The Impact of Government Guarantees on Banks' Wholesale Funding Costs and Risk Taking: Evidence from a Natural Experiment

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Abstract

This study compares the effect of the introduction and removal of the Australian Government Wholesale Funding Guarantee Scheme (WGS) on the funding costs and risk taking incentives of authorised deposit-taking institutions (ADIs). This government guarantee was introduced in the height of the international financial crisis to reduce bank failures. We examine whether the guarantee may have also induced changes in banks' risk taking incentives. We analyze a sample of 240 ADIs over the period from March 2002 to December 2014 and employ a difference-in-differences approach. We find strong causal evidence to indicate that the government guarantee helped ADIs to significantly reduce their funding costs even beyond the subsequent removal of the guarantee scheme. Furthermore, we find increased bank leverage and reduced market discipline after WGS participation. A robustness check using guaranteed and non-guaranteed bonds issued by ADIs confirms the benefit of a reduction in bank funding costs from the government guarantee and moral hazard concerns.

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Keywords: Government Guarantee, Wholesale Funding, Bank Funding Costs, Market Discipline, Risk Taking, Moral Hazard

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1. Introduction

Government interventions and support of the banking sector has been the subject of much public debate since the 2007-2008 Global Financial Crisis (GFC). The potential adverse consequences of government support for banks and the sovereign-bank nexus are well documented in the recent literature (Acharya et al. (2014), Dam and Koetter (2012), Duchin and Sosyura (2014), Gropp et al. (2013) and Hryckiewicz (2014)). Whilst there is much evidence on government support in the form of bailouts and government protection of bank deposits, in contrast, government guarantees on wholesale debt funding is less well understood. Recent theoretical work by Allen et al. (2015a) have highlighted the potential risks of providing government guarantees upon financial stability but there remains scant empirical evidence. This paper aims to fill this void and provides new bank-level evidence on the effects of government guarantees, by examining the direct impact of the provision of an explicit guarantee by the Australian Government on deposit taking institutions' wholesale debt funding during the height of the GFC on bank funding costs and bank risk taking.

In recent years, governments in a number of countries around the world have strengthened deposit protection arrangements and introduced explicit guarantees for financial institutions' wholesale debt. Wholesale funding guarantee schemes have been implemented in response to the extremely difficult funding conditions experienced during the GFC. The schemes are designed to promote financial system stability by reducing the likelihood of bank failures and to encourage the ongoing provision of credit, by supporting confidence in the financial sector. Moreover, by reducing actual and perceived risks they assist financial institutions to access wholesale funding (at a reasonable cost) during a time of considerable financial turbulence. However, it has been

identified in the academic literature that the provision of government guarantees may also create distortions in banks' risk taking decisions (Allen et al., 2015a, b).

The Australian Government Wholesale Funding Guarantee Scheme (WGS) was introduced to protect large deposits greater than AUD 1 million, as well as wholesale debt funding used by Australian deposit-taking institutions up to maturities of five years. The WGS commenced on 28 November 2008 at the height of the GFC and closed on the 31 March 2010. The government guarantee provided was unique in that Australia did not previously have any explicit deposit protection and there was initially no explicit end date announced for the scheme to signal to market participants that the government was prepared to support the banks for 'as long as it takes'. This offers a rare natural experiment for understanding the causal effect of a broad risk-based government guarantee on bank debt.

Our study is related to a major strand of the banking literature investigating the impact of deposit guarantees on the market discipline provided by retail depositors. For example, Demirguc-Kunt and Huizinga (2004), Gropp and Vesala (2004), Imai (2006), Yan et al. (2014), Hadad et al. (2011), Karas et al. (2013), all find that the introduction of a domestic deposit insurance scheme lowers the perceived risks for financial institutions and this, in turn, leads to a reduction in market discipline by depositors for protected banks, allowing banks to take excessive risks (Ioannidou and Penas, 2010). A weakening in market discipline manifests in a reduction in the interest rates demanded by depositors resulting in a major reduction in funding costs for financial institutions. However, going forward, banks worldwide may become increasingly less reliant on traditional deposit funding for two main reasons. First, the new Basel III liquidity rules incentivizes banks to use more long-term wholesale funding to better match the maturity structures in their uses of funds for extending longer-term loans.[2] Second, as investors chase higher yields in the protracted

