on bail-in and money-market funds. Section 3 provides the institutional setting, including the relevant global regulatory reforms. Section 4 sets out the event, highlighting how the bail-in of African Bank creditors was achieved. The following two sections outline the data and empirical strategy. The final section concludes.

2 Related literature

The paper contributes to a small but growing literature on the practicalities and potential unintended consequences of bail-in and contingent convertible bonds, particularly that using these tools may magnify rather than dampen systemic risk during failures (see, for example, [Goodhart \(2010\)](#), [Geithner \(2014\)](#), [Av-goules and Goodhart \(2015\)](#) and [Hüser et al. \(2017\)](#)). The paper presents a

²Contagion is defined following [Iyer and Peydro \(2011\)](#) that ‘[t]here is contagion if the failure of a bank causes a significant negative externality to other banks’.

³Constant net asset value (C-NAV) mutual funds maintain a unit net asset value. In contrast, variable net asset funds (V-NAV) mutual funds have a fluctuating market price.

case study⁴ and so also links to the literature on individual bank runs or groups of runs in the tradition of [Iyer et al. \(2012\)](#), [Shin \(2009\)](#) and [Iyer et al. \(2016\)](#).

The paper also provides insights on how money-market funds behave when faced with an idiosyncratic shock. This literature notes that money-market funds with a constant net asset value (C-NAV) provide an implicit capital guarantee, making them analogous to banks without deposit insurance. These funds may thus be more susceptible to runs and specific types of runs.⁵

[Kacperczyk and Schnabl \(2013\)](#) examine money-market funds in the run-up to the global financial crisis noting evidence that fund inflows were positively correlated with fund risk. More risky funds also suffered larger runs following shocks. Moreover, money-market funds do have liquidity mismatches, albeit limited. A sudden increase in demand for redemptions has a similar impact on a money-market fund as a sudden increase in demand for uninsured bank deposits, with [Wermers \(2012\)](#), and a related paper [Schmidt et al. \(2016\)](#) noting that illiquidity may create strategic complementarities. In the United States, for example, [Chen et al. \(2010\)](#) find that money-market mutual funds with more illiquid assets experience a larger outflow in response to bad news. The relative illiquidity of corporate bonds may create either first-mover advantages or strategic complementarities. A related effect is that of the ‘flight from maturity’ ([Gorton et al. \(2014\)](#)).

[Schmidt et al. \(2016\)](#) argue that, after a shock, redemptions by ‘sophisticated’ investors should be larger. Money-market funds are also often underwritten by ‘sponsors’, which [Acharya et al. \(2013\)](#) find could precipitate contagion by imposing losses on the sponsor, typically a bank.

Large redemptions from money-market funds may create financial spillovers in multiple other ways, including:

- The bail-in of one bank may cause concern about common exposures, and mutual fund managers may decide to pre-emptively liquidate holdings of banks with similar assets (see for example [Allen and Gale \(2000\)](#) or [Ahnert and Georg \(2017\)](#));
- Asset managers may choose to liquidate assets to meet large redemption requests, causing fire sales ([Morris et al. \(2016\)](#)), which may create a ‘cascade of defaults’ ([Battiston et al. \(2012\)](#)) and create a fall in transaction values ([Coval and Stafford \(2007\)](#)); and
- Money-market funds may have exposures to multiple banks, and banks may in turn have large exposures to money-market funds. This series of overlapping claims creates an opaque network, which may make a financial

⁴Prior to this case, the most notable example was the 2013 bail-in of depositors in Cyprus. From 2016, bail-in became mandatory in EU member states as part of the Bank Recovery and Resolution Directive. For a review of European case studies see [World Bank \(2014\)](#).

⁵This literature in turn builds on the seminal papers on bank runs, in particular [Diamond and Dybvig \(1983\)](#), and the information effects in [Postlewaite and Vives \(1987\)](#), [Bryant \(1980\)](#), [Chari and Jagannathan \(1988\)](#) and [Jacklin and Bhattacharya \(1988\)](#). Signals are considered in [Carlsson and van Damme \(1993\)](#), [Morris and Shin \(2000\)](#), [Morris and Shin \(2003\)](#) and [Goldstein and Pauzner \(2005\)](#).

system intermediated by money-market funds more fragile (Cipriani et al. (2014) and Hüser et al. (2017)).

This paper also links to the literature on signals – bail-in arguably provides a signal to players about the financial position of similar banks. Morris and Shin (1999) posit that in a global games setting with firms facing liquidation, intervention by public authorities may solve a co-ordination problem, reducing the likelihood of a messy, inefficient liquidation. Baeriswyl and Cornand (2010) note that authorities may well use policy signals to influence behavior. That said, importantly for this analysis, Angeletos et al. (2006) argue that policy interventions may create multiple equilibria, with the decision maker caught in a trap where her decision dictates both the coordination outcome and thus, by deduction, the policy intervention. The signals also cause participants to update information about other banks (e.g. Allen and Gale (2000), Acharya (2009), Allen et al. (2011), Ahnert and Georg (2017) or Cipriani et al. (2014)).

There is also a strand of money-market fund literature considering the effect of various regulatory reform proposals. Here I examine the performance of variable net asset value funds against constant net asset value funds and the use of discretionary liquidity facilities, illustrating some of the findings in the theoretical literature (see, for example, Parlato (2016)) that argues that adopting a variable net asset value reduces the risk to investing in money-market funds (as they are inherently less fragile), but also reduces the potential return, with mixed effects on liquidity.

3 The institutional setting

3.1 The regulatory reforms

The regulatory reforms that introduce ‘bail-in’ and ‘contingent convertible’ (or ‘co-co’) debt are intended to provide an alternative to ‘bail-out’. When a bank faces a solvency shortfall, bail-in gives powers to the regulator to recapitalize the bank by writing down the claims of creditors, while in the case of contingent convertible bonds, these claims can be converted to equity. This is instead of taxpayers providing a bail-out.⁶ By shifting losses to creditors, and away from taxpayers, the intention is to break the cycle of deteriorating sovereign and banking system health.

Bail-in and contingent convertible bonds also have putative ex ante benefits – they may increase artificially-low funding costs for systemically important banks and thus reduce the ex ante incentives these banks enjoy. These arise because bondholders anticipate that ‘too-big-to-fail’ banks have a lower credit risk as there is an implicit state guarantee (Dewatripont and Freixas (2012), Hett and Schmidt (2014)).⁷

⁶For a discussion of the regulatory reforms see Financial Stability Board (2014), for a review of how countries have implemented bail-in see Financial Stability Board (2016) and for details of the process see Zhou et al. (2012).

⁷Persaud (2014) takes a contrary view noting that, on a risk-adjusted basis, the return

Interventions are only appropriate in idiosyncratic situations (Goodhart (2010)) as the intervention itself could ‘warn’ agents of further action. The point where the instrument converts (the ‘trigger point’) could become self-fulfilling. For example, assuming that market capitalisation is the trigger point, a ‘death spiral’ may ensue – as market capitalisation falls towards the trigger, there may be a discontinuous sudden collapse (Perotti and Flannery (2011)).

The reforms also attempt to solve a political question about who bears the burden of a bank failure, but the political dimension of ‘burden sharing’ is not straightforward (see, for example Allen et al. (2017)). During 2016, for example, authorities were reluctant to bail-in bondholders of Banca Monte dei Paschi di Siena, an Italian bank. This was in part because the bondholders were large pension funds, and politically it was difficult to impose losses on a politically powerful constituency.

3.2 The African Bank case

3.2.1 Growth phase: 2008 to 2013

African Bank Investments Limited, a holding company, had three main subsidiaries – a furniture retailer (Ellerines) that it purchased in 2008, a consumer credit insurer (Stangen), and a bank. This bank, African Bank, was a monoline lender, lending almost exclusively to low-income earners on an unsecured basis. Despite its banking license, the bank had historically not taken significant retail deposits, rather relying on wholesale funding, primarily from bondholders, including pension and mutual funds.

From 2008, the group grew rapidly, supported by cross-selling of products and services between the different parts of the group. It was evident, however, that the furniture subsidiary had been bought at an inflated valuation.⁸ A series of writedowns reduced its value significantly. Before being bought, it had also sold furniture for cash or on hire-purchase. The shift to unsecured lending caused an increase in defaults.⁹

Despite these challenges, lending growth continued. By 2011, the growth in its unsecured lending book was over 50% per year, in marked contrast to the industry average of 10%. African Bank had exposure to low-income employees across all sectors, including mining. During 2012 a sustained mining strike, including violence in the platinum mining industry, created substantial financial distress amongst borrowers. The majority of loans written in the fourth quarter

on securities with bail-in characteristics is misaligned, and systemically important banks still issue bail-in securities at artificially low yields.

