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Estimates of bank-level funding costs in South Africa

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12 April 2021

Abstract

We develop a new dataset of bank-level balance sheets data to estimate bank-level funding costs. These estimates are useful for monitoring funding pressures and other risks to the banking sector as well as understanding the impact of prudential regulations and market conditions on the transmission of monetary policy. We show that bank funding cost spreads are materially higher now than before the Global Financial Crisis of 2008, in spite of lower interest rates. We show that during the COVID-19 crisis, aggregate funding costs have fallen in level (i.e. percentage) terms, but that funding costs have increased when expressed relative to reference rates. We show that the relative cost of raising deposits has increased, as deposit rates have not fallen by as much as the repurchase rate and other money market rates.

JEL classification: E40, E44, G21

Keywords: bank funding costs, composition of funding, financial market conditions

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1. Introduction[1]

This paper measures the costs of bank funding using bank-level data on bank funding and the costs of different components of bank liabilities. The cost of bank funding affects the cost of lending to businesses and households and therefore has implications for monetary policy, by affecting growth and inflation. The extent to which banks pass on funding cost changes to specific lending rates may vary over time, as banks decide whether to absorb such changes and accept a change in the margin that they earn when making loans. This is likely to depend on factors such as the state of the economy (and therefore the demand for loans) or competition for bank lending. Given potential impacts of bank profitability, bank funding costs may also have implications for financial stability.

Even though bank funding costs matter for monetary policy and financial stability, there has been relatively little work done to develop methodologies for accurate measurement. Most papers that create proxies of funding costs tend to use market indicators of funding spreads. For example, Beau et al. (2014) proxy their funding spreads on long-term wholesale funding spreads or credit default swap (CDS) premia.[2] Jondeau et al. (2020) construct forward funding spread indicators for the United States and euro area that approximate the cost of obtaining bank funding on money markets.[3] Illes et al. (2019) construct the weighted average cost of bank liabilities for 11 European banking systems,[4] while Kapuscinski and Stanislawska (2018) use the same approach as Illes et al. (2019) to measuring funding costs for the Polish banking sector.

For South Africa, Rapapali and Steenkamp (2020) construct a simplified measure of bank funding costs for the South African banking sector, and show that their measure is similar to a measure obtained by weighting together surveyed funding costs from major banks. This paper refines the methodology developed by Rapapali and Steenkamp (2020) and applies it to individual bank data. We scrape bank funding data from the BA900 survey data from the South African Reserve Bank (SARB) website for all 36 currently registered banks. We also use confidential funding rate data from the BA930 survey at bank-level. We create funding cost estimates for the aggregate banking sector and individual banks, as well as on a component-by-component basis at bank- and industry-level. Ours is the first study we know of to produce granular bank-level estimates based on bank balance sheet data and data on the actual costs of funding components. We only show aggregate results in this paper to preserve the confidentiality of the underlying bank-level data.

We argue that these estimates are useful for monitoring funding pressures and other risks to the banking sector, as well as understanding the impact of prudential regulations and market conditions on the transmission of monetary policy. The contribution of our paper is to summarise how banks have responded to the changes in market conditions and regulatory

[1] We are grateful for comments and suggestions from two anonymous referees and help with data set construction from Lisa De Beer, Danie Meyer, Tabea Mokotong, Lesego Morope, Wessel Mostert, Pontso Ndobo and Myrtle Van Jaarsveld.

[2] Specifically, they proxy secondary market bond spreads using the constant-maturity unweighted average of secondary market spreads to swaps on senior unsecured bonds, spreads on retail bonds as spreads for fixed-rate retail bonds over equivalent-maturity swaps, or using CDS premia based on an unweighted average of large bank senior CDS premia.

[3] They proxy bank rollover risk associated with maturing short-term wholesale funding using the spread between three-month interest forward rate and the corresponding default-free overnight interest swap forward rate.

[4] They use data on the volume of deposits, short-term debt securities (under 1 year maturity), covered bonds and funding from central bank operations for each banking system, alongside market rates to proxy the new business rates applicable to each form of liability funding.

requirements post-Global Financial Crisis (GFC), and to assess the implications for the costs of individual bank funding. We also focus on describing developments in funding costs in the build-up to and during the COVID-19 crisis, and compare funding costs between large and small banks.

We show that bank funding costs are materially higher now than before the GFC of 2008, in spite of lower interest rates. We show that this reflects, in large part, an increase in the relative cost of raising deposits. We show that during the COVID-19 crisis, aggregate funding costs have fallen in level (i.e. percentage) terms, but that funding costs have increased when expressed relative to reference rates. We also assess the heterogeneity in funding costs for large and small banks, and show that smaller banks have lower funding costs for deposits, while being more dependent on deposit funding, meaning that they have lower liability-side funding costs overall.

2. What are funding costs?

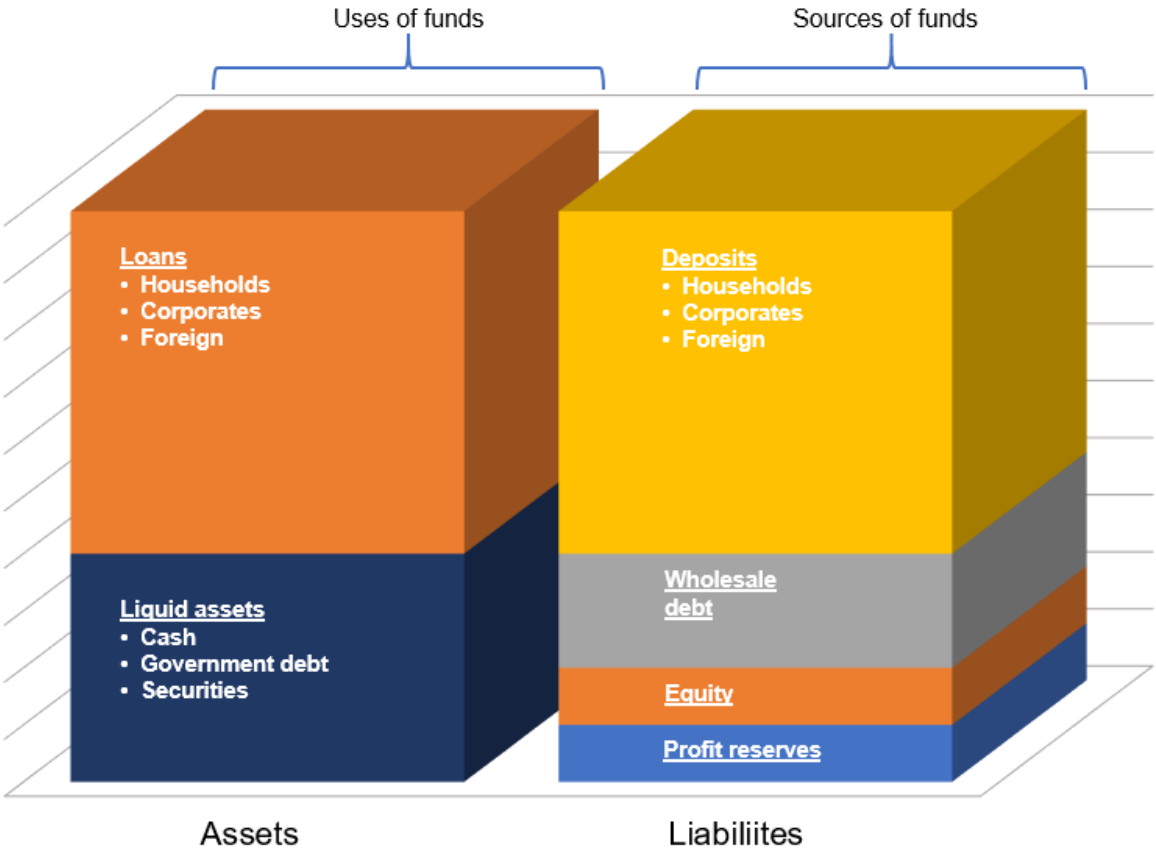
To fund the loans that banks make to consumers and firms, banks obtain funding from retail and corporate wholesale deposits, issuing debt instruments, as well as from their capital base, which comprises the owners' equity in the bank and accumulated profits.[5]

Figure 1 provides a simplification of the balance sheet of a typical bank in South Africa. The sources of bank funding are recorded on the liability-side of their balance sheets and the uses of bank funding on the asset-side (see Beau et al. 2014 for a more detailed discussion). The asset and liability sides of bank balance sheets typically have maturity mismatches: many sources of funding, such as 'on-call' retail deposits, could be withdrawn from banks at any time, while a large proportion of their loans (i.e. mortgages) will have a much longer maturity. Banks therefore have to manage maturity mismatches, which they can do, for example, by ensuring they have sufficient stable funding and could replace withdrawn or maturing funding if needed. Government regulations also stipulate that banks have to maintain reasonable levels of liquid assets to be able to accommodate unexpected changes in funding conditions. Since such regulations reduce the amount of loans a bank could make for a given quantum of funding and channel funding to specific types of assets (usually government securities), they impose an implicit cost on banks. The methodology used to estimate bank funding focuses on the liability-side of bank balance sheets, given the availability of granular survey data from the BA900 survey conducted monthly by the SARB.[6]

[5] 'Retail' funding typically refers to funds obtained from individuals, households and small firms, usually in the form of deposits. 'Wholesale' funding typically refers to funding obtained from large corporates, banks, pension funds or the insurance industry or investors.

[6] A future working paper in this series by Diesel et al. (2021, forthcoming) will estimate the implied cost of regulatory liquid assets for South African banks, which allows for assessment of the additional costs stable funding and liquidity buffer requirements imply for South African banks.

Figure 1: Stylised bank balance sheet



Changes in the SARB policy rate affect the cost of bank funding, which in turn may affect the quantity and associated terms of bank lending. As described earlier, the supply of loans is also affected by several other factors, including monetary policy and regulatory settings, the level of competition in the banking sector and conditions in the funding market. In order to answer questions around the impact of prudential regulations and market conditions on the transmission of monetary policy, estimates of funding costs are important. The contribution of this paper is to produce bank-level estimates that can be used to assess balance sheet risks and pass-through of policy at bank-level in South Africa.

3. Data and methodology

To create our funding cost estimates, we combine data from various market and regulatory surveys. The first is the BA900 regulatory form, which the SARB requires each commercial bank and mutual bank to complete on a monthly basis. This data is available publicly via the Reserve Bank website, and houses the 48 banks which have been registered between January 1993 and the present.[7] Using the BA900 data, we are able to calculate weights for wholesale debt, which, given the limited data on the maturity structure of wholesale liabilities in the BA surveys, we define as all liabilities accrued which are not deposits.[8]

[7] Specifically, we use the *requests* library, developed by Reitz (2011), for Python 2019 to scrape the BA900 data files from the Reserve Bank website. We subsequently clean and sort these files into a panel dataset using the *tidyverse* package, developed by Wickham (2017), for R 2019.

[8] We use the following short-, medium- and long-term entries in the form to construct wholesale debt funding series for each bank: Other borrowed funds, Foreign currency funding, Other liabilities to the public, Outstanding

Market rate data is obtained from Bloomberg. We use monthly negotiable certificate of deposit (NCD) rates, NCD spreads to reference rates, as well as the 3-month Johannesburg Interbank Average Rate (JIBAR). NCD rate data are not available historically for each bank, so we construct average NCD rate and spread for all banks for the wholesale debt funding components based on a simple average of the rates available for the five largest banks at a given point in time.[9]

The final source of data used is the BA930 regulatory form, which is compiled by each of the 36 currently registered banks[10] in South Africa (listed in Table 1). This dataset is strictly confidential, and contains the outstanding balances and weighted average rates of deposits and loans at bank-level.