[2] Basel III liquidity standards require banks to have net stable funding ratios (NSFR) above 100% to ensure that the traditional mismatches in banks' uses and sources of funds are significantly reduced and they become more resilient in times of liquidity shortages, as during the GFC (see King (2013) for details on this measure).

low interest rate regime they tend to have a stronger preference to invest their funds in longer term debt securities offered by financial institutions over deposits. Hence, it is important to understand the distortionary effects of wholesale funding guarantees. It is possible that guarantees on wholesale funding may pose an even greater moral hazard concern, given that the monitoring of banks by sophisticated creditors in the wholesale funding markets is likely to be more effective than that provided by individual retail depositors. Furthermore, Boyle et al. (2015) provide evidence based on survey responses to show that there is actually greater withdrawal risk for deposits when countries, without prior explicit deposit insurance, introduce deposit insurance schemes during banking crises, which was the case in Australia.

Australia offers a unique setting to study the impact of the introduction of a voluntary wholesale funding guarantee scheme as, up until recently, it was one of only two OECD countries with neither an explicit deposit nor wholesale funding guarantee scheme (New Zealand being the other). When the Wholesale Funding Guarantee Scheme was introduced, banks could choose to participate or not, which allows for cross-sectional as well as time variation. ADIs that chose to participate had to pay a fee of between 70 and 150 basis points that was based on their credit rating or a default price where a credit rating was unavailable. Furthermore, unlike almost every other developed country, different types of deposit-taking institutions – banks, credit unions and building societies in Australia are all covered and supervised by the same regulator, the Australian Prudential Regulation Authority (APRA) and are all subject to the same prudential and legislative requirements. For this reason, Australia affords a rare, natural experiment for an empirical comparison on the impact of both the adoption and removal of a wholesale funding guarantee scheme on financial intermediaries' funding costs, across different ownership structures in deposit-taking institutions.

In the context of the Financial Claims Scheme introduced in Australia for retail deposits during the GFC, Yan et al. (2014) showed that market deposit rates and deposit growth for ADIs became

much less sensitive to bank fundamentals, once the scheme was in place. However, in contrast, relatively little is known about the effects of the WGS on different types of ADIs with heterogeneous funding and ownership structures. To date, there has been a dearth of attention paid to the effect of government guarantees on mutuals, such as credit unions and building societies. Moreover, there has also been no previous study on the effect of introducing a wholesale funding guarantee without any prior deposit insurance already in place nor the exogenous removal of a wholesale funding guarantee scheme after its implementation. Our paper aims to fill these voids in the literature by comparing the effects of the recent introduction of the WGS on commercial banks and mutuals (credit unions and building societies). Our study differs from existing studies on deposit insurance, in that we focus on the effects of explicitly insuring wholesale debt and large-sized deposits.

To establish causality, we apply a difference-in-differences estimator on a total sample of 29 Australian banks, 15 building societies and 196 credit unions, reporting to the prudential regulator, APRA over the period from March 2002 to December 2014. We find strong empirical evidence to indicate that ADIs in general experienced a significant reduction in their funding costs and funding premiums after taking up the WGS. The removal of the guarantee scheme had no effect on the funding costs and funding premiums for all types of ADIs suggesting that the guaranteed ADIs continued to benefit from market perceptions of implicit government support. Importantly, the adoption of the WGS directly reduced market discipline, as the sensitivity of guaranteed ADIs' funding costs to bank risks diminished. Following WGS adoption, we find that whilst bank leverage increased, asset risk did not change significantly.

There are important policy implications emanating from our findings as policy makers need to be mindful of the moral hazard problems associated with offering government guarantees on banks' funding sources to maintain credit provision even in times of stress. There is some evidence to suggest that, had the government guarantee been kept in place for a prolonged period

of time, banks could have been perversely incentivized to become highly levered and used borrowed funds to finance riskier assets. However, it appears that uncertainty regarding the closing date of the government guarantee may have prevented that from developing.

The remainder of the paper is structured as follows: in Section 2 we provide some background into the Australian financial institutions assessed in this paper as well as the Australian Wholesale Funding Guarantee scheme. Section 3 outlines and reviews the related literature. Section 4 presents the data and methodology used. Section 5 reports the main empirical results. Section 6 discusses our robustness checks and Section 7 concludes.