⁸The official report on the failure, Myburgh (2016), details multiple problems at the furniture subsidiary which appeared to be unknown to African Bank, including poor credit controls and poor governance.

⁹Previously, lending to Ellerines customers was on a hire-purchase collateralized basis, with the right to repossess furniture. This was changed to unsecured lending in Ellerines stores which could be used for furniture. Unsecured loans came with credit insurance provided by Stangen, but with extensive exclusions. In addition, personal unsecured loans were provided direct to customers through a branch network and in Ellerines stores.

of 2012, which followed these severe problems in the mining sector, ultimately turned bad.

3.2.2 Bank deteriorates: Late 2013

The funding structure was short-term and mainly wholesale, increasing funding risk. African Bank had the highest concentration of liabilities to domestic ‘other financial intermediaries’ (80.5%), i.e. mutual funds, pension funds and other non-bank intermediaries (see Table 1). Moreover, African Bank had a substantially high exposure to foreign-currency funding (19.5% of liabilities), in marked contrast to other banks, where the average bank’s exposure varied between 5 and 10%.

In November 2013, African Bank Investments Ltd announced that its business had deteriorated substantially, with headline earnings falling 88% and credit impairments rising to R8.27 billion, about 20% of its balance sheet. It argued a recapitalization would place the business on a sound footing. Accordingly, the company managed to launch a rights issue for 685.3 million new ordinary shares, priced at 800 cents a share. This was a discount of 38.7% to the theoretical price.

The recapitalization did not assuage the fears of bondholders. A slow run, or ‘walk’ of wholesale funders began. Total liabilities declined by R8 billion, from R59 billion to R51 billion, over the course of six months. The decline in liabilities was indeed only rand liabilities, which fell from R46 billion to R36 billion during the period, with foreign currency liabilities rising by R2 billion. There was a ‘flight from maturity’ (Gorton et al. (2014)). Short-term liabilities rose from 10 to 14% of total overall liabilities over the space of a year. The yield on short-term instruments rose. Some money-market funds pre-emptively reduced exposure to the bank. However, the increased yield on, and greater issuance of, short-term debt encouraged less conservative money-market funds to increase exposure.

Credit impairments continued to rise. For the bank, non-performing loans (NPLs) rose to 31.7% of gross loans in March 2014, from 28.2% as of September 2013. For the comparative period, provisions for credit losses increased to 26.3% of average gross loans, from 15.5%. Moody’s Investment Service reduced the group’s rating to sub-investment grade on May 30, 2014. Offshore funds which had mandates linked to the ratings were forced to sell African Bank debt instruments, and yields on African Bank debt nearly doubled, rising by approximately 300 to 400 basis points.

4 The event: bail-in of creditors

On the evening of Wednesday, August 6, 2014, African Bank issued a profit warning. To maintain both regulatory requirements and solvency, it indicated it needed a R8 billion recapitalization, which would also be through a rights issue as in the previous year. The impact was immediate. The share price slid

from 500c to 35c per share over twenty-four hours and some of the international bond prices fell as far as 50% of par. By the close of trade that week, the share price was nearly zero.

On Sunday, August 10, 2014, the weekend following the profit warning, the bank was placed under curatorship (statutory management), and the bail-in of creditors was announced. The components of the write-down announcement were as follows:

- The bank would be split into a ‘good bank’ and a ‘bad / residual bank’. Reasonably well-performing loans would be transferred to the good bank, while the remaining non-performing loans would remain behind in the residual bank, which would be gradually wound down;
- The claims of senior unsecured bondholders were separated out into two: A claim in the ‘good bank’, at 90% of the face value of their instruments and a ‘stub’ claim in the ‘residual bank’ of 10% of the value of their instruments. The understanding was that the claim in the residual bank was essentially worthless. This had the same effect as an enforced ‘bail-in’, in that bondholders had little choice but to accept potential losses in order to achieve the resolution of the bank. (However, this meant that it was not a true bail-in. Bondholders retained a residual debt claim.)
- Subordinated creditors initially lost their entire holdings. Subsequently, a compromise between senior, subordinated creditors and the Reserve Bank was reached, and it was agreed that subordinated creditors would be transferred to the good bank at 37.5% of their holdings.
- Subsequent announcements also clarified that interest would accrue, and that maturities would be extended.
- To forestall a potential freeze in money-market instruments, on the morning following the resolution, the large banks offered unlimited buy-back for overnight instruments they had issued. This promise was backed up by the standing liquidity facility from the central bank.

4.1 Money-market funds ‘break the buck’

[Table 1 about here.]

Before the market opened on Monday, August 11 2014, the regulator instructed money-market funds with African Bank exposure to reprice this exposure and take into account the 10% haircut. The effect was a negative impact on the value of all exposed money-market funds.

Exposed money-market funds ‘broke the buck’, i.e. registered capital losses. But the ‘breaking of the buck’ was purely mechanical and an outcome of the regulatory formula and the haircut, and not due to sudden large redemptions. In terms of the relevant regulation (Board Notice 90, paragraph 7), ‘a reduction in value occurs where a loss of a sale or a default of a money-market instrument

results in a loss greater than the income accrued in the portfolio in an accounting period’ (Financial Services Board (2014)). The accounting period under the law is one day.

The full write-down of 10% of the value of African Bank instruments was thus offset first against the daily yield of the money-market fund and, if that was not sufficient, then the capital was reduced. It was essentially treated as a ‘negative yield’.¹⁰ The bail-in imposed on funds was larger than the daily yields. This it was inevitable that all funds with any African Bank exposure had a capital write-down. We show below that the large redemptions did not cause the breaking of the buck. Rather, the redemptions accelerated *after* the breaking of the buck.

Moreover, to forestall an uninformed run, funds with exposure in African Bank were given the option to transfer holdings to separate retention funds, with the effect of creating a type of discretionary liquidity restriction.¹¹ This ostensibly made the valuation of the money-market fund transparent and immediate; reducing the likelihood of a run, and reducing ‘first-mover advantage’. The reorganization took place before the market opened. Only four money-market funds chose to use retention funds, while nine did not; and one chose sponsor support.

4.1.1 Release of information on exposures

Money-market funds voluntarily regularly release ‘fact sheets’ containing a summary of the largest holdings of the fund, typically the ten largest exposures. These are available to investors, and are also collated by third-party information services, e.g. Morningstar. A review of the fact sheets shows that African Bank did not qualify as a ‘top-ten exposure’ for any fund. Up to the bail-in event, it is unlikely that retail investors knew what the extent of holdings were. More sophisticated investors may have had more information, partly through ongoing interaction with the fund managers. However, it is unlikely that they had detailed information.¹²

On the Monday morning following the bail-in, however, the information set available changed significantly. All funds were forced to both announce their exposure to African Bank, and announce the impact on the fund. Funds communicated this via text message or e-mail to their clients early on Monday.

¹⁰A detailed breakdown of each fund’s approach to the event is provided at https://www.psg.co.za/wealth/funds_impacted_by_abil, with worked calculation examples.

¹¹During periods of distress, first-movers benefit from being able to access the liquid assets first, known as ‘sequential service’ (Goldstein et al. (2016)). This leaves an ever-diminishing pool of assets for investors who act later. To forestall the potential run, discretionary liquidity restrictions stop early movers from withdrawing their entire investment. For a discussion of the use of these restrictions following the global financial crisis see Aiken et al. (2015).

¹²This was confirmed through interviews with large institutional investors.

5 Data

Two mutual fund data sets were compiled for the empirical analysis – an extensive quarterly mutual fund data set (*‘Quarterly data set’*) and a more limited daily mutual fund data set (*‘Daily data set’*).

The focus here is on interest-bearing mutual funds, particularly money-market funds and short-term ‘income’ funds. *Money-market funds*¹³ are the largest interest-bearing type of fund, with assets under management of approximately R267 billion in March 2016, or 10.7% of GDP. These funds must maintain a constant net asset value (NAV) of 1; and may only invest in money-market instruments with a residual maturity of less than 13 months, a weighted average duration of 90 days, and a weighted average remaining life of 120 days. *Income funds* (‘short-term interest-bearing’) funds do not maintain a constant NAV, and may invest in longer-dated instruments, but in other respects are most like money-market funds.¹⁴

5.1 Quarterly data

The quarterly data set contains consistent data for all money-market and income funds from March 2013 to March 2015. The data was collated from quarterly mutual fund reports published by the Association of Savings and Investment South Africa.¹⁵ All registered mutual funds submit data on a prescribed template to the Association, which publishes the data on a regular and consistent basis.