We calculate the weights for each bank-, component- and sector-level funding component based on the outstanding balances of the selected components from the BA930 and BA900 surveys. The weighted average rates from the BA930 survey are calculated for each funding component across all accounts maintained in the ordinary course of arms-length banking business (excluding special or concessionary rates, or outlier rates) and weighted based on the outstanding balances at month-end. The major categories of each funding component in the survey are listed in Table 2; there are 31 components for deposits and 123 components for wholesale debt funding.

Since the BA survey forms provide only three maturity categories (less than one month, one month to six months, and greater than six months), we use these to dissect funding costs into short-, medium- and long-term maturity categories. As the bank-level data on the weighted rates associated with different forms of funding are confidential, we only show aggregated results to preserve confidentiality of the bank-level data. Apart from funding costs in level terms (i.e. in percentage points), we construct funding spreads by expressing funding rates associated with different funding components relative to maturity-matched reference rates. We create funding cost estimates for the banking sector as a whole, as well as at individual bank-level, and component-by-component basis at bank- and industry-level.

3.1 Weighted average bank funding costs

We estimate the aggregate banking sector cost of existing liability-funding (labelled weighted average funding costs or $WACF$) as follows:

$$WACF_t = WACF_t^{Deposits} + WACF_t^{WSD}, \tag{1}$$

where $Deposits$ comprise $Household, Corporate, Foreign$ sectors, and wholesale debt (WSD) is made up of short-term ST (original maturity to 1 month), medium-term MT (1 to 6 months), and long-term LT (>6 months). The components are calculated as:

$$WACF_t^{Deposits} = WACF_t^{Householddeposits} + WACF_t^{Corporatedeposits} + WACF_t^{Foreigndeposits} \tag{2}$$

and

$$WACF_t^{WSD} = WACF_t^{WSDshortterm} + WACF_t^{WSDmediumterm} + WACF_t^{WSDlongterm} \tag{3}$$

The total liabilities used for each weighting distribution is calculated as

liabilities on behalf of clients, and Other liabilities.

[9] Future iterations of this work should consider drawing on bank-specific NCD rates if available.

[10] The BA930 survey is only compiled by registered banks. We therefore reduce our sample size to these 36 banks.

$$L_t^{Totalbanks} = \sum_{i,d} L_{i,d,t} + \sum i, wL_{i,w,t}, \tag{4}$$

where $L_{i,d,t}$ is the total outstanding balance of bank i for deposit component d which includes three sectors (Household, Corporate, Foreign) at time t, and $L_{i,w,t}$ is similarly defined as the outstanding balance for wholesale debt funding component w which includes three maturities (short term, medium term, long term). Now, the weighted contribution for bank i's deposit component d is calculated as the sum of each of the component's subcomponents, stylised as d_s. This is given by:

$$WACF_{i,d,t} = \sum_{d_s} \frac{L_{i,d_s,t}}{L_t^{Totalbanks}} \times weightedrate_{i,d_s,t}, \tag{5}$$

where $weightedrate_{i,d_s,t}$ is the weighted rate of subcomponent d_s for bank i at time t, retrieved from the BA930 survey. In the survey, banks self-report weighted rates for each deposit category. The weighted contribution for each term structure of wholesale deposits is similarly calculated as the sum of the weighted contribution of the subcomponents of bank i, labelled w_s. This is calculated as:

$$WACF_{i,w,t} = \sum_{w_s} \frac{L_{i,w_s,t}}{L_t^{Totalbanks}} \times rate_{w,t}. \tag{6}$$

As earlier stipulated, $rate_{w,t}$ is standardised across all banks in the industry and all subcomponents of the same time period.

$$rate_{w,t} = \begin{cases} NCD_t^{1m}; & w = short\ term, \\ NCD_t^{6m}; & w = medium\ term, \\ \frac{NCD_t^{12m} + NCD_t^{24m} + NCD_t^{36m} + NCD_t^{60m}}{4} + JIBAR_t^{3m}; & w = longterm. \end{cases} \tag{7}$$

The long-term NCD rates used (12-, 24-, 36- and 60-month horizons) are expressed as spreads to the JIBAR. In order to calculate rates in levels (i.e. percentage terms), we simply add the three-month JIBAR to the spread, the most common benchmark rate in South Africa. We do not consider shareholder equity for estimation bank funding costs since it represents less than 10% of total bank liabilities, tends to vary little over time, and is not a regular source of bank funding for loans.

The BA930 survey, used to extract deposits data, starts in January 2008. The BA900 survey, combined with the converted DI900 survey, provides data back to January 1993. However, market NCD rates are only available from March 2011. We backdate these rates using the methodology used in Rapapali and Steenkamp (2020). Thus, from January 2008 to February 2011, we use proxies for wholesale debt rates. The two-month NCD rate is used as a proxy for the one-month NCD rate.[11] Owing to the data availability issue described earlier, the six-month and long-term rates are backdated a weighted average of three of the 'Top 5' banks based on total liabilities.[12]

In order to maintain consistency in our approach, and to be consistent with market norms, we use a single rate to calculate the spreads, the three-month JIBAR. While this is an over-simplification, this allows for comparisons across liability categories. Thus, the above equa-

[11] The third graph in Figure 21 shows that the two series follow a similar path between March 2011 and December 2018.

[12] The top two graphs in Figure 21 indicate that these proxies also follow a similar trend over the sample period.

tions are similarly defined,

$$WACF_{i,d,t}^{spread} = \sum_{d_s} \frac{L_{i,d_s,t}}{L_t^{Totalbanks}} \times spread_{i,d_s,t}, \tag{8}$$

where

$$spread_{i,d_s,t} = weightedrate_{i,d_s,t} - JIBAR_t^{3m}, \tag{9}$$

and

$$WACF_{i,w,t}^{spread} = \sum_{w_s} \frac{L_{i,w_s,t}}{L_t^{Totalbanks}} \times spread_{w,t}, \tag{10}$$

where

$$spread_{w,t} = rate_{w,t} - JIBAR_t^{3m}. \tag{11}$$

This approach enables automated updating of our funding cost proxies and identification of anomalies or missing entries in the BA survey data. Where anomalies are found, a simple average of the values for the periods before and after the anomaly is taken, while the anomaly is reported and followed up. Where there are missing entries, the entry is ignored for the purposes of the above calculations.[13] Owing to the confidential nature of the data, we do not list the anomalies identified.

3.2 Marginal bank funding costs

To approximate the liability-side cost of raising new funding for new loans in a given month we calculate a 'marginal cost of bank funding' (MCF) proxy. Owing to a lack of data on new funding behaviour by South African banks, we follow Rapapali and Steenkamp (2020) and define the marginal cost of bank funding as the weighted average spread of all categories included in the WACF methodology that increase in that period. This is given by:

$$MCF_t = MCF_t^{Deposits} + MCF_t^{WSD}, \tag{12}$$

where

$$MCF_t^{Deposits} = MCF_t^{Householddeposits} + MCF_t^{Corporatedeposits} + MCF_t^{Foreigndeposits}, \tag{13}$$

and

$$MCF_t^{WSD} = MCF_t^{WSDshortterm} + MCF_t^{WSDmediumterm} + MCF_t^{WSDlongterm}. \tag{14}$$

The weights used to calculate each of the MCF_t measures are based on the positive changes of outstanding balances. This is calculated as:

$$\Delta L_t^{Totalbanks,+} = \sum_{i,d} \Delta L_{i,d,t}^{+} + \sum i,w \Delta L_{i,w,t}^{+}, \tag{15}$$

where

[13] An example of missing entries includes a substantial proportion of deposits having a zero rate applied to them. Some of these entries may be as a result of the miscalculations or mis-specifications.

$$\Delta L^{+}_{i,d,t} = \begin{cases} L_{i,d,t} - L_{i,d,t-1}; & L_{i,d,t} > L_{i,d,t-1}, \\ 0; & elsewhere, \end{cases} \tag{16}$$

and

$$\Delta L^{+}_{i,w,t} = \begin{cases} L_{i,w,t} - L_{i,w,t-1}; & L_{i,w,t} > L_{i,w,t-1}, \\ 0; & elsewhere. \end{cases} \tag{17}$$

We diverge from the approach used in Rapapali and Steenkamp (2020) to calculate marginal funding costs in order to allow the estimation to be automatible.[14] The sections that follow describe developments in bank-level funding costs, focusing separately on changes in the composition of bank funding and changes in the associated costs of different components.

4. Funding weights

Figure 2 summarises the composition of aggregate bank funding in South Africa. Bank funding is dominated by deposits (which include NCDs), the majority of which is raised from the corporate sector. Relative to advanced economy banking systems where Basel regulatory changes encouraged a shift towards increased retail deposit and long-term wholesale debt funding, South African banks have not changed their funding mix substantially over time. The funding composition shift around 2012 shown in the figure reflects a change in survey form in 2012, which is expected to have improved the accuracy of the reporting. Unfortunately, SARB survey data do not allow a detailed assessment of the profile of wholesale funding. The available data shows that about 50% of wholesale debt funding has a maturity of less than six months (i.e. labelled short- and medium-term in Figure 2). However, the dominance of deposit funding (and low reliance on foreign funding) does increase the resilience of the banking system to shocks in foreign wholesale funding markets. The maturity of new debt issuances by banks has also been rising over time. Naidoo, Nkuna, and Steenkamp (2020), for example, estimate that the average maturity of debt issuances by South African banks has increased from around 4.5 years in 2010 to over 7.5 years in 2019.

Another interesting feature of the structure of bank funding in South Africa is the large proportion of deposits that are 'on-call' (Figure 3). There are several potential explanations for the high share of deposit funding in banks' funding mix, although this question has received little academic investigation. Explanations emphasised by market participants include a relatively low contractual savings rate by international standards, the liquidity preference of the regulated funds management industry, precautionary saving behaviour by South African households and corporates, and a relatively high cost of foreign wholesale funding.

[14] Rapapali and Steenkamp (2020) measure MCF using deposit data from the BA930 survey, as well as bank debt issuance costs estimated in Naidoo, Nkuna, and Steenkamp (2020) based on data from the Johannesburg Stock Exchange (JSE). We deviate from this approach in order to make the funding cost estimation automatible for monitoring purposes. In Rapapali and Steenkamp (2020), marginal funding costs are presented as a six month rolling average of estimated marginal funding costs to reduce the volatility of these weights of the different components of marginal funding. In this paper, we do not smooth marginal funding costs in an attempt to most accurately reflect monthly changes in marginal funding costs. Figure 19 shows that our estimates are broadly consistent with the estimates from Rapapali and Steenkamp (2020). Apart from simplification of methodology for estimating debt funding costs, the differences reflect corrections in data anomalies, the use of more granular data.