2. Background

2.1 Australian banking sector

The banking sector in Australia is highly concentrated, with four major banks ("the big four") accounting for approximately 88 per cent of all domestic bank assets as of 2014. Apart from the major commercial banks, the banking system also comprises various "other banks" that in the past have had a local concentration in one state or territory. These banks account for approximately ten per cent of all domestic bank assets. Additionally, there are two other categories of ADIs – Credit Unions and Building Societies. When combined together, they only account for approximately two per cent of all bank assets. Credit Unions and Building Societies (also known as mutuals), unlike larger deposit-taking institutions, traditionally focus primarily on retail banking and are still a pivotal source of competition within the retail banking sector. Mutuals differ from commercial banks in that their customers have some ownership in the financial institution. They are not publicly listed companies and are limited in their ability to issue new shareholder equity. Thus, they rely to a greater extent on retained earnings to generate new capital. This differs from publicly listed commercial banks, which can issue new shares to

raise extra capital (Rasmussen, 1988). In Australia, mutuals come under the same legislative and prudential requirements as all other Australian banks.

We exclude foreign branches and subsidiaries in this study as these rely on funding by parent companies overseas as well as transfer costing.

2.2 Wholesale Funding Guarantee

The Australian Government Guarantee Scheme, for deposits greater than AUD 1 million and wholesale funding, was announced in October 2008 and commenced on 28 November in that year. It was introduced in response to the evaporation of liquidity in the global financial system. The scheme was designed to restore financial system stability in Australia and to encourage the ongoing provision of credit by supporting confidence and assisting ADIs to access wholesale funding from international credit markets at a reasonable cost during the time of considerable turbulence and liquidity shortage. The scheme also ensured that Australian institutions were not placed at a disadvantage, compared to their international competitors, who could access similar government guarantees on bank debt. The scheme was administered by the national central bank, the Reserve Bank of Australia for the federal government. Eligible ADIs were able to apply to have their new and/or existing eligible wholesale funding securities guaranteed under the scheme. The scheme was voluntary and subject to an approval process and other conditions, including the payment of a monthly risk-sensitive fee of either 70 (if rated AAA to AA-), 100 (A+ to A-) or 150 (BBB+ and below or unrated) basis points by the ADI on the amounts guaranteed. Following improvements in funding and market conditions, the Australian government closed the wholesale funding guarantee to new borrowings on 31st of March 2010. Outstanding large deposits and wholesale funds guaranteed under the WGS remained guaranteed until their maturity and approximately AUD 160 billion of guaranteed (wholesale) funds remained, with up to 5 years of maturity at the time of the removal (RBA, 2009).

3. Related literature and hypotheses tested

3.1 Determinants of banks' funding costs and funding premiums

The literature on banks' funding costs is comparatively small and includes contributions by Deans and Stewart (2012), Araten and Turner (2013), Berkelmans and Duong (2014), Beau (2014), Babihuga and Spaltro (2014) and Aymanns et al. (2016). These papers identify a number of drivers on banks' funding costs such as banks' asset quality, capital adequacy, funding liquidity, funding mix, and the general state of the macro economy.

Funding costs across financial institutions differ due to ADIs' access to wholesale debt markets. Large ADIs can take advantage of their size, diversification or frequent security issuances to reduce their funding costs (see Kroszner (2016) and Aymanns et al. (2016)). Beau (2014) analyzes direct and indirect costs associated with the issuance of wholesale funding. Deans and Stewart (2012) show evidence for Australia that major banks have a relatively higher proportion of wholesale debt compared to other banks while for credit unions and building societies, deposits make up the bulk of their funding structure. Therefore, the wholesale liabilities ratio is a key factor driving variations in funding costs across banks. Furthermore, Babihuga and Spaltro (2014) investigate marginal funding costs, defined as the sum of the LIBOR rate and bank credit spreads and find that macroeconomic variables also account for much of the variations in bank funding costs.