The data set has 19,314 data points. There is sufficient data on 74 interest-bearing mutual funds, of which 37 are money-market funds and 37 are income funds. There are 29 fields of information per fund (individual-specific, time variant). This includes information on the aggregated portfolio allocation of each fund by type of financial instrument and by maturity. Financial instruments are categorized and aggregated into nine categories, viz. instruments issued by government, other public entities, non-financial corporations, financial corporations, cash instruments, derivatives instruments, and listed and unlisted money-market instruments.

Eight maturity buckets are reported (overnight, 0-3, 3-6, 6-12 months, and 1-3, 3-7, 7-12 and more than 12 years). The source of funds is either retail or institutional. The former is defined as natural persons, whereas the latter is non-natural persons and can include institutional investors such as pension funds and life companies, large corporations or other funds.¹⁶ There is also

¹³Money-market funds are regulated under Board Notice 90 of the Collective Investment Schemes Control Act (2002). The regulatory framework is similar to that of the relevant Securities and Exchanges Commission requirement (rule 2a-7) requirements for money-market funds and the European Union UCITs standards.

¹⁴The classification scheme follows the industry association’s fund classification scheme, available at <http://www.asisa.org.za>

¹⁵See <https://www.asisa.org.za/statistics/>.

¹⁶Large and sophisticated corporations typically hold operational balances in overnight money-market funds.

information on average balances, and the number of accounts.

Table 2 reports summary statistics for June 2014, shortly before the curatorship announcement. The data summarises the data into constant NAV money-market funds and variable NAV income funds. It also provides details on average returns and portfolio allocation across the different types of funds. These differences are discussed in more detail below.

[Table 2 about here.]

5.2 Daily data set

The second data set contains *daily data* on money-market funds and income funds. It is collated from daily reports by *Profile Data*¹⁷ and cross-checked against information from *Morningstar*,¹⁸ two third-party providers of mutual fund information. Daily data is available on fund size, most recent return,¹⁹ total expense ratio, transaction cost and total investment cost.²⁰

The daily set contains a subset of large funds. Summary statistics are reported in Table 3. There are a total of 103,000 data points, made up of 515 days of data beginning from before the event until two years after the event; and 50 funds, with four fields of fund-specific, time-variant information per fund. For money-market funds, the daily data set contains 17 funds compared to the 37 funds in the quarterly data set. At September 2014, the total money-market fund holdings in the daily set amounted to R163.5 billion, compared to the total assets of the funds in the quarterly data set of R241.5 billion. Put another way, the daily set contains 46% of the funds by number and 68% by value. Returns are calculated as the annualized monthly yield on the fund (distributions as a percentage of the fund).

For income funds, the daily set contains 33 funds, compared to 37 funds in the quarterly data set. The daily data has 89% by number and 65% by value. For income funds, returns are calculated in two ways. The first is the annual income and capital gains distributions, which are slightly misleadingly termed dividends. These are expressed as a percentage of the fund. The second is the change in the NAV. Fund-level return and TER data is matched to the quarterly data set.

The significant difference between the two data sets is that the daily set only has information on NAVs, returns and costs, whereas the quarterly set has extensive information on holdings.

[Table 3 about here.]

¹⁷<http://www.profile.co.za>

¹⁸<http://www.morningstar.co.za>

¹⁹Measured as the annualized interest and dividend yield paid to investors.

²⁰The total expense ratio is an industry-wide measure of the cost of administering the portfolio relative to the NAV, transaction costs related to the costs of buying or selling the fund, and total investment cost is an aggregate of the two measures.

5.3 Supplementary financial instrument level data

Additional data was obtained from the regulator of mutual funds and merged with the main quarterly data set. This data is a limited subset of 35 large income and money-market funds at two dates, end of June 2014 and end of September 2014. The data capture approximately 20% of the money market and income funds by value, and 45% by number. The data provide the exposure of these funds to 2,422 financial instruments, issued by 206 issuers at the end of June 2014 and the end of September 2014. Each instrument code provides information on maturity date and average interest rate.

For the purposes of the analysis, I classified each of the 2,422 financial instruments following an approach matching the quarterly data set. However, the more granular information allows for additional subcategories. For the issuer information, the data set adds large bank, mid-tier bank, small bank, central government, and public entity. For the maturity information it adds term to maturity, which is not in the industry data set.

Additional data was obtained from the South African Reserve Bank, both from the Bank Supervision Department which publishes data on liabilities of supervised banks; annual reports and trading updates from African Bank Investment Ltd and African Bank Ltd.²¹ This data was complemented with data published by the funds themselves, including fund ‘fact sheets’ – however, these sheets do not always contain detailed information on fund holdings.²²

[Table 4 about here.]

5.4 Exposure to African Bank

The estimate of exposure to African Bank was obtained in two ways. The first way was an analysis of the regulatory returns, which provide a detailed picture of the exposure of each fund to different instruments. The second was to calculate the exposure by considering the size of the retention funds set up by each fund. The two ways yield broadly comparable results – however, due to inconsistencies in the way funds report to the regulator, the second approach was preferred. Where funds did not set up retention funds, the first approach was used.

5.5 Data cleaning and reconciliation

Two adjustments had to be made to the data: retention funds and double-counting. Some funds created retention funds at the time of the failure. These retention funds caused an automatic reduction in the size of the fund, as the assets were held in a separate fund. The effect is to overstate the reduction in the size of the fund. The second concern is double-counting – money-market

²¹<http://africanbank.investoreports.com/> and from the Treasury division of the bank.

²²See, for example, the June 2014 Stanlib statement which does not disclose the African Bank holdings, despite the fact that it was a larger proportion of its holdings than other holdings, which were disclosed.

funds by definition buy high-yield short-term instruments. These are sometimes simply units²³ in other money-market funds. This is most notable for yield-chasing funds of funds, typically actively managed funds that merely aim to keep a portfolio of, for example, the ten highest yielding money-market funds. As far as possible, data without double-counting was used.

5.6 Were funds with African Bank exposure different ex ante?

Table 2 presents summary statistics of interest-bearing funds grouped by type (money-market or income) and exposure to African Bank on 30 June 2014, prior to the event.

On average, money-market funds with African Bank exposure were larger than funds without exposure. The 14 money-market funds with exposure had an average net asset value of R 15.9 billion, compared to the 23 without exposure of R 3.1 billion.

Returns, however, were larger in non-exposed money-market funds (see Table 3). Non-exposed money-market funds had an annual yield (weighted by fund size) of 5.23%, compared to a yield of 5.11% for exposed funds, and a yield of 5.18% for all funds.²⁴

A further measure of the riskiness of the portfolios is in the holdings of underlying instruments. Table 2 presents both instruments and maturities using the quarterly data set.

The high exposure to financial corporations is evident. Money-market funds, in particular, show very high exposure to financial corporations. Average exposure of money-market funds to financial corporations was 95.1%, mainly deposits (35.9%), debt instruments (31.0%), and unlisted instruments (28.2%). All exposures to African Bank amounted to 1.1%.

6 Results

6.1 The impact on money-market funds

In this section, the impact on mutual funds following the bail-in is analyzed. From a simple examination of the daily data (see Figure 1), it is immediately apparent that there were large-scale redemptions of investments in money-market funds. On average, African Bank made up approximately 1.1% of the holdings of money-market funds. Within three weeks, money-market fund redemptions reached R32.4 billion, or 11.8% of the size of all money-market funds. The redemptions were concentrated in money-market funds with exposure to African Bank, where clients redeemed 15% of their holdings. The profitability signal

²³A ‘unit’ is an holding in a collective investment scheme or a money-market fund, similar to an ‘share’ in a company. (Originally these were ‘unit trusts’, i.e. trusts that had been unitised). In the case of a money-market fund, a unit maintains its value at 1.

²⁴This yield may appear high – however the corresponding inflation rate for the period was 6.59%.

precipitated the beginning of redemptions. Once the bail-in was announced two days later, redemptions accelerated. They continued as Moody’s downgraded the credit rating of the bank on Wednesday, August 13, the second time in a year.

[Figure 1 about here.]

6.2 Redemptions controlling for fund heterogeneity

It is possible that the large observed money-market and income fund redemptions may reflect other differences between the funds, and not be directly attributable to exposure to African Bank. The related literature showed that overall riskiness, maturity structure and nature of investors (uninformed or informed) may influence redemptions following a shock. Funds with a variable NAV, for example, are theoretically more robust in the face of shocks.

There is sufficient data in the quarterly data set to control for the observed heterogeneity between mutual funds, in terms of size, investment strategy, holdings, maturity structure, and variable NAV versus constant NAV.

For the first analysis, I use a full sample of 74 mutual funds, with equal time periods before and after the event. Both money-market and income funds are included, and in subsequent sections the behavior of these two kinds of funds will be analyzed separately.