Figure 2: Aggregate weights

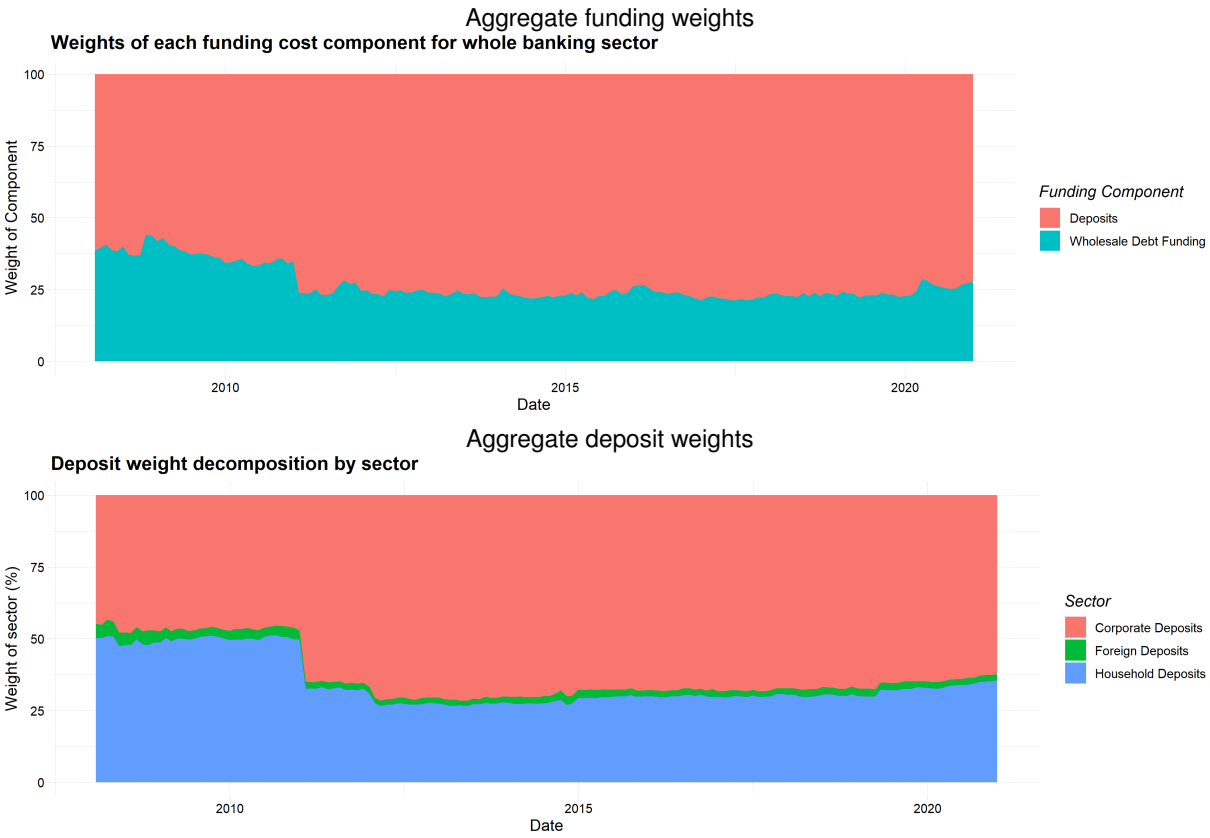
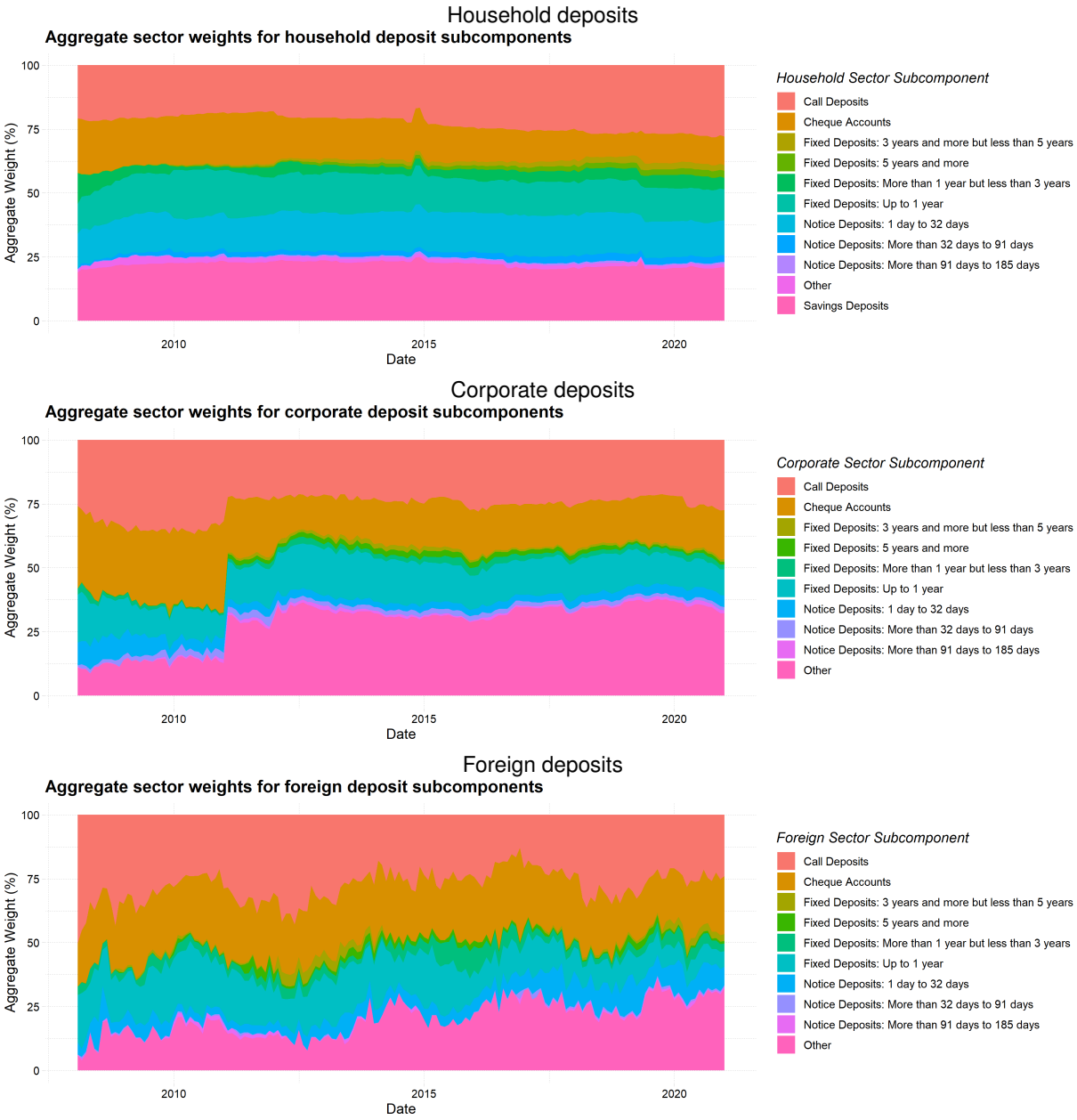


Figure 3: Composition of sector deposits



5. Funding rates

The previous section showed that deposit funding forms the largest component of South African banks' funding mix. Figure 4 shows that deposit rates are generally below the three-month JIBAR rate, the most commonly used reference rate in South African financial markets. Medium- and long-term wholesale debt funding, on the other hand, tends to be above the three-month JIBAR. Household deposits have the lowest cost in level term (i.e. in percentage terms) of any bank funding components. During the GFC in 2008, the cost of raising long-term wholesale funding increased relative to the policy rate, as risk premia spiked on concerns of the vulnerability of the banking sector. Since the GFC, the cost of funding has fallen in level terms, but these costs have remained elevated when expressed as spreads to the policy rate. Whereas a positive spread built up over the policy rate (repo) beginning around 2014, based in part on expectations of potential monetary policy tightening and an increase in the liquidity spreads (discussed later), the spread narrowed as rates fell as the Covid crisis intensified.

Figure 4: Rate comparison

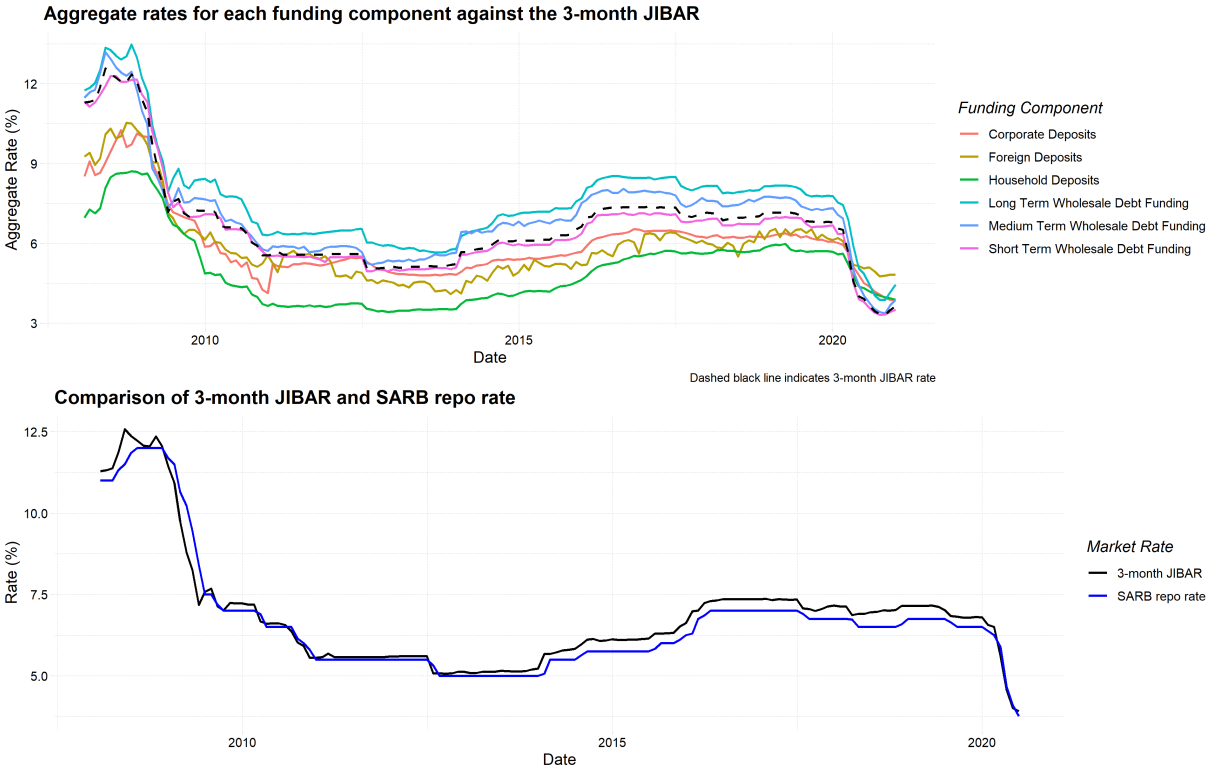


Figure 5 shows that deposit rates vary significantly at product-level. Call and cheque deposits, which make up a large proportion of household and corporate deposit funding, are remunerated at much lower interest rates than term or notice deposits. Focusing on call and cheque deposit rates, Figure 6 provides aggregations of these rates across the funding sectors. It is notable that call deposit rates have since 2015 been lower, on average, than corporate and household rates. For cheque deposits, households have been remunerated at a lower rate than the other sectors, with foreign rates generally being the highest.