In terms of funding premiums, which is a measure of the difference between overall funding costs and the cash rate (interest rate for short-term bank deposits with the Reserve Bank of Australia), Deans and Stewart (2012) show that during 2008 and the early part of 2009, funding premiums increase strongly as a result of the GFC. Berkelmans and Duong (2014) document that spreads between funding costs and cash rate narrow marginally after a crisis, reflecting the shifts in the composition of banks' funding liabilities and the narrowing of wholesale debt spreads.

However, both studies are based on aggregate summary statistics rather than a bank-level analysis.

To fill these voids in the current literature on deposit insurance we formulate the following hypotheses to be tested:

H1: Banks that utilised the Wholesale Funding Guarantee Scheme (WGS) were subject to lower funding costs compared to those ADIs that did not.

H2: The removal of the WGS had less effect on banks' funding costs than its adoption due to a continued perceived level of coverage and implicit government support.

3.2 Guarantees and bank risk taking

Banks' shareholders are residual claimants. Equity is similar to a call-option on the asset value (with the debt value as the strike price). The value of the option increases with the variance of the underlying asset value and shareholders thus have an incentive to engage in high risk-taking activities to increase their residual claims at the expense of depositors' funds. However, in mutual institutions, the depositors are also the shareholders. Hence, residual claims are offset by the decrease in fixed claims (interest paid on deposits) and the incentive for mutuals to take higher risk is lower than for non-mutuals. Furthermore, mutuals are also deterred from pursuing risky ventures by their limited capacity to raise new equity capital; they typically rely on retained earnings to generate capital. Thus, capital constraints impede risk-taking (Llewellen and Holmas, 1991). The ability to raise capital from external capital markets gives banks a competitive advantage and in turn makes them more attractive to depositors. Recent banking theories suggest that there is a positive relationship between bank capital and market share (Mehran and Thakor, 2011). The evidence suggests that well-capitalised institutions are able to compete more effectively for deposits (Calomiris and Wilson, 2004). Berger and Bouwman (2013) find that

high levels of capital enhance medium and large US banks' performance, in relation to their resilience (i.e., survival) and market share, primarily during banking crises. This is consistent with most theories predicting that capital enhances banks' survival probabilities. Banks typically argue that holding more capital jeopardises their performance and leads to less credit supply and loss of profit due to increased funding costs. However, incentive based theories predict that higher capital should enhance bank profitability. Holding more capital will either strengthen the bank's incentive to monitor its relationship with borrowers or the bank attenuates assets that elevate the probability of a financial crisis such as risky commercial real-estate loans (Acharya et al., 2011, Allen et al., 2011, Baker and Wurgler, 2013 and Berger and Bouwman, 2013).

The provision of government guarantees and deposit insurance is known to present a moral hazard problem (see Allen et al., 2015a,b for an exposition). There are several studies showing that deposit insurance schemes increase bank risk and also the likelihood of a banking crisis (Barth et al. (2004), Demirguc-Kunt and Detragiache (2004), Ioannidou and De Dreu (2006), Ioannidou and Penas (2010)). Yet, it remains that deposit insurance is a cornerstone of many banking systems, because it helps to protect savers and prevent bank runs. However, it also provides banks with incentives for excessive risk taking because, firstly, it weakens the market discipline carried out by creditors, and secondly, the deposit insurance premium is typically mispriced due to regulators' limited ability to assess risks and to charge risk-adjusted premiums. Some studies provide more specific evidence, for example, Gropp and Vesala (2004) find for a sample of European banks that explicit deposit insurance reduced bank risk during the 1990s whilst Anginer et al. (2014) find for a global sample of banks that deposit insurance generally increases bank risk during normal times, but decreased bank risk during the crisis period from 2007-2009. Ioannidou and Penas (2010) analyze the effect of deposit insurance on the risk-taking behavior using credit registry data and find that banks originate riskier loans without mitigation through collateral or maturities. Gropp et al. (2013) study the removal of a government guarantee

following a lawsuit and find a reduction of risk by the reduction of origination of high risk loans. Furthermore, Black et al. (2014) argue that government guaranteed bank bonds improve debt liquidity, default risk, and reduce the funding costs but do not provide empirical support.

To fill these voids in the current literature on deposit insurance we formulate the following hypotheses to be tested:

H3: Banks took more risk after their adoption of the WGS.