The first model specification is:

$$\Delta \text{LogFundSize}_t = \beta_0 + \beta_1 X_{t,j} + \beta_2 T_{t,j} \tag{1}$$

where $\Delta \text{LogFundSize}_t$, is the one period change in the log fund size, $X_{t,j}$ is a vector of mutual fund characteristics j at time t , and $T_{t,j}$ is a vector of treatment dummies that evaluate the statistical significance of various treatments. It is widely documented²⁵ that fund flows are determined by returns. That is, funds with higher returns experience greater inflows all other things being equal. Using fund returns directly is problematic, however. Fund returns are likely to be confounded with exposure to African Bank, in particular as the return on African Bank instruments was higher than other instruments. For this reason, I proxy fund returns using maturity and types of exposure to instruments. Two maturity measures are included: a measure of the share of short-dated instruments (*ShareShort*), which is a proxy of the portfolio allocation to instruments of duration less than 6 months) and the change in maturity ($\Delta \text{Maturity}$). I also include the share of exposure to government bonds (*ShareGovi*) and in an alternative specification add in a measure of the share of assets in cash instruments (*ShareCash*).

The treatment effects take the form of three dummy variables: *BailIn* tests for the effect of the bail-in, and takes the value of 0 for the period before the bail-in and 1 for the periods after. *AfricanBank* takes the value of 1 for funds

²⁵See, for example, the discussion in [Kacperczyk and Schnabl \(2013\)](#) or [Cici et al. \(2017\)](#)

with exposure to African Bank.²⁶ *MMF* takes the value of 1 if the fund is a money-market fund.

6.2.1 Results

Table 5 presents the results of an analysis using panel treatment effects. The results confirm the initial analysis presented in Figure 1.

In specification (1), the coefficient on short-dated maturity is positive, suggesting that funds with relatively higher shares of assets in short-dated instruments experience larger flows on average. Similarly, the change in maturity is also positive. This may reflect the corollary of Gorton et al. (2014)’s ‘flight from maturity’ effect – as funds grow, their maturity lengthens. As expected, the coefficient on the measure of the share of government bond holdings is negative – safer, low-yielding funds with large exposure to government bonds experience slower growth all else being equal.

The treatment dummies are also of the expected size and effect. The African Bank measure is positive and statistically significant – as observed in Table 2, typically larger funds had exposure to African Bank.

Most notably, the triple interaction term for bail-in, African Bank and money-market fund is negative and statistically significant. This supports the hypothesis that money-market funds with African Bank exposure experienced larger outflows following the shock, even after controlling for other fund characteristics. It does not necessarily follow that income funds were completely unaffected – I will examine this question in more detail below. Interestingly, the dummies for bail-in and money-market funds are individually not statistically significant in this specification, but become so in specification (4) discussed below. This is consistent with the observed flows – only African Bank-exposed funds experienced large redemptions.

[Table 5 about here.]

6.2.2 Robustness and econometric tests

In specification (1), the analysis considered the change in the size of the fund. However, at the time of the bail-in, funds could elect to transfer their African Bank exposures to a retention fund. Only a limited number of funds elected to transfer, but it is possible that the transfer may bias the results by overstating the size of the redemptions in the fund. For this reason, in specifications (2), (3) and (4), the dependent variable is the size of the fund adjusted for retention funds. The effect on the estimated co-efficients is small. Notably the estimated coefficient on the triple interaction term is unchanged at three decimal places.

The second concern is the observed concentration of holdings (Table 6). The ABSA money-market fund, South Africa’s largest, accounted for 57% of all money-market fund exposures to African Bank, or R1.677 billion. This may

²⁶Due to multi-collinearity in the final regressions, an alternative of share of African Bank exposure was also used.

appear large, but the ABSA money-market fund was valued at R51.1 billion in early 2014, and so the African Bank holdings account for only 3.3% of the fund. Together 91.4% of money-market fund exposures were concentrated in five money-market funds.

[Table 6 about here.]

To test whether or not there is an impact, in specification (3) I exclude the largest fund from the data sample. The results suggest that the single fund does not drive the results, but there are some changes to the magnitude of the result. Interestingly, the coefficient on the triple interaction term becomes more negative. This suggests that excluding the largest fund does change the results, albeit not substantially.

The largest fund is also relatively unique in that it is almost entirely (99%) invested in cash instruments.²⁷ This is in marked contrast to other MMFs, which maintain approximately 11% in overnight cash-type instruments. This may further bias the results. To take this into account, in specification (4), the regression excludes the largest fund, and includes a measure of the share of cash (*ShareCash*).²⁸

In specification (4), the double interaction term of bail-in and African Bank becomes more negative and statistically significant. This may suggest that all mutual funds with African Bank exposure experienced some outflows. However, the triple interaction term remains negative and significant, indicating that money-market funds still experienced larger outflows.

6.3 How did money-market funds respond to the event?

The panel regressions suggest that money-market funds with African Bank exposure were the most affected by the shock in August 2014. But there are remaining questions - how were money-market funds specifically affected by the African Bank exposure? How do these interlinkages work? Do different types of money-market funds respond differently? What exactly determined the outflow - was it the profitability announcement, the bail-in or the ratings downgrade? Using the different data sets, we can to some extent answer these questions.

6.3.1 Daily redemption patterns - money-market funds and other funds

In the week after the bail-in announcement, total money-market fund redemptions were 6.7%, whereas money-market funds with African Bank exposure

²⁷Its African Bank holdings were also in overnight negotiable certificates of deposit, which are classified as cash for the purposes of the statistics, and were also bailed in.

²⁸For brevity, full econometric tests are not reported here. Tests were conducted to evaluate whether there are unidentified fund-specific characteristics, and these indicated that a fixed-effects panel is appropriate. The nature of the specification is first differences, due to the presence of serial correlation effects as borne out by a Wooldridge test. The existence of potential cointegration effects is reduced by the specification method. That said, we find no evidence of a unit root in the dependent variable.

had redemptions of 8% and those without exposure actually saw small inflows. Within a month, redemptions in African Bank-exposed funds reached nearly 15%. If we express the redemptions in absolute terms, there was a total outflow from money-market funds of R 32.4 billion, and assets under management fell from R 271.3 billion to R 241.5 billion, or approximately 11.8%.

By 30 September 2014, the end of the reporting quarter, total redemptions from money-market funds were R32.4 billion, with assets under management falling from R 271.3 billion to R 241.5 billion, or approximately 11.8% of the industry. We can estimate where the money went by looking at the monthly banking statistics.²⁹ It appears that institutional investors moved money to banks, with the deposits in banks from these investors rising to R24 billion from R16 billion, an increase of R8 billion, or 50%. There were inflows into banks from households and pension funds, although smaller. In addition, flows to equity funds and multi-asset funds also rose.

If one considers that the outflow was approximately 11 times the size of the entire money-market fund exposure to African Bank, it is clear that there was a significant flow.

Table 7 presents an analysis of the behavior of different money-market funds controlling for fund and investor characteristics. This gives an indication how different characteristics affected fund flows differently. The following is notable:

- Of the outflow, the majority was due to institutional investors (outflows of R23.3 billion) compared to retail investors (R9.1 billion);
- Moreover, investors acted (relatively) rationally. The 14 portfolios with exposure to African Bank were most affected – losing R30 billion; whereas the 29 portfolios with no African Bank exposure only lost R2.1 billion. Here institutional investors also responded as expected indicating some knowledge – they withdrew very little from funds with no African Bank exposure. This suggests that improved information had a substantial (and expected) result on run behavior;
- Fourteen funds with African Bank exposure experienced outflows. These outflows also averaged 11x the size of the African Bank exposure. The largest outflow from one fund was 24x the exposure to African Bank; and the smallest was 2x the exposure.

These results could be explained in part by a somewhat unintended consequence of the retention funds. Creating the retention fund immediately highlighted that the relevant fund had exposure to African Bank – possibly this explains why so few money-market funds actually used retention funds. Nevertheless, the four funds that chose to use retention funds had R21.9 billion in outflows; equivalent to 9x their holdings in African Bank. In contrast the 9 funds that chose not to experienced R8.2 billion in outflows, equivalent to 16.6x their African Bank holdings.

²⁹Obtained from the Bank Supervision Department of the South African Reserve Bank.

6.4 How did income funds respond to the event?

[Figure 2 about here.]

Income funds experienced the African Bank episode very differently from money-market funds. I disaggregate changes in income funds into two effects. The first effect is the price effect, i.e. changes to the NAV of income funds. The second effect is the redemption effect, i.e. changes to income funds due to withdrawals. I consider both effects below.