Figure 5: Funding rates for deposits at sector level

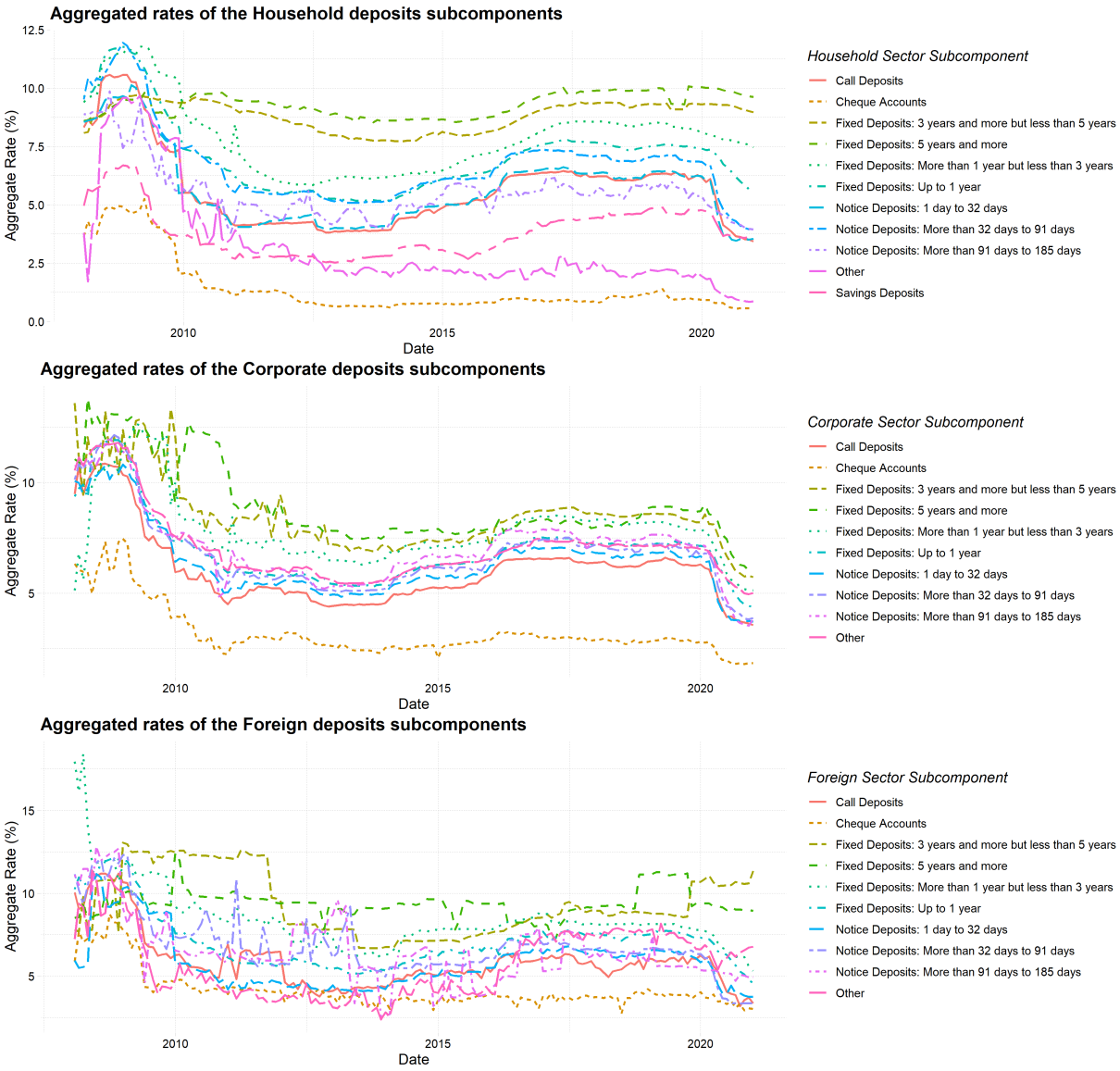
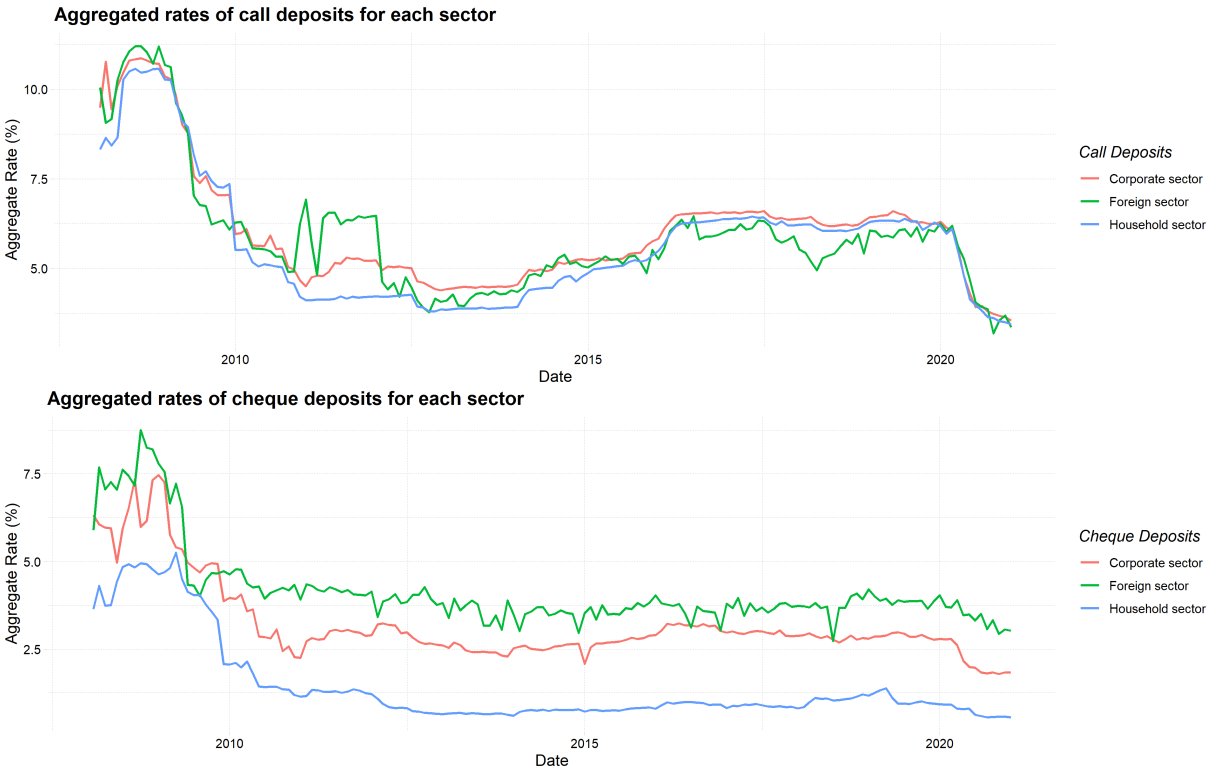


Figure 6: Selected funding rates at sector level (aggregated)



6. Funding costs

Aggregate funding costs are relatively high by international standards in nominal level terms.[15] Figure 7 shows that aggregated weighted average funding costs peaked at almost 11% during the intensification of the GFC in late 2008, before declining to around 4.5% in early 2011. The fall in interest rates following the COVID-19 crisis has seen the WACF approach these earlier lows in June 2020. Deposits have been the largest contributor to the level of WACF, reflecting their dominance as a source of funding.

When expressed as funding spreads, funding costs are generally at a discount to reference rates (Figure 8). As discussed earlier, this reflects the combination of the high share of deposits (particularly on-call deposits attracting near zero rates) in bank liabilities.[16] Whereas funding costs followed policy rates lower since the GFC, they rose in spread terms by over 100 basis points, reflecting the higher relative costs of deposits, which fell less than policy rates. This is consistent with international experience, with funding spreads structurally increasing and becoming more volatile post-GFC (see Cook and Steenkamp (2018) for New Zealand, Kapuscinski and Stanislawska (2018) for Poland, or Illes et al. (2019) for estimates for the euro area). Since the COVID-19 crisis, funding spreads have risen sharply in spite of lower policy rates, driven by the narrowing of corporate and household deposit spreads.

[15] Illes et al. (2019) show that European WACF fell from about 5% to below 1% between 2009 and early 2018, similar to what Kapuscinski and Stanislawska (2018) finds for Poland. New bank funding costs in New Zealand averaged about 3% between 2009 and 2017 according to Cook and Steenkamp (2018). We are not aware of comparable funding cost estimates for other emerging market banking systems.

[16] It is not unusual that raising on-call deposits tends to be relatively cheap banks compared with other forms of funding. For example, funding spreads for deposits are estimated by Kapuscinski and Stanislawska (2018) to be negative for Poland, while on-call deposit spreads were negative in New Zealand pre-GFC, according to estimates from Wong (2012).

As expected, the level of marginal bank funding costs has been more volatile than the average cost of existing bank liabilities, and has followed a broadly similar overall pattern (Figure 9). Since the COVID-19 crisis however, marginal funding costs have risen in level terms, on the back of dearer deposits. In spread terms, marginal funding costs rise by over 250 basis points in the immediate aftermath of the COVID-19 crisis, a similar-sized increase to the spike during the GFC (Figure 10), reflecting the dramatic increase in the corporate deposit spread. Expressed as funding spreads, both weighted average and marginal funding costs have fallen from their 2020 highs, retreating by 30 and 80 basis points by December 2020, respectively. Our estimates are updatable as monthly bank balance sheet data is published, allowing the extent of such funding pressures to be assessed on an ongoing basis.