3.3 Deposit guarantees and market discipline

Market discipline is a mechanism through which bank depositors control banks' risk-taking by firstly, changing the level of deposits and/or interest rate demanded (Demirguc-Kunt and Huizinga, 2004). Demirguc-Kunt and Huizinga (2004), Imai (2006) and Ioannidou and Penas (2010) find that explicit deposit insurance gives banks incentives to take added risks because they can capture all profits and shift losses to guarantors. Thus, depositors and shareholders have little incentive to discipline their banks. Consistent with this, Flannery (1998) shows that market discipline weakened in the presence of deposit guarantees in the United Stated during the 1930s. Demirguc-Kunt and Huizinga (2004) compare market discipline across countries with and without explicit deposit insurance schemes in place. They find that explicit deposit insurance reduces the interest rate paid on deposits and lowers market discipline. They also uncover that the specific design features of deposit insurance, such as coverage and funding sources affect market discipline. There have also been several country-specific studies on the adoption of deposit insurance. For instance, Mondschean and Opiela (1999), Ioannidou and De Dreu (2006) and Hadad et al. (2011) examine the effect of adopting explicit deposit insurance schemes in Poland, Bolivia and Indonesia, respectively. These studies compare the market disciplining role of depositors' pre- and post-implementation and they consistently conclude that deposit insurance weakens market discipline.

Karas et al. (2013) apply a difference-in-differences (DiD) estimator to identify the differential effects of deposit insurance on the behavior of insured households and uninsured households. In this way, they can rule out the confounding effect of time-varying factors, thereby providing direct evidence that the introduction of the deposit insurance scheme diminishes the sensitivity of insured depositors to bank risk taking.

Other studies examine the effectiveness of market discipline on Australian banks. Given Australia's lack of a liquid market in long-term commercial debt, earlier studies have focused on the market for certificates of deposits and subordinated debt in assessing market discipline. Dennis et al. (1998) find that the risk spread on banks CDs is closely related to risk as measured by bank capital and liquidity. Esho et al. (2005) provide evidence of market discipline in the subordinated debt market. However, the efficiency of market discipline may be affected, by implicit guarantees, particularly for Too-Big-To-Fail (TBTF) banks. These banks benefit from a widespread public belief that large banks will ultimately be rescued and bailed out by governments in a crisis (see e.g., Acharya et al., 2014). The TBTF status of Australia's major banks creates an implicit federal government guarantee of the non-deposit liabilities of those banks even in the absence of any explicit deposit guarantees (FSI, 2014).

Our study is related to that of Yan et al. (2014) who examine the introduction of the general deposit funding guarantee in Australia and the interaction between deposit insurance and market discipline. They show that market deposit rates and deposit growth for ADIs became much less sensitive once the deposit scheme was in place. Our study delineates from their work in that we explicitly focus on the individual bank's participation choice in the government guarantee which ADIs had to purchase to cover their wholesale funding and large deposits and not the insurance on retail deposits, which required no bank participation and hence deposit premium as part of the Financial Claims scheme.

Furthermore, to our best knowledge no previous study analyzes the removal effect of a deposit guarantee scheme. Such a removal may have a limited impact on bank funding costs and funding premiums for two reasons. First, the removal has a transitionary impact on bank wholesale funding as the guarantee is in place until the funding matures, which may be well past the expiration date of the guarantee. Second, banks may benefit from explicit guarantees (like the WGS) as well as implicit government guarantees. The introduction of the WGS and its subsequent removal is likely to increase the market perception that government guarantees are available in the future for financial institutions in distress.

To fill these voids in the current literature on deposit insurance we formulate the following hypotheses to be tested:

H4: Market discipline was reduced after the banks' adoption of the WGS.

4. Empirical framework

The decision to participate is voluntary and banks that chose to participate may have had special characteristics (compare Figure 2 and Figure 3) and our results may be biased by this selection process. Therefore, we implement a two stage model throughout. In a first stage, we model the probability to participate in the WGS and compute the Inverse Mills Ratio (IMR). We control for the IMR in all in our second stage models and employ a difference-in-differences estimation approach to analyze the various hypotheses. All models are based on standard errors clustered at the bank level. Using a difference-in-differences estimation we can observe the impact on the "treated" (insured) ADIs both before and after the WGS treatment. All panel regressions in this study are estimated using Ordinary Least Squares (OLS).