6.4.1 Impact on income-fund NAVs

To better understand the impact on NAVs, Figure 2 presents the income fund NAVs over the course of the bail-in episode. The figure shows that income fund NAVs adjusted downwards ahead of the bail-in event. This was because income funds registered losses as the mark-to-market price of African Bank instruments deteriorated.

However, the NAVs of non-exposed funds also fell. This suggests there may be broader confounding market-wide effects unrelated to African Bank. To test this, I use an adapted version of the standard Fama-Macbeth model to calculate the deviation of returns for exposed and unexposed funds relative to all income funds.

$$R_{it} - R_{ft} = a_i + \beta_i(R_{Mt} - R_{ft}) + e_{it} \quad (2)$$

In this regression, R_{it} is the daily return (including changes to NAV) on fund i for day t , R_{ft} is the riskfree rate (the overnight South African Treasury rate), R_{Mt} is the the return on all income funds, a_i is the average return left unexplained by the benchmark model (the estimate of α_i), and e_{it} is the regression residual. We can compare the estimate of a_i for income funds with African Bank exposure to that of income funds without exposure. For brevity, the full results are not presented here. However, our estimate is that return for income funds with African Bank exposure relative to the benchmark was -0.5974, with a standard error of 0.1356. For income funds without exposure, the estimate is 0.212 with a standard error of 0.098. This shows a significant underperformance for African Bank income funds over the period.

6.4.2 Impact on income-fund redemptions

There is evidence that income funds also experienced redemptions during the period. The econometric results presented in Table 5 indicate that income funds were, however, less affected by the shock than money-market funds. A variety of techniques were used to test for whether or not there is a statistically significant outflow.³⁰ However, limited indications of an impact are found, partly evidenced by the box-and-whisker plots presented in Figure 3.

³⁰These included panel regressions similar to those presented in Table 5, ANOVA t-tests and standard OLS regressions.

[Figure 3 about here.]

6.5 Portfolio reallocation and spillover effects

The previous section analyzed how investors into mutual funds behaved, noting that there were significant redemptions. But how did the funds respond - i.e. what did asset managers do? Significant portfolio rebalancing could trigger spillovers, particularly if the rebalancing precipitated large-scale sales of financial instruments in other banks.

The connection between non-bank financial institutions, such as mutual funds and pension funds, and banks is particularly close in South Africa – in 2013, approximately 33.6% of bank liabilities were to these other financial intermediaries; in contrast the global average was 4.9% in the same year.³¹ By March 2016, the South African mutual fund industry had approximately R1.7 trillion of assets under management, or 68% of nominal gross domestic product (GDP). As a comparator, retail bank deposits were approximately R912.5 billion, or 36% of GDP.

The size of the mutual funds potentially magnifies the potential for spillovers and arises through the channels discussed above – common exposures, hoarding, a cascade of defaults or through opaque interlinkages between money-market funds and banks.

6.5.1 At aggregate level

The industry data set shows evidence of rebalancing of holdings in financial institutions. Income funds (see Table 8) reduce their exposure by 12.9%. Money-market funds increase their exposure to financial institutions, by 2%.

[Table 7 about here.]

A related effect is a change in maturities. Table 9 shows the allocation across different maturities for money-market funds. There was a marked fall in allocation to cash, from R27.3 billion to R18.7 billion. This may reflect the need to fund the large redemption requirements that came through. However, there was a rise in allocations to short-term (0-3 month) instruments, typically short-term deposits. Allocations to this category rose from R107 billion to R114 billion, or from 39.6% of the portfolio to 47.6% of the portfolio. But the main effect is at the longer maturities. The allocation in the 3-6 month category fell from R72.9 billion (or 26.9%) to R51.4 billion (or 21.3%). Holdings longer than six months were also reduced from R63.6 billion to R56.0 billion.

[Table 8 about here.]

³¹Statistics in this section are from [Financial Stability Board \(2015\)](#) and the industry data set.

6.5.2 Portfolio rebalancing at a financial instrument level

The data on allocation to financial institutions data is somewhat misleading, as it includes insurers and other non-bank financial institutions. It may not, for example, capture a rebalancing of the portfolios away from banks towards non-bank financial institutions. The observed lengthening of maturities also does not necessarily capture the nature and type of reallocations between different types of instruments. To better understand these dynamics, the data at financial instrument level is more appropriate.

To test the effects at a financial institutional level, banks are classified into three categories: ‘Big Four’, which are the four largest South African banks (Barclays Africa / ABSA, Standard, FirstRand and Nedbank); Small and mid-tier banks (Investec, Capitec and Sasfin) and African Bank. Sovereign debt instruments are instruments issued by the national government. Public entity debt is issued by both sub-national sovereigns and state-owned entities (including municipalities, large national state-owned entities and smaller regional entities, such as water boards).

Table 10 summarizes the results. In this sample, total mutual-fund redemptions are 3.3%. There are marked rebalancing effects, however, showing that fund managers actively sought to reduce exposure to bank-issued debt, in favor of safer sovereign-issued debt. Exposures to Big Four banks debt reduce from R24.4 billion to R22.2 billion, a decline of 9.1%. This suggests significant potential spillover effects.

[Table 9 about here.]

6.5.3 Potential for a market freeze

The notable decline in exposures to large banks highlights that a key concern during the resolution was the potential for a market freeze in short-term paper. At end July 2014, the big four banks had 4.6% of their liabilities from mutual funds. There was a notable decline in funding from mutual funds from R119.3 billion to R110.0 billion between end July and end August 2014, over the period of the resolution.

This was in financial instruments with a duration of less than 30 days, typically negotiable certificates of deposit (NCDs). Of these instruments, 36% were held by money-market funds. As highlighted above, arrangements were made to ensure that there was no freeze in the market for these instruments.

Liquidity conditions can be proxied by short-term interest rates. In Figure 4, the evolution of the spread between the central bank overnight rate and the 90-day NCD rate is presented. There is a clear indication of some stress as rates rose. Moreover, there were knock-on effects. In the two weeks directly after the bail-in, three corporates cancelled bond issuances due to adverse market conditions: Real People Investments (a small bank), Toyota and BMW (the local subsidiaries of the automakers).

[Figure 4 about here.]

6.6 Long-term outcome

Ultimately, African Bank was successfully restructured. By August 2017, three years after the bail-in, the bank had resumed profitable lending. The ‘stub’ claim, created at the time of the bail-in, was trading at 66% of par. Essentially the majority of the bail-in had been recovered as the profitability of the bank improved. The bail-in arguably provided an opportunity for the authorities to stop the further deterioration of the bank, recapitalize it by writing off creditors’ claims, and restore its ability to undertake business.

7 Conclusion

Policymakers are increasingly relying on bank resolution strategies that seek to impose losses on creditors. Using a unique event, this paper analyzes the effects of one such resolution on money-market funds.

The immediate result was that all affected money-market funds ‘broke the buck’. This triggered large redemptions. Nevertheless, there was a limited impact on the financial system. There was a small but notable reallocation (3.6%) of funds away from non-cash financial instruments issued by other banks toward government-issued instruments. Over the course of six weeks, the maturity of money-market fund holdings also changed – there was a decline in cash balances at large banks and a marked shortening of maturities. However, these effects were managed through complementary actions, including market-making facilities to ensure liquidity

There are lessons for bail-in frameworks. The impact on creditors may create additional financial fragility, particularly when creditors are uncertain about their exposure to the bank being bailed in. Systemic runs may also occur when the failure is not believed to be idiosyncratic, leading creditors to believe that bail-ins may follow in similar banks.

If the authorities had not announced a credible haircut, or if the communication on the plan had been vague, the withdrawals from money-market funds may well have been larger, and the rise in redemptions may well in turn have led to the large-scale withdrawals of funds by money-market funds from other banks, precipitating a more generalized run. Money-market funds also responded differently depending on whether gating occurred – funds that chose to use retention funds had relatively smaller outflows.

The analysis challenged some of the conventional wisdom about the interaction between wholesale funding and banks. The first is that wholesale funding is more prone to runs than retail funding. Indeed, the experience of African Bank showed the contrary. It was predominantly funded by long-dated wholesale funding, and this arguably reduced the risk of a sudden run on the bank. Indeed, it seems that wholesale funders slowly reduced their exposure to African Bank by not rolling over their maturing instruments.

In this case, the bail-in was arguably successful. A failing bank could be partly recapitalized through imposing losses on creditors. Appropriate comple-

mentary actions, such as discretionary liquidity restrictions and market-making facilities for short-term paper arguably mitigated further spillovers. The African Bank experiences suggests that if carefully implemented, bail-in can support a bank resolution that shares the financial burden between strained fiscal authorities and creditors.