Figure 7: Aggregate weighted average funding costs

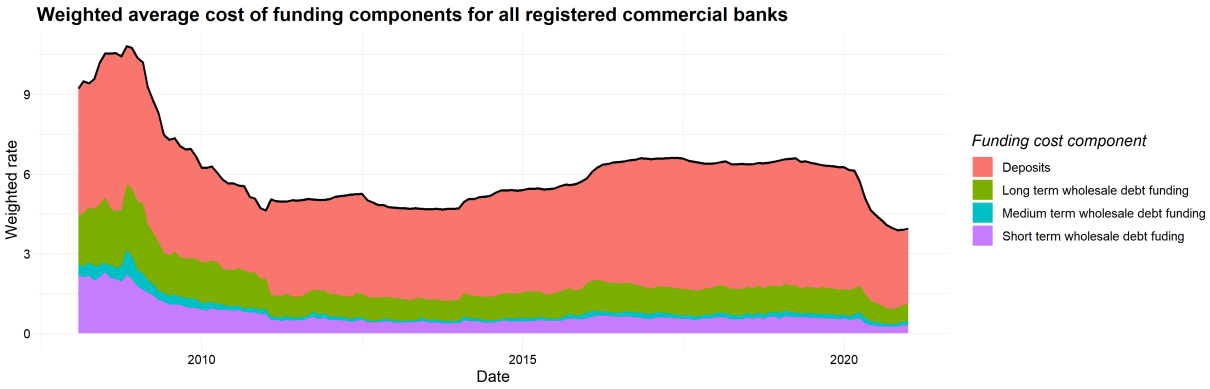


Figure 8: Aggregate weighted average funding spreads

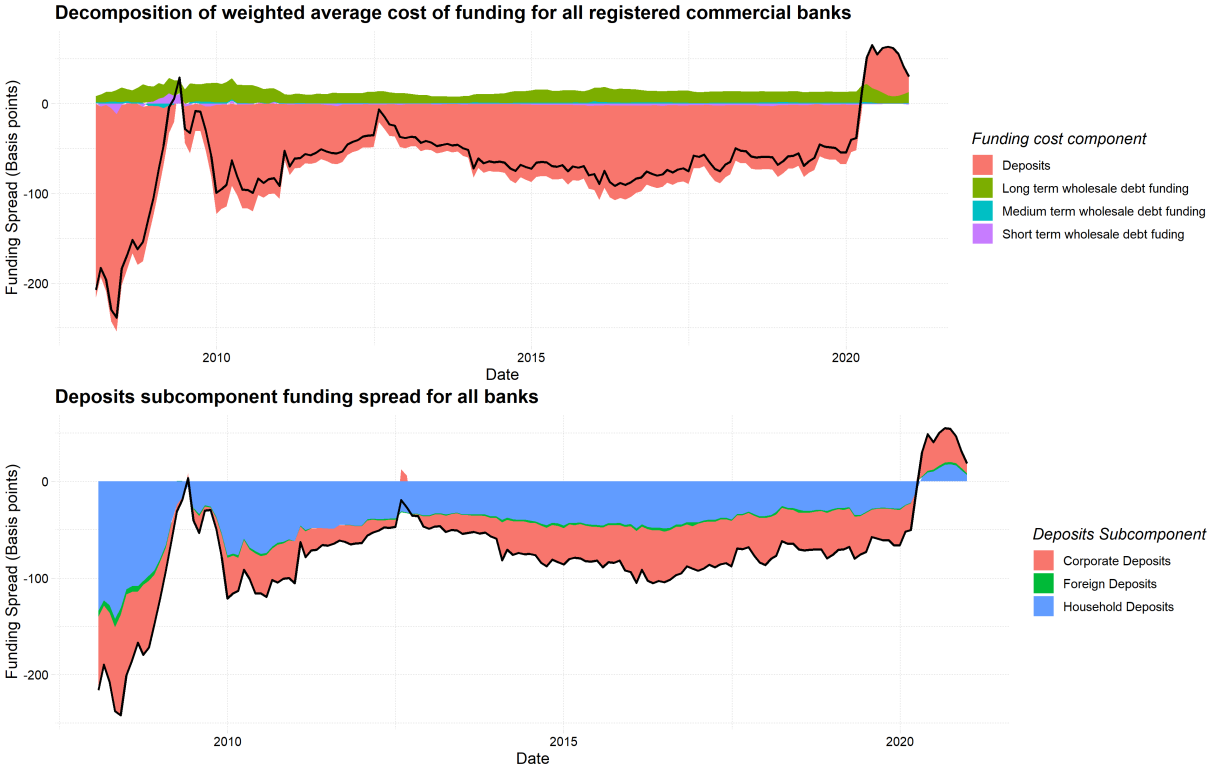


Figure 9: Aggregate marginal funding costs

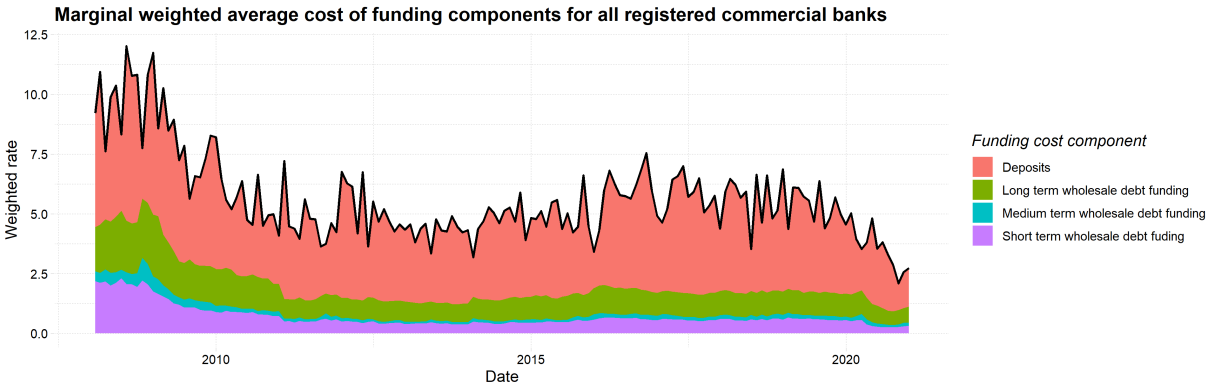
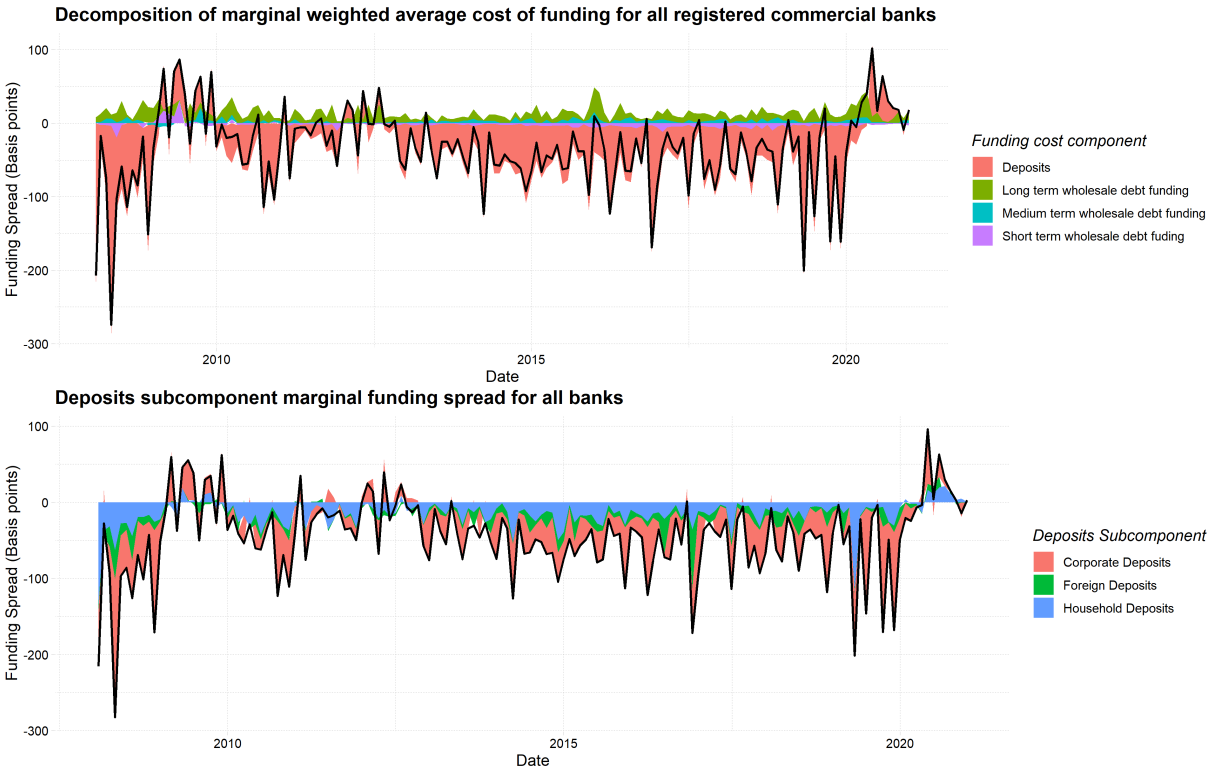


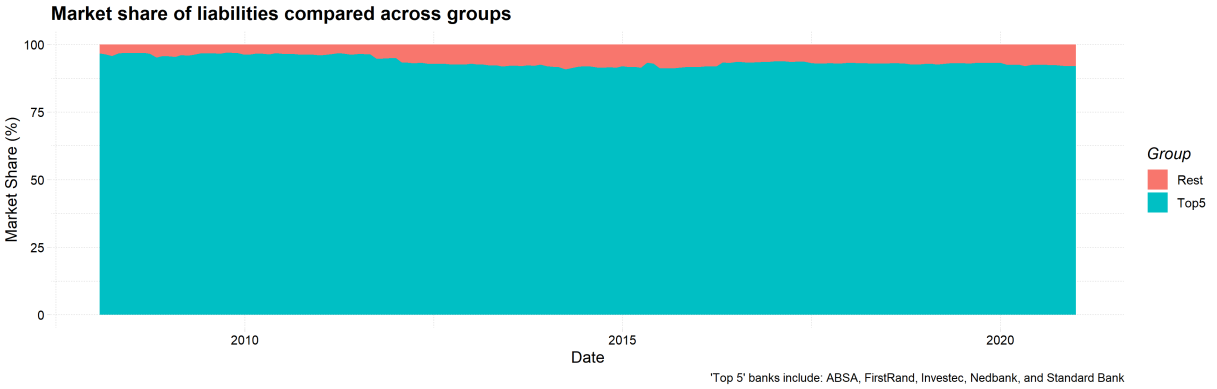
Figure 10: Aggregate marginal funding spreads



7. Heterogeneity in bank funding costs

The South African banking system is highly concentrated, with the five largest banks (listed in Table 1) representing about over 92% of the total banking sector liabilities (Figure 11). Nonetheless, there are substantial differences in funding weights and the rates at which banks obtain funding. A somewhat surprising characteristic of the South African banking sector is that small banks are able to raise deposits more cheaply than larger banks. Figure 14 demonstrates that smaller banks are more dependent on deposit funding than larger banks. As a result, smaller banks tend to have lower funding costs overall (Figure 15). Based on our most recent estimates, this funding cost advantage for smaller banks is about 50 basis points.

Figure 11: Market share of five largest banks



The finding that small banks have lower funding costs than the largest banks contrasts starkly with the existing literature that finds that globally systemically important banks have relatively lower funding costs (see Babihuga and Spaltro 2014) and that banks with higher funding costs tend to be those with weaker capital position, which are usually relatively small banks (Beau et al. 2014). On account of the confidentiality of the bank-level funding cost data we cannot discuss which banks have the highest funding costs. However, it is worth noting that, even between large banks, there are large and varying differences in funding composition and funding costs. As discussed above, the predominant source of funding cost advantages is differences in the cost of raising deposits. Figure 13 shows that several categories of deposits, particularly 'on-call' deposits, have meaningfully lower rates in the case of small banks, compared to large banks. These cost differences, along with the relatively small share of wholesale debt in small bank funding (approximately 15% in 2020 compared to 25% for large banks), implies lower overall funding cost estimates for small banks in aggregate.[17]

We have shown above that the recent developments in funding costs reflected, in large part, an increase in the cost of raising deposits. In the section that follows, we attempt to account for the increase in the cost of bank funding relative to money market rates since the GFC.

[17] Note that Figure 15 may slightly overstate the funding cost advantage of small banks as our paper uses common wholesale debt rates for all banks. However, the estimates of Naidoo et al. (2020) suggest that although debt issuance costs have been averaged materially higher in level terms for small banks relative to large banks, in spread terms (expressed relative to the rate on an interest rate swap of similar maturity as the debt instrument issued on a particular day) issuance costs have been broadly comparable over recent years (see Figure 20 for volume-weighted estimates from Naidoo et al. 2020). Given the small volume of debt issuance by small banks, this suggests that the understatement of debt issuance cost differences appears to be relatively small in spread terms.

Figure 12: Deposit rate comparisons across large and small banks (sector-level)

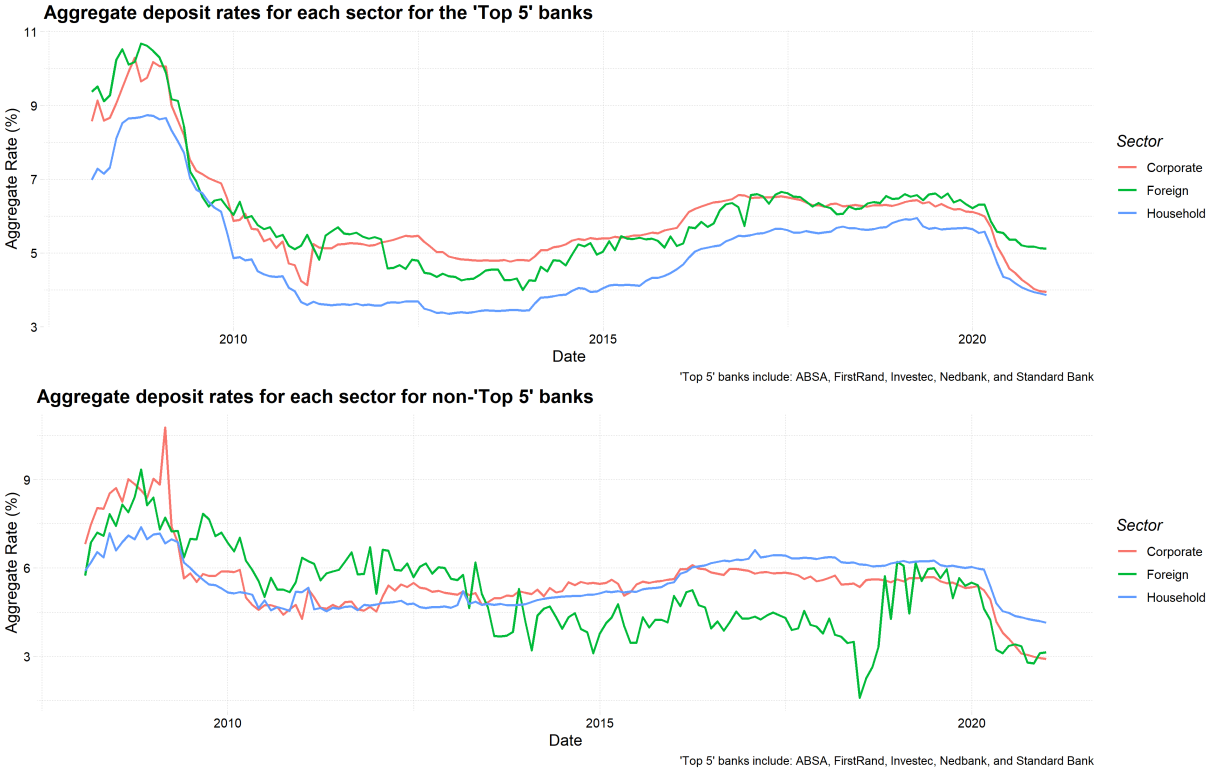


Figure 13: Deposit rate comparisons across large and small banks (product-level)