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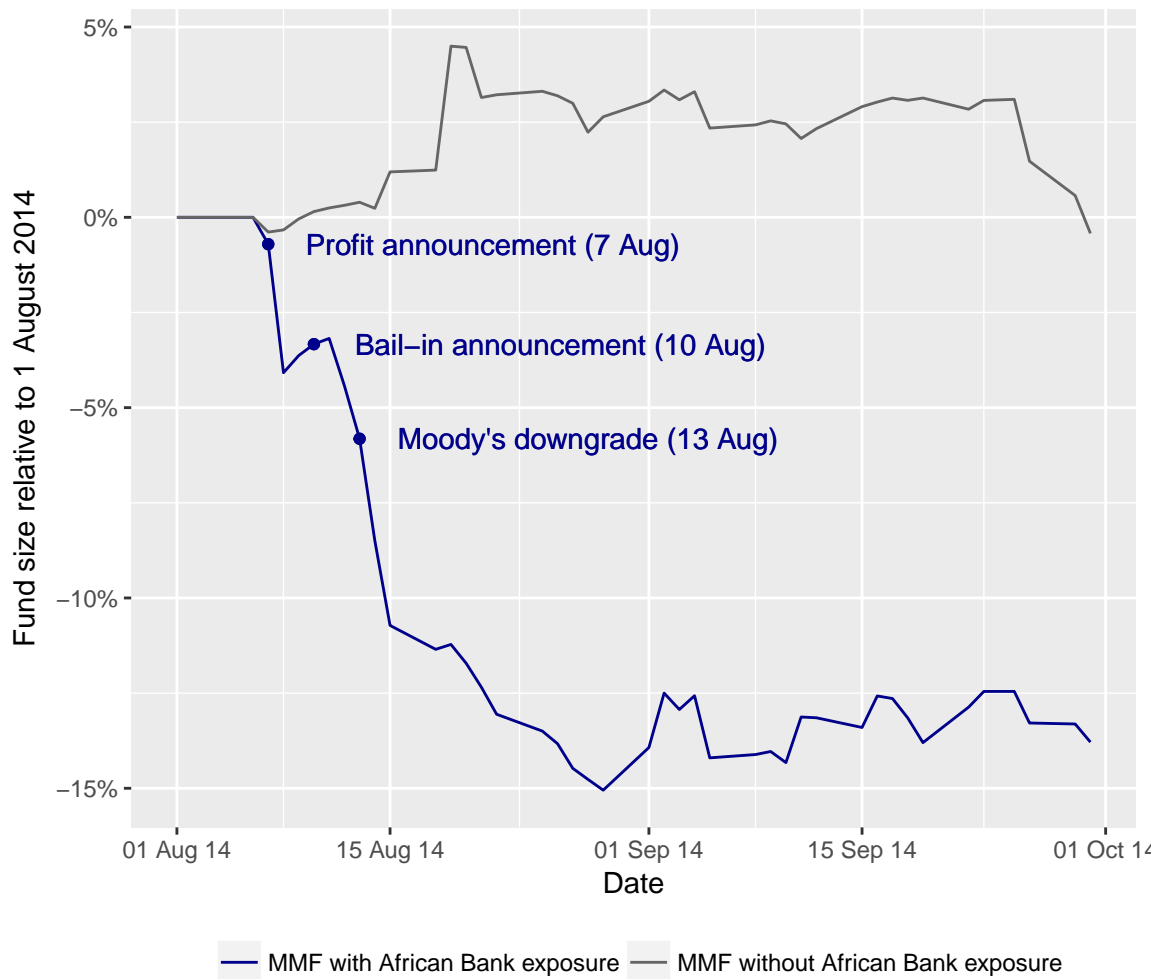


Figure 1: Redemptions were concentrated in money-market funds with African Bank exposure. Redemptions began shortly after the adverse profitability announcement, and accelerated after the bail-in and Moody's downgrade.

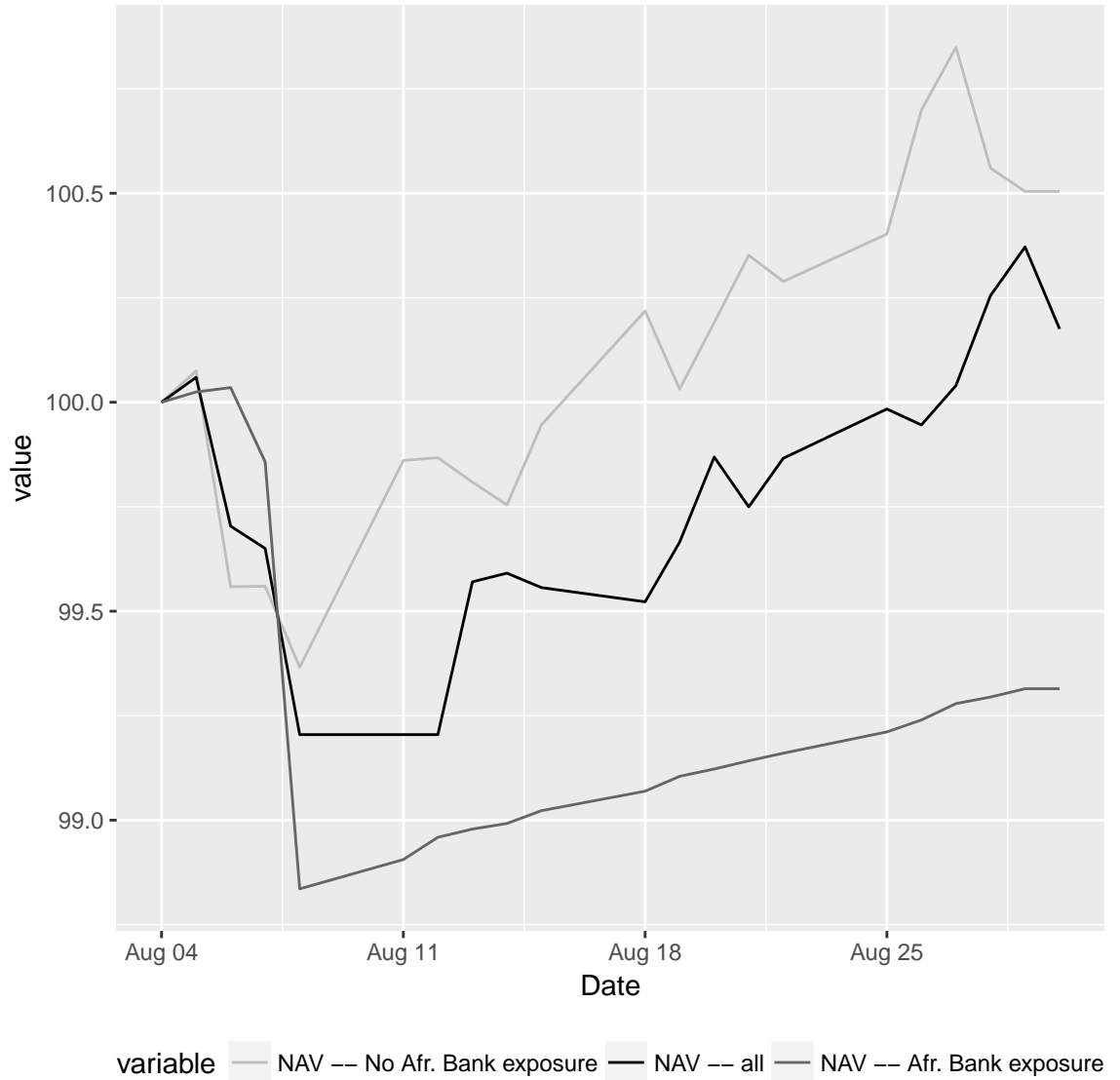


Figure 2: Income fund NAVs. Revaluation effects led to NAVs falling for African Bank-exposed income funds. NAVs fell during the week prior to the bail-in as bond prices fell, and then recovered as the value of other instruments in the portfolio improved.

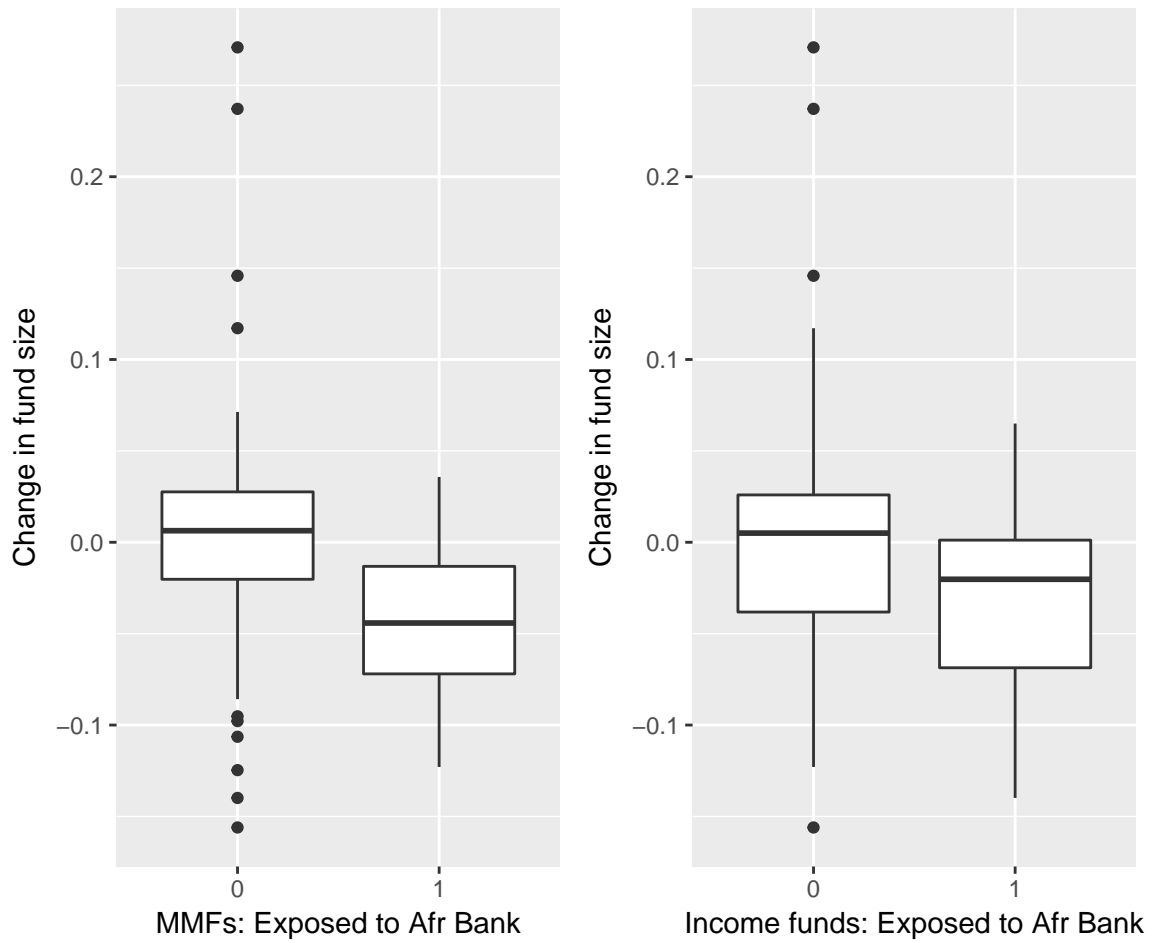


Figure 3: Redemptions in exposed money-market funds compared to income funds. Affected money-market funds experienced large and statistically significant outflows. While there were outflows in affected income funds, these are not found to be statistically significant.

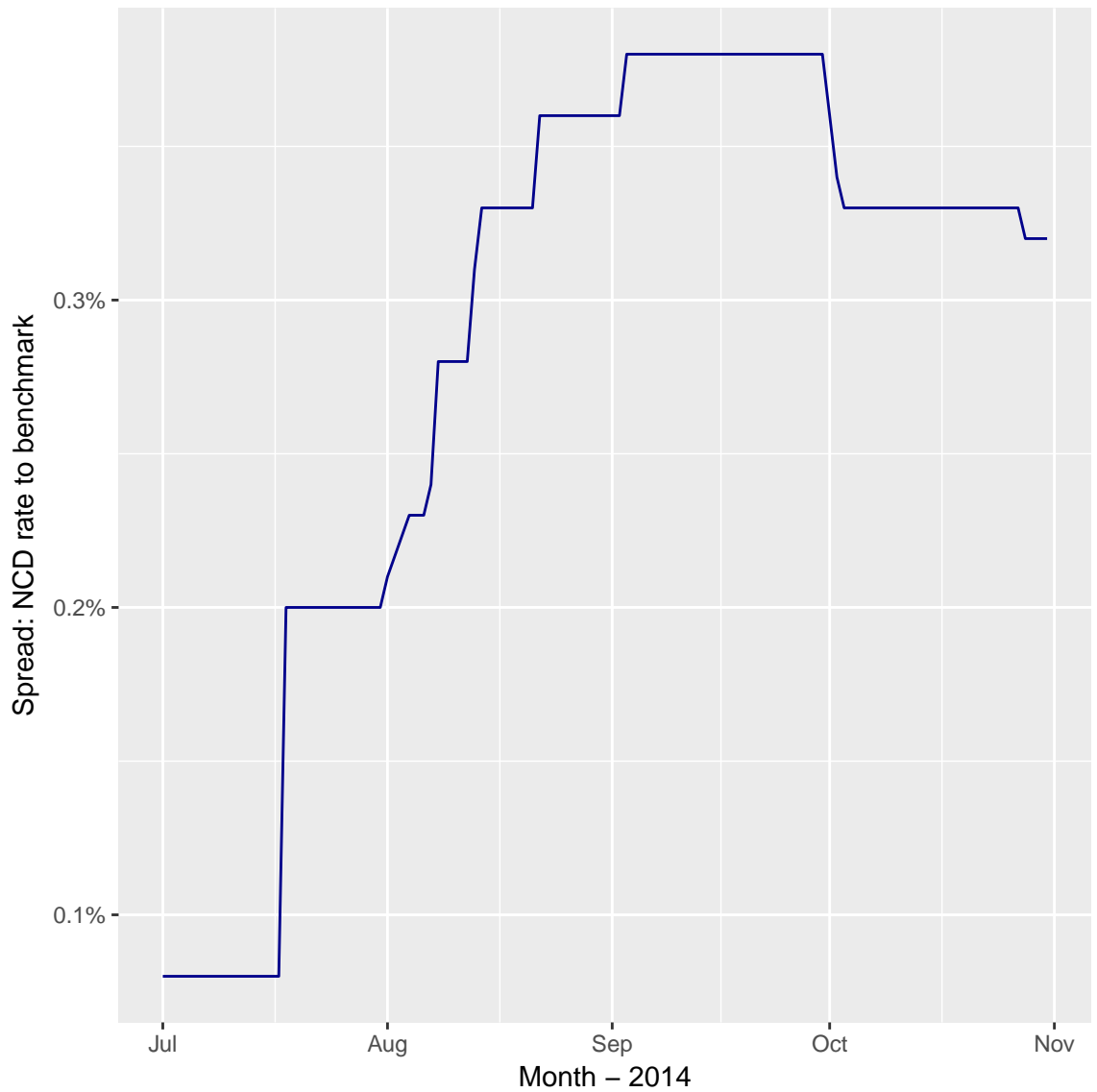


Figure 4: Spread between bank NCD rate and overnight rate. The spread between the prevailing rate on negotiable certificates of deposits issued by banks and the benchmark rate widened over the course of the bail-in. Interviews with market participants reveal a substantial tightening of market conditions. Three non-bank financial institutions were forced to cancel bond issuances, and bond issuances for banks became more expensive.

Table 1: Liability holders: African Bank, June 2014

Type of fund	Holding (ZARbn)	Share*
Domestic money-market funds	2.9	6.9%
Other mutual funds and pension funds	28.4	67.4%
Foreign funds	10.7	25.4%
Retail depositors	0.1	0.3%
Total	42.1	100.0%

* Share of African Bank liabilities

Source: Own calculations based on regulatory and industry data sets, ABIL data and [Sewell and Woodrow \(2014\)](#) (see discussion below).