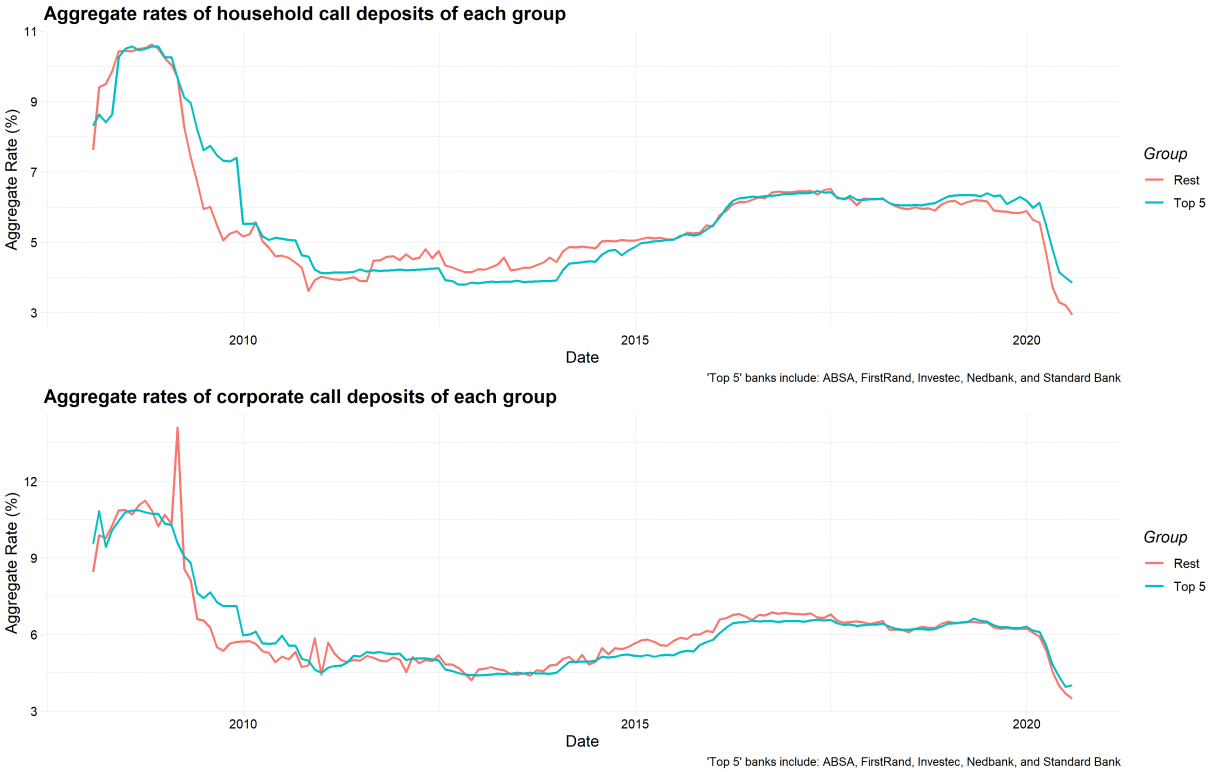


Figure 14: Funding composition comparisons across large and small banks

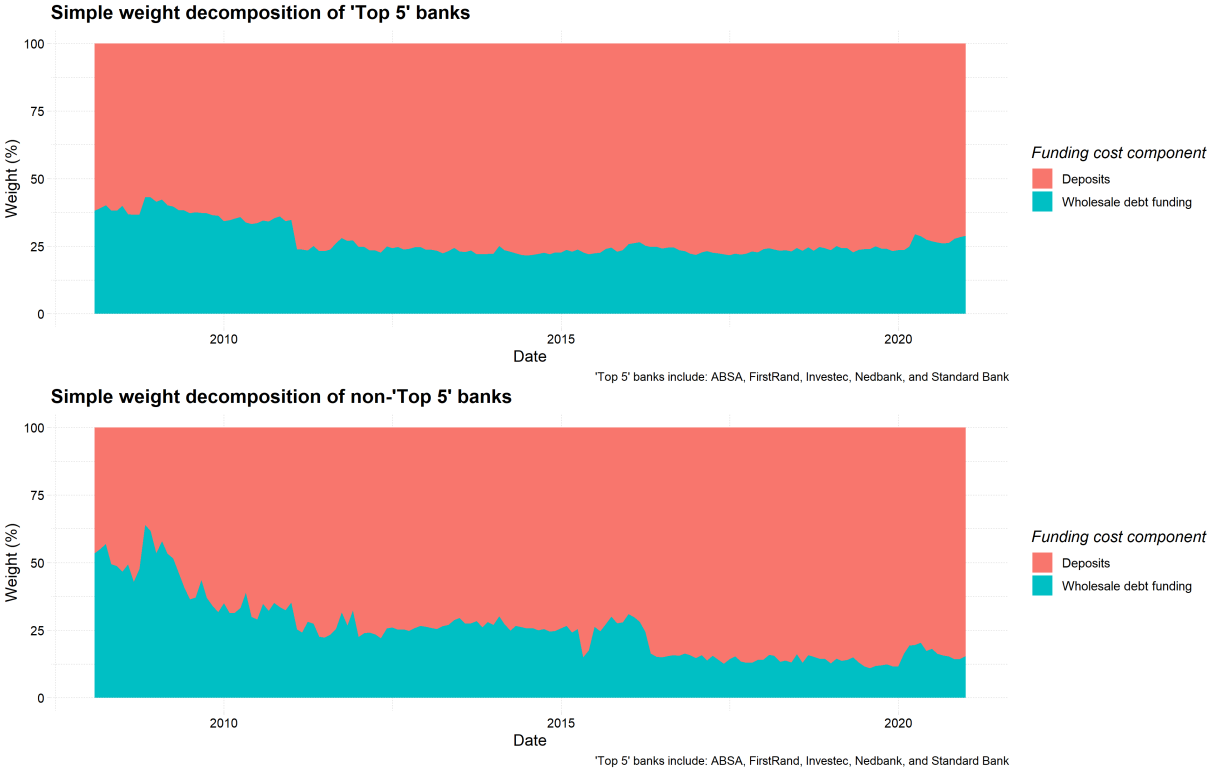
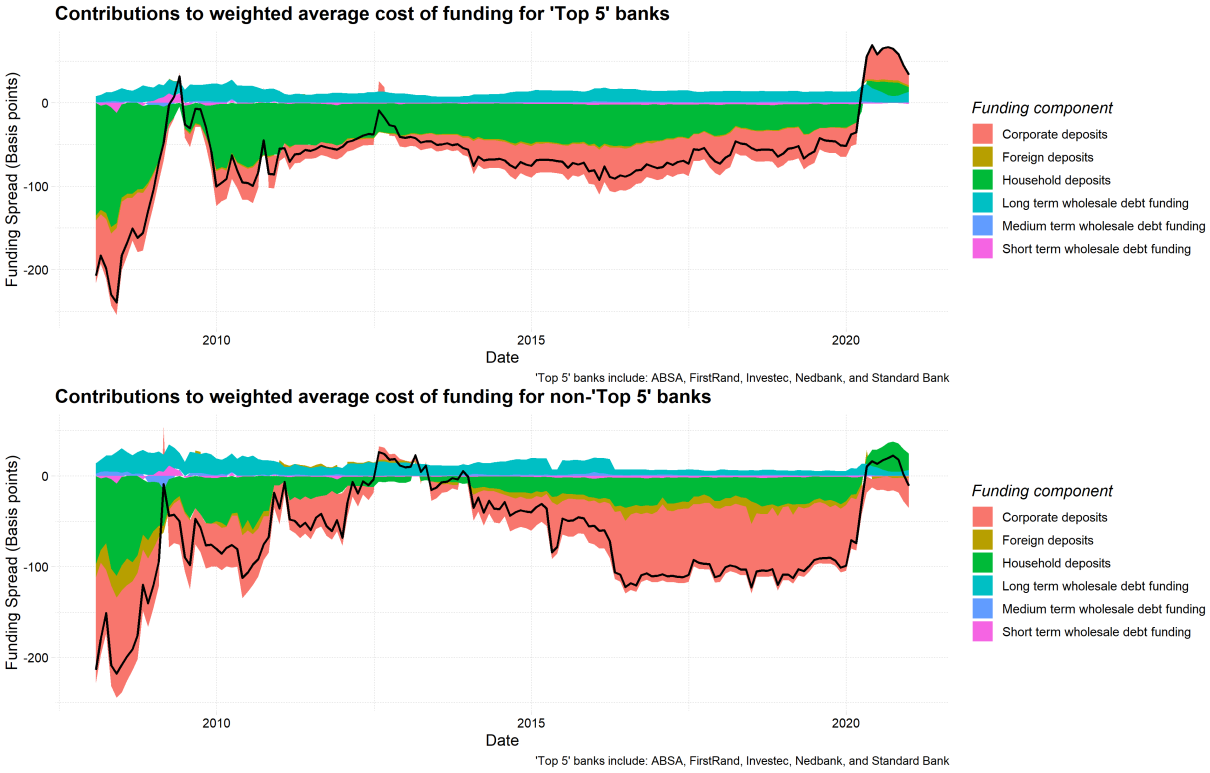


Figure 15: Funding cost comparisons across large and small banks



Note: Large and small banks listed in Table 1.

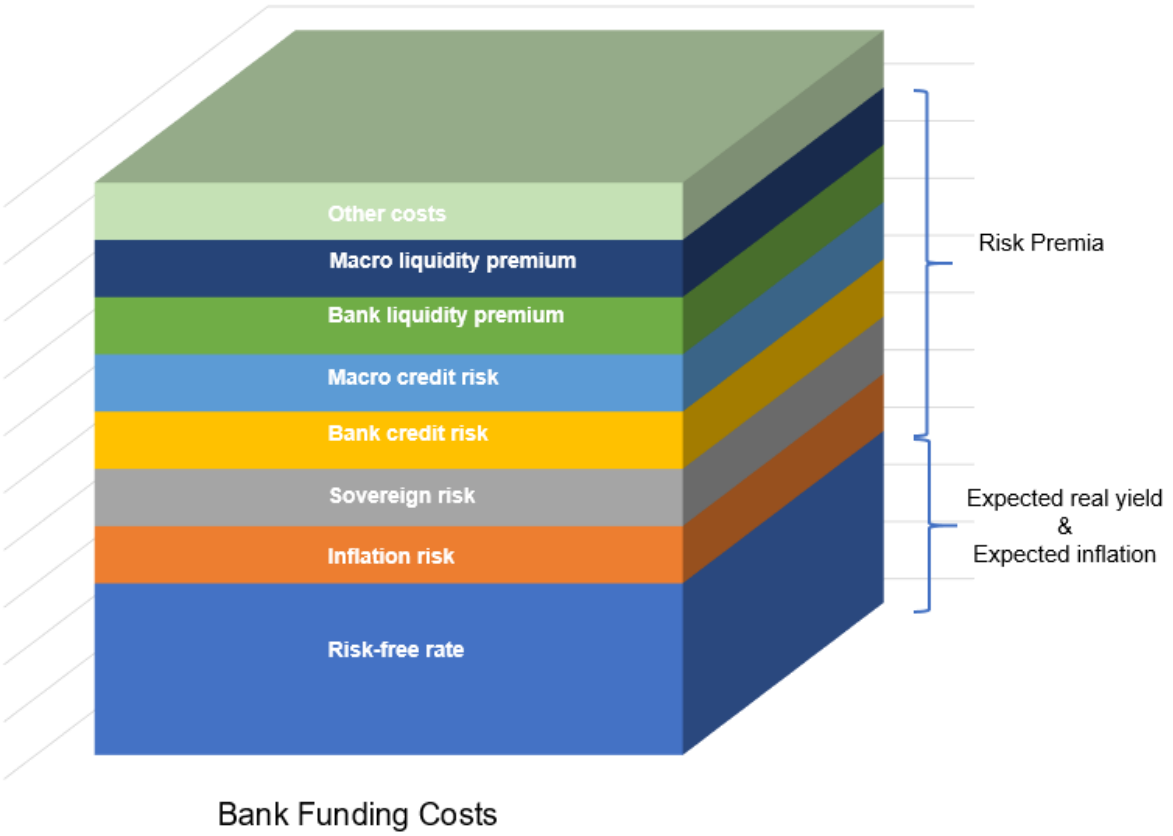
8. Macro developments associated with funding cost changes

In this section, we investigate the ability of macroeconomic developments to explain the behaviour of bank funding costs. In particular, we are interested in the factors that can explain

why funding costs have not matched the fall in the interest rates since the GFC.

The level of bank funding costs will reflect several macroeconomic factors. Figure 16 provides an illustration of such factors, which include the risk-free rates in the economy, the extent of credit risk, liquidity premia (associated with the term of bank funding and extent of liquidity in funding markets), and other costs. The central bank policy rate is sometimes considered a risk-free rate itself, given the low risk of default. Since banks can obtain overnight funding at the policy rate, current and expected levels of the repurchase rate (repo) affect short-term interest rates and risk-free rates at longer maturities. On average, risk-free rates depend on factors such as the expected rate of inflation and level of real yield in the economy. Other macroeconomic factors will also add to the rate at which a bank can fund its liabilities. These include the volatility and uncertainty around the level of inflation, the extent of sovereign risk (since banks tend to hold government securities to meet regulatory requirements), uncertainty around the economy's growth outlook and therefore banking sector exposure to credit losses ('Macro credit risk'), as well as the perceived creditworthiness of an individual bank ('Bank credit risk') and overall demand for credit. Liquidity premia can be broken into two components: 'Macro premia' related to bond market liquidity in the economy, and 'Bank-level premia' reflecting the liquidity of a bank's debt in the secondary market, as these affect the cost investors require to hold bank term debt. Lastly, 'Other costs' that affect bank funding costs include debt issuance costs, including rating and legal fees, and the cost of derivatives used to hedge foreign denominated funding back to domestic currency or managing the interest rate risk associated with fixed- or floating-rate funding instruments. The relative contribution of these factors will vary over time, and also reflect the structure of a bank's balance sheet and funding mix of a bank. The factors that affect bank funding costs also have a bearing on lending rates, but different lending rates will reflect the costs of funding, the riskiness associated with different types of loans, the regulatory requirements associated with making certain types of loans or with certain forms of funding, bank-specific operating costs, as well as bank mark-ups over costs applied to different loans.

Figure 16: Decomposition of bank funding costs



To illustrate the sensitivity of banks' funding costs to market conditions and the macroeconomic environment, we use a simple model that assesses the association between bank funding costs and various indicators of funding conditions and credit risk.[18] We consider a large number of variables to explain the dynamics of funding costs. These include measures of macroeconomic fundamentals (market risk[19], the level of the risk free rate (i.e. repo rate) and M2 money supply growth (year-on-year), when modelling funding costs in level terms), bank fundamentals (bank interest margins[20] and non-performing loans[21]), market conditions (liquidity spread[22], the South African 'Ted spread'[23], the term premium[24], and South Africa's

[18] There is a large literature that assesses the impacts of macroeconomic factors on bank balance sheets and funding costs from a *causal* perspective (see Maurin and Galiay (2015) for bank debt costs in the euro area), but our focus here is just to illustrate how market conditions have been correlated with measured bank funding costs. Pursuing this further in future research would provide useful policy insights.

[19] Based on the JSE equity volatility index (VIX). Somewhat surprisingly, funding cost spreads have a low negative correlation with the VIX, and we exclude it from our baseline specification.

[20] Defined as net income over total assets aggregated across all banks.

[21] Defined as impaired advances as a ratio of total loans and advances aggregated across all banks. Unfortunately, the market for bank-level Credit Default Swaps is not liquid in South Africa, so we do not have access to good proxies of monthly frequency banking sector credit risk.

[22] Based on an aggregation of the spread between three-month JIBAR and the repo, the 12-month NCD spread over an equivalent swap rate and a volume adjustment to account for an immediacy premium applying to large trades.

[23] Calculated as the difference between Treasury bill and three-month JIBAR.

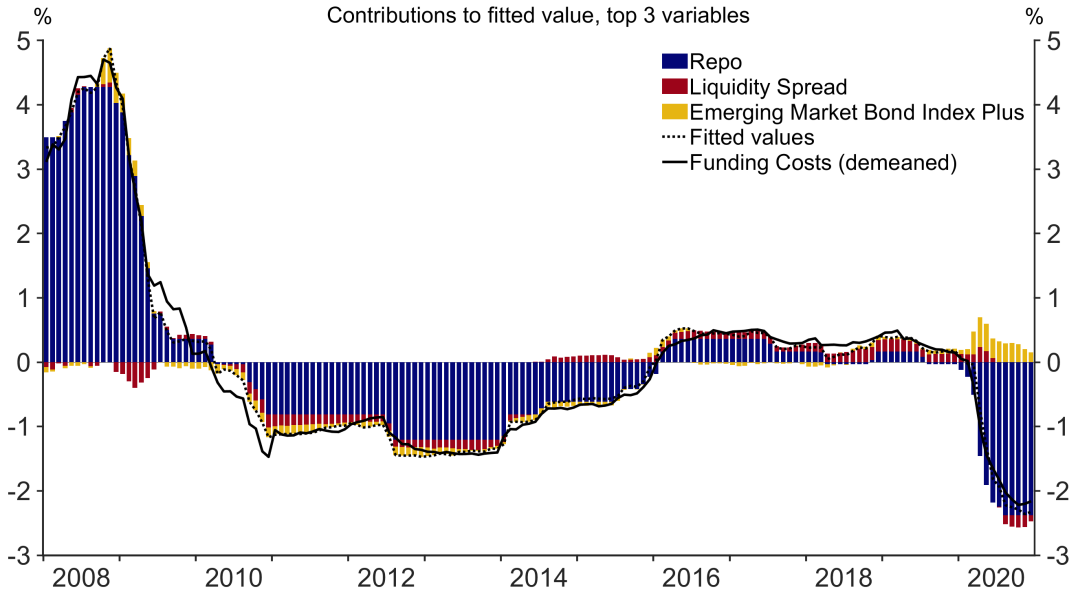
[24] We consider both the one-year, two-year, five-year and 10-year premia estimated using the methodology described in Soobyah and Steenkamp (2020), and find that the one-year premium provides the best model fit among these premia, although the difference is small. The term premium captures a variety of premia, including a liquidity premium, macroeconomic and sovereign credit risk, and an inflation risk premium. We find that,

sovereign risk premium[25]).

The model used is a combination of individual Ordinary Least Square models, weighted based on their ability to explain funding costs based on a Bayesian model averaging methodology.[26] Funding costs are demeaned to ensure stationarity. The level of funding costs can be explained by the average level of the risk-free rate we use in the model (the repo), although over the COVID-19 crisis period a worsening domestic risk premium (as measured using the Emerging Markets Bond Index Plus spread for South Africa) has offset some of the impact of interest rate cuts on the level of funding costs (Figure 17). In the lead up and period subsequent to the GFC, as well as the recent spike in funding spreads during the COVID-19 crisis, macroeconomic factors and market condition variables can explain a large proportion of the increase in funding costs relative to reference rates (Figure 18). For both the GFC and the COVID-19 crisis, an increase in South Africa's risk premium and in non-performing loans can explain the bulk of the observed increase in funding spreads.

Given the lack of proxies for the various premia affecting specific types of bank funding, we argue these results are illustrative only. Further development of proxies for macroeconomic and banking sector risk and market liquidity premia would help to enrich our understanding of the macroeconomic drivers of funding costs.

Figure 17: Contributions to funding cost levels (deviation from average)

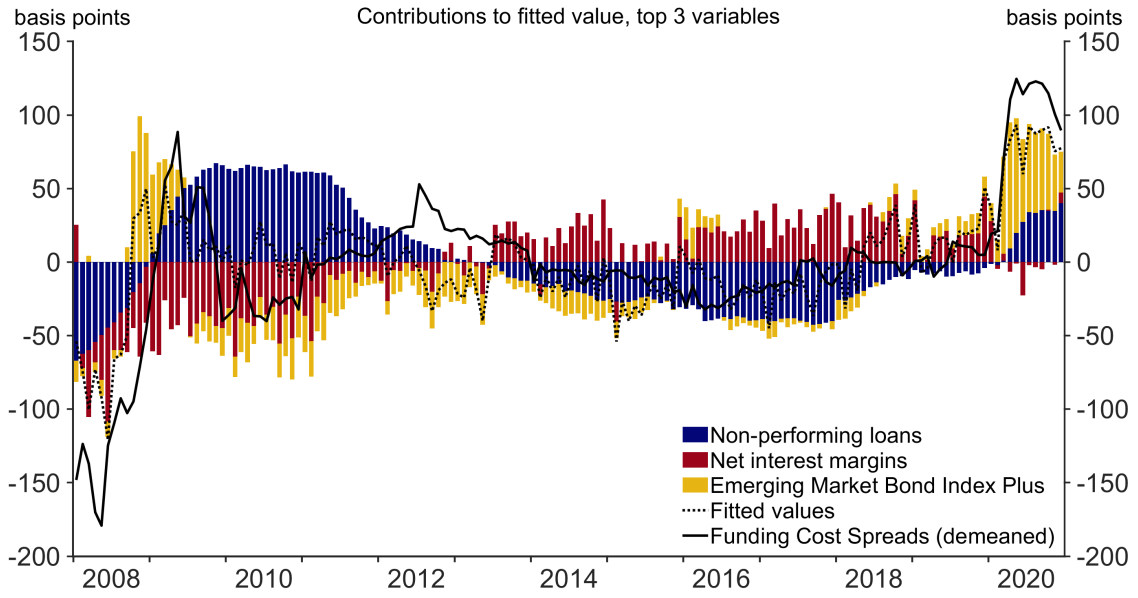


in general, however, the JPMorgan's Emerging Markets Bond Index (EMBI) Plus provides a slightly better fit of funding costs than our term premia estimates.