Table 2: Summary statistics, quarterly data, interest-bearing mutual funds, June 2014

	All funds		MMFs		Income		
	All	All	Yes ¹	No ¹	All	All	
	N = 77	N = 37	N = 14	N = 23	N = 37	N = 11	
	N = 26			N = 26			
Net asset value (Mean, ZARm)	4,985	7,281	15,900	3,143	2,861	5,301	1,935
Avg balance (ZARm)	0.56	0.70	3.55	0.25	0.33	0.34	0.32
Share retail investors	44%	34%	32%	35%	54%	56%	53%
Number of accounts	7,376	9,580	3,980	12,267	5,286	10,629	3,444
<i>Portfolio by issuer</i>							
Non-financial corporations	4.5%	3.2%	3.9%	1.8%	6.8%	0.1%	16.1%
Financial corporations	89.9%	95.1%	95.3%	94.7%	80.6%	95.6%	59.9%
- Deposits	24.1%	35.9%	48.5%	9.7%	2.9%	2.9%	2.9%
- Debt	35.9%	31.0%	30.4%	32.2%	44.8%	45.0%	44.4%
- Unlisted money-market instruments	29.9%	28.2%	16.4%	52.8%	33.0%	47.7%	12.6%
- African Bank	1.7%	1.1%	1.6%	0.0%	2.8%	4.9%	0.0%
Government	0.6%	0.7%	0.1%	2.0%	0.4%	0.2%	0.7%
Public entity	1.6%	1.0%	0.7%	1.5%	2.9%	2.9%	2.8%
Other mutual funds	3.3%	0.0%	0.0%	0.0%	9.3%	1.2%	20.5%
	100%	100%	100%	100%	100%	100%	100%
<i>Portfolio by maturity</i>							
Overnight	8.9%	11.0%	11.9%	9.0%	3.1%	1.0%	6.8%
0-3 Months	34.8%	39.7%	42.6%	33.3%	21.5%	20.7%	22.9%
3-6 Months	23.6%	24.3%	18.7%	36.5%	21.7%	29.2%	8.3%
6-12 Months	23.2%	24.7%	26.8%	20.1%	19.0%	14.2%	27.7%
1-3 Years	8.2%	0.3%	0.0%	1.1%	29.8%	33.4%	23.4%
3-7 Years	0.9%	0.0%	0.0%	0.0%	3.4%	1.4%	6.9%
7-12 Years	0.2%	0.0%	0.0%	0.0%	0.8%	0.0%	2.0%
≥ 12 Years	0.2%	0.0%	0.0%	0.0%	0.8%	0.0%	2.0%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

¹ Yes (No) - (Not) exposed to African Bank instruments on June 2014

Table 3: Summary statistics, daily data, interest-bearing mutual funds, July 2014

	All funds		MMFs		Income	
	All	All	Yes ¹	No ¹	All	No
Fund size (mean)	N = 50	N = 17	N = 9	N = 8	N = 33	N = 6
Annual return	4,641.14	10,665.10	18,019.91	3,298.26	1,873.37	788.19
- Interest distributions (MMFs)		5.18	5.11	5.23		
- Interest and dividend distributions (Income funds)					5.89	6.17
Total expense ratio	0.83	0.45	0.48	0.43	1.01	1.10
						2,083.41

¹ Yes (No) - (Not) exposed to African Bank instruments.

Table 4: Summary statistics, supplementary financial-instrument level data

Category of issuer	Number		Mean		Days-to Maturity	Coupon %
	<i>Issuers</i>	<i>Instruments</i>	<i>Jun-14</i>	<i>Sep-14</i>		
Large Bank	4	787	31,762	28,784	197	8.2%
Mid-tier bank	3	120	11,060	14,124	30	5.8%
African Bank	1	53	18,260	457	53	7.8%
State-owned entities	23	192	46,366	41,958	96	8.9%
Sovereign	1	115	40,5068	60,074	115	6.0%
Derivatives	16	270	9,220	8,149	269	6.3%
Non-bank	157	881	15,028	14,892	881	8.2%
	205	2418	24,601	24,063	234	7.3%

Table 5: Did exposure to African Bank determine mutual fund redemptions?

	<i>Dependent variable:</i>			
	Δ Log Fund Size		Δ Log Fund Size (Adj.) ^a	
	(1)	(2)	(3)	(4)
Share: short maturity (≤ 6 months)	2.031*** (0.192)	2.032*** (0.192)	2.066*** (0.193)	2.002*** (0.200)
Δ Maturity	0.170*** (0.013)	0.170*** (0.013)	0.174*** (0.013)	0.176*** (0.013)
Share: Government	-0.538*** (0.206)	-0.537*** (0.206)	-0.533** (0.206)	-0.644*** (0.227)
Share: Cash				-0.496* (0.268)
Dummy: Bail-in	0.054 (0.198)	0.054 (0.198)	0.065 (0.199)	0.079 (0.202)
Dummy: African Bank ^b	0.246** (0.124)	0.242* (0.124)	0.245** (0.124)	0.212 (0.133)
Dummy: MMF ^b	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0001 (0.0002)	-0.0002 (0.0002)
Dummy: Bail-in * Afr Bank	-0.062 (0.052)	-0.057 (0.052)	-0.063 (0.053)	-0.156*** (0.049)
Dummy: Bail-in * MMF	-0.225 (0.292)	-0.225 (0.292)	-0.242 (0.293)	-0.227 (0.300)
Dummy: Afr Bank * MMF	-0.359 (0.367)	-0.361 (0.367)	-0.387 (0.379)	-0.326 (0.389)
Dummy: Bail-in * Afr Bank * MMF	-0.635* (0.382)	-0.635* (0.382)	-0.739* (0.393)	-0.706* (0.402)
Fixed effects:	fd=Fund	fd=Fund	fd=Fund	fd=Fund
Observations	507	507	500	469
R ²	0.283	0.283	0.289	0.318
Adjusted R ²	0.270	0.270	0.276	0.303
F Statistic	20.470***	20.441***	20.831***	20.214***

Note:

*p<0.1; **p<0.05; ***p<0.01

This table presents the results of panel fixed effects (first difference) regressions. The dependent variable is the one-period change in the log size of mutual funds.

(a) Adjusted for retention funds. Retention funds are added back to the original fund.

(b) Instrumental variables - for money-market fund: exposure to instruments over 1 year, and for African Bank exposure: share of African Bank exposure.

Table 6: Concentration of holdings

	Exposure	% of fund	% of all MMF
ABSA money-market fund	R 1 677 m	3.3%	56.9%
Stanlib money-market funds	R650 m	2.6%	17.3%
Investec money-market fund	R270 m	1.0%	9.2%
Momentum money-market fund	R95 m	1.1%	3.2%
Other (9 funds)	R254 m		8.6%
Total	R2 945 m	1.00%	100%

Source: as above, and fund fact sheets

Table 7: Which types of money-market funds saw inflows and outflows?

Controlling for:	<i>n</i>	Inflow + / Outflow -	Flow as % of fund
No control (all funds)	37	- R32.8 billion	-12.6%
Portfolios experienced outflows	21	- R37.4 billion	-14.4%
Portfolios experienced inflows	16	+ R 4.7 billion	1.8%
Investor type			
Institutional investor	37	- R23.3 billion	-9.0%
Retail investor	37	- R9.1 billion	-3.6%
Exposure to African Bank			
Exposed	14	- R 30.1 billion	-11.6%
Not exposed	23	- R2.7 billion	-1.0%
Exposure to ABL & Investor			
Institutional — ABL	14	- R22.2 billion	-8.6%
Institutional — No ABL	23	- R1.1 billion	-0.4%
Retail — ABL	14	- R7.5 billion	-3.0%
Retail — No ABL	23	- R1.6 billion	-0.6%
Retention fund			
Retention fund / sponsor support	4	- R21.9 billion	-8.4%
No retention fund	33	- R8.2 billion	-4.2%

Source: Industry data set (see text).

Table 8: Mutual fund exposure to financial institutions

Type of fund	June	Sept	% change
Income funds	57.8	50.3	-12.9%
Money-market funds	72.0	73.4	2.0%
All funds	129.8	123.8	-4.6%

Note: Aggregate holdings of instruments issued by 'financial institutions'.

Table 9: Change in maturity profile, money-market funds

	June		Sept	
	R m	%	R m	%
Cash	27 303	10.1%	18 791	7.8%
0-3 Months	107 492	39.6%	114 919	47.6%
3-6 Months	72 891	26.9%	51 436	21.3%
≥ 6 Months	63 616	23.5%	56 008	23.2%
Total	271 301	100%	241 154	100%

Note: This table uses the industry data to show how the aggregate maturity of MMFs changed from the quarter before and after the bail-in.

Table 10: How did mutual funds rebalance their portfolios?

Exposure to (Rand billion)	June 2014	Sept 2014	Change	%
‘Big Four’ bank	24.4	22.2	-2.2	-9.1%
Small and mid-tier bank	2.0	2.1	0.8	3.9%
African Bank*	1.0	0.0	-0.9	-97.5%
Sovereign	4.7	6.9	2.2	48.3%
Public entity	7.5	6.9	-0.6	-7.5%
Derivative	2.3	2.1	-0.2	-6.8%
Non-bank corporate	13.6	13.4	-0.3	-1.9%
Total	55.5	53.7	-1.8	-3.3%
Total (ex African Bank)	54.5	53.6	-0.9	-1.6%

Almost all holdings in African Bank were restated.

This table uses the regulatory data set to identify how money-market fund asset allocation changed over the time of the bail-in announcement. The largest changes are highlighted in **bold**: a reduction in allocations to big-four banks and an increase in allocation to risk-free and liquid sovereign paper (48% increase).

The data is a representative sample, and is approximately 20% of the full data set.