[25] Measured using the EMBI spread for South Africa over the emerging market average.

[26] The model is based on the Bayesian Model Averaging approach of Raftery et al. (1997) and the Gibbs sampling estimation approach of Geweke (1993).

Figure 18: Contributions to funding cost spreads (deviation from average)



9. Conclusion

The estimates of bank funding costs produced in this paper enable ongoing monitoring of bank funding risk. Our estimates suggest that funding costs are materially higher than before the GFC, in spite of lower interest rates. This largely reflects an increase in the cost of raising deposits. During the COVID-19 crisis, we have likewise seen a fall in aggregate funding costs in level (i.e. percentage) terms, but an increase in spread terms. Again, this has been primarily driven by an increase in deposit spreads. Despite 300 basis points in cuts to the policy rate since outbreak of the COVID-19 crisis in March 2020, funding cost spreads on existing liabilities are about 70 basis points higher, and costs on new funding over 100 basis points higher. This suggests that financial conditions have not loosened in line with significant monetary policy easing.

We also assess the heterogeneity in funding costs for large and small banks, and our estimates suggest that smaller banks have lower funding costs for deposits, while being more dependent on deposit funding, meaning that they have lower liability-side funding costs overall.

We present an illustration of the ability of macroeconomic factors and market conditions to explain developments in funding costs. Over the course of the COVID-19 crisis, an increase in South Africa's risk premium and the banking sector's non-performing loans can explain a large proportion of the increase in funding spreads. It is nonetheless difficult for available liquidity premia and credit risk measures to fully explain the meaningful increase in funding costs relative to reference rates. This highlights the need to develop better proxies for macroeconomic and banking sector risk and market liquidity premia and to develop our understanding of the macroeconomic drivers of funding costs.

An important contribution of this research is to construct estimates that allow the monitoring of balance sheet risks in the South African banking system and funding markets, as well as enabling further research into the impacts of prudential regulations and the COVID-19 crisis on transmission of monetary policy and lending behaviour by South African banks.

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11. Technical Appendix

Figure 19: Comparison to Rapapali and Steenkamp (2020)

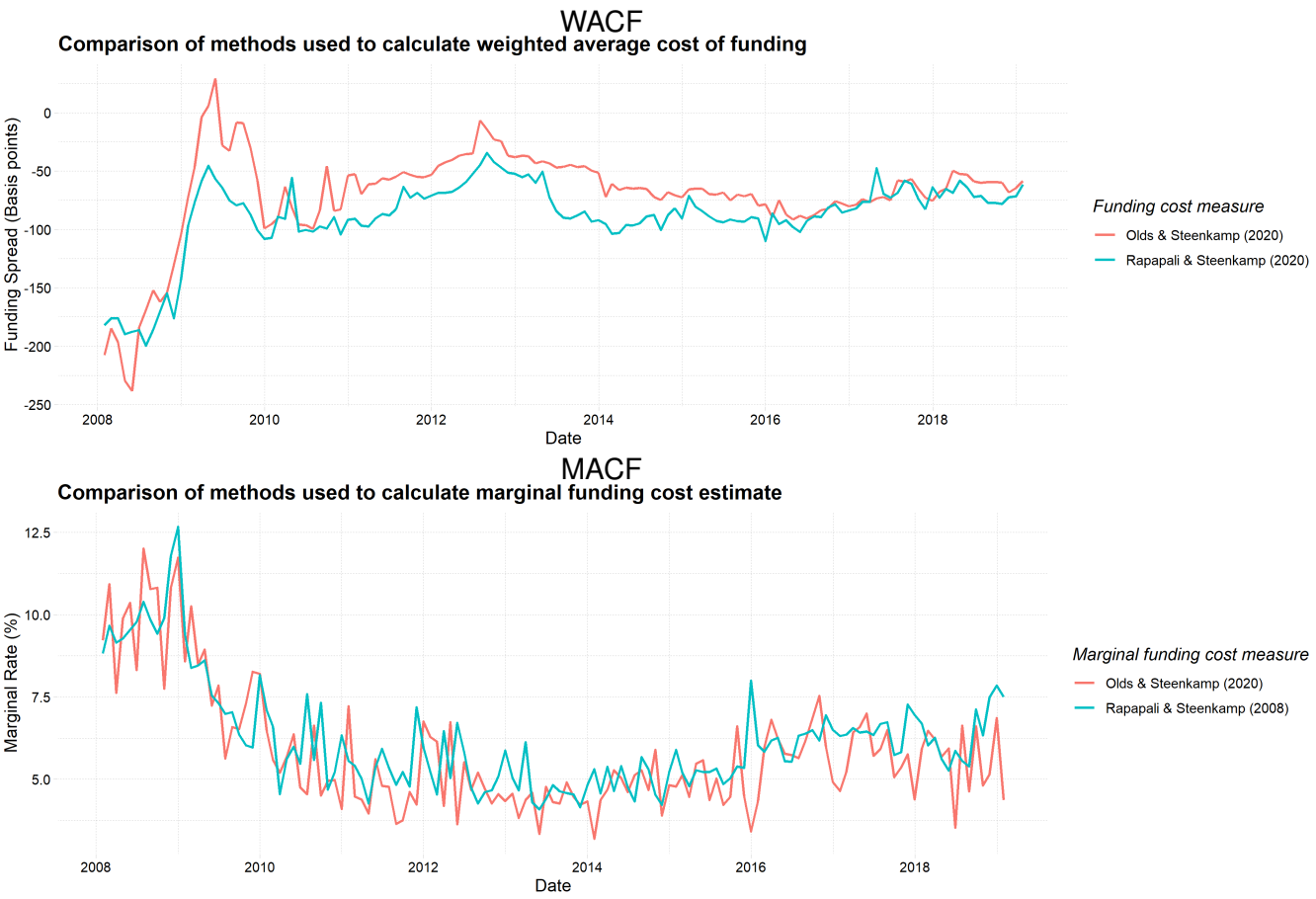

Figure 20: Naidoo, Nkuna and Steenkamp (2020) bank debt issuance estimates

Figure 21: Backdating NCD

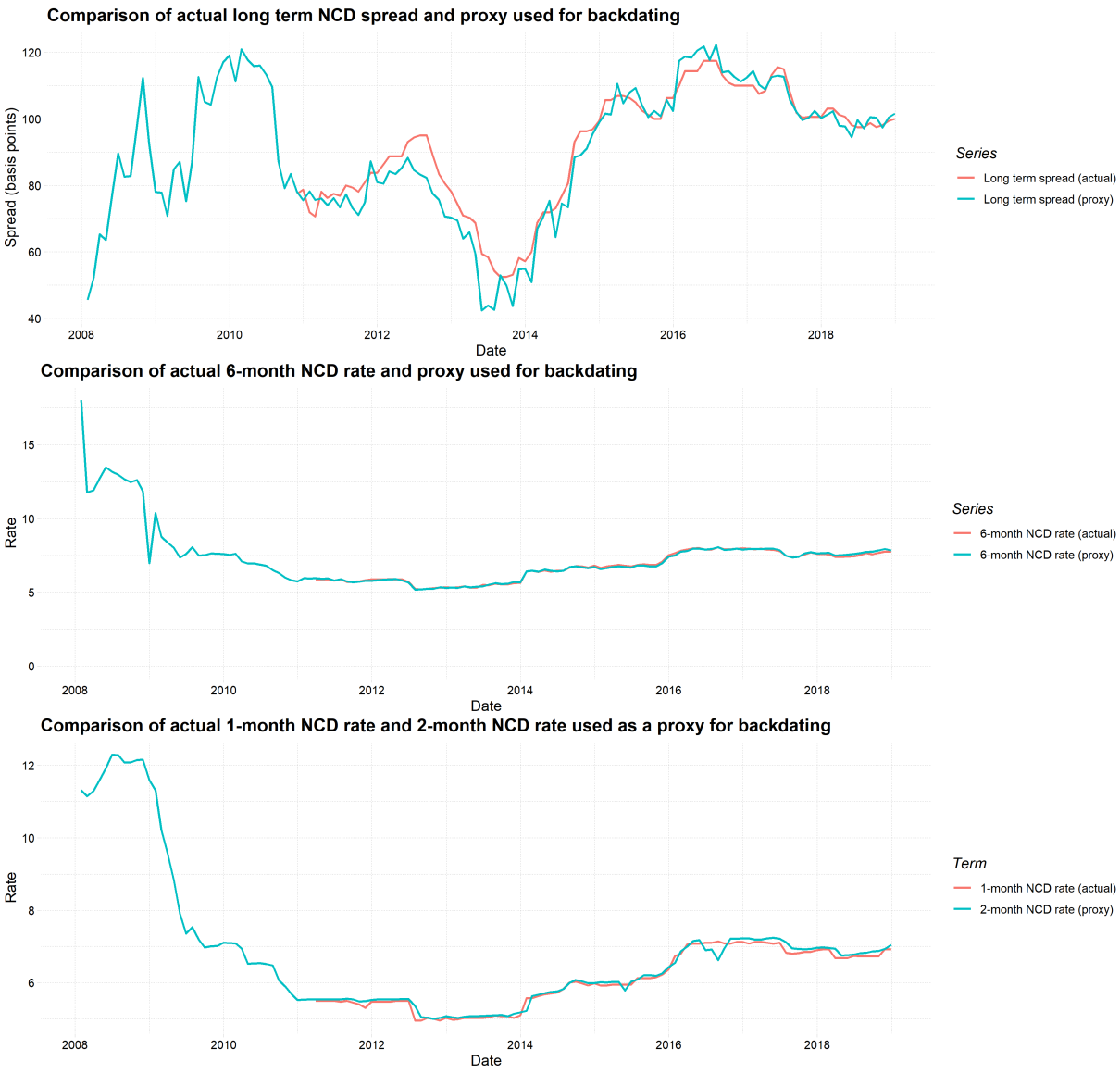

Table 1: List of registered banks

Top 5	
ABSA Bank Ltd	FirstRand Bank Limited
Investec Bank Ltd	Nedbank Ltd
The Standard Bank of S A Ltd	
Rest	
African Bank Limited	Al Baraka Bank Ltd
Bank of Baroda	Bank of China Ltd JHB Branch
Bank of India - Johannesburg Branch	Bank of Taiwan South Africa Branch
Bidvest Bank Limited	BNP Paribas South Africa Branch
Canara Bank	Capitec Bank
Citibank N.A	Deutsche Bank AG
Discovery Bank Limited	Grindrod Bank Ltd
Grobank Ltd	Habib Overseas Bank Ltd
HBZ Bank Ltd	ICICI Bank Limited
JPMorgan Chase Bank	Mercantile Bank Ltd
Sasfin Bank Ltd	Société Générale Johannesburg Branch
Standard Chartered Bank	State Bank of India
TymeDigital by Commonwealth Bank SA	UBank Limited
China Construction Bank Corporation - JHB Branch	
The Hongkong and Shanghai Banking Corporation Limited - Johannesburg Branch	

Table 2: Major funding components

Deposits
Deposits comprising sectors: Household, Corporate, and Foreign
Call Deposits
Cheque Accounts
Fixed Deposits: Up to 1 year
Fixed Deposits: More than 1 year but less than 3 years
Fixed Deposits: 3 years and more but less than 5 years
Fixed Deposits: 5 years and more
Notice Deposits: 1 day to 32 days
Notice Deposits: More than 32 days to 91 days
Notice Deposits: More than 91 days to 185 days
Other
Savings Deposits (Household sector only)
Wholesale debt funding
Wholesale debt at maturities: Short Term, Medium Term, and Long Term
Other borrowed funds
Foreign currency funding
Other liabilities to the public
Outstanding liabilities on behalf of clients
Other liabilities