4.1 Control for WGS selection

More formally, banks participate voluntarily in the WGS and we model the probability to participate in the WGS by a Probit model with standard errors, which are clustered at the bank level:

$$P(WGS_{it} = 1) = \phi(\vartheta X_{it}) \quad (1)$$

We compute estimate the Inverse Mills Ratio as follows:

$$\mathrm{IMR_{it}} = \frac{\phi(\vartheta \mathrm{X_{it}})}{\Phi(\vartheta \mathrm{X_{it}})}, \quad (2)$$

With the marginal density function of the standard normal distribution $\phi(.)$ and the cumulative density function of the standard normal distribution $\Phi(.)$. X_{it} is a vector of bank characteristics controlling for the participation. In a second step, we include the Inverse Mills Ratio (IMR) as a control variable in the models testing our research hypotheses.

4.2. Test of the adoption of the WGS guarantee

The following difference-in-differences equations are formulated to test the Wholesale Funding Guarantee's impact on ADIs' funding costs:

$$FundingCost_{it} = \alpha(WGS_i * AfterGar_t) + \beta WGS_i + \gamma AfterGar_t + \delta X_{it} + \theta IMR + \varepsilon_{it} \quad (3)$$

where *i* indicates the individual ADIs and *t* indicates each time period. We test three distinct measures for bank funding costs: (i) the average funding costs as the ratio of interest expense relative to total liabilities, (ii) the funding premiums as the difference between average funding costs and the cash rate (i.e., a proxy for the risk-free interest rate), and (iii) the rate sensitive funding costs as the ratio of incremental interest expenses paid on new liabilities to new liabilities.

WGS is an indicator variable that takes the value of one, for the ADIs that chose to take up the guarantee and the value of zero, for the ADIs that did not. *AfterGar* is also a dummy variable that takes the value of one for the period after the guarantee was introduced, and takes the value of zero for the period before the guarantee. *WGS*AfterGar* is our difference-in-differences operator that shows the effect of the guarantee on the insured ADIs, after it was introduced. X_{it} is a vector of bank-specific and macroeconomic control variables. *IMR* is the Inverse Mills Ratio from our first stage regression which is included to account for the selection bias created by banks' voluntary adoption of the WGS.

$\alpha, \beta, \gamma, \delta, and\ \theta$ are the respective parameters that indicate the sensitivities of test and control variables with regard to the dependent variable. Note that the control variables have a parameter vector δ.

The difference-in-differences models do not allow bank or time fixed effects due to multi-collinearity as *AfterGar* conflicts with the time dummy and *WGS* with the bank dummy.

4.3. Test of removal of the guarantee

As Australia is the only country that has subsequently removed a wholesale funding guarantee after a period of time, we take advantage of this natural experiment to assess the removal effect

of the guarantee on ADIs' funding costs. We introduce the variable *RemovalGar* into regression and estimate the following model:

$$FundingCost_{it} = \alpha(WGS_i * RemovalGar_t) + \beta(WGS_i * AfterGar_t) +$$

$$\gamma RemovalGar_t + \pi AfterGar_t + \vartheta WGS_i + \delta X_{it} + \theta IMR + \varepsilon_{it} \quad (4)$$

In regression models in Equations (4), the variable *WGS* is the same as in the Equation (3), taking the value of one for ADIs that voluntarily adopted the wholesale funding guarantee and zero otherwise. The newly introduced variable *RemovalGar,* takes the value of one for the periods after the removal of the guarantee and the value of zero for the periods before and during the guarantee. The variable *RemovalGar* allows us to incorporate both removal effect and adoption effect in one regression.

The independent variables and their parameters in Equation (4) are identical to Equation (3).

4.4. Test of bank risk taking

We test the risk taking of banks using the following model:

$$RiskTaking_{it} = \alpha(WGS_i * AfterGar_t) + \beta WGS_i + \gamma AfterGar_t + \delta X_{it} + \theta IMR + \varepsilon_{it} \quad (5)$$

We apply three proxies for bank risk taking: (i) leverage as the ratio of total liabilities to total assets, (ii) *Z-score* as the ratio of sum of the four-quarter averaged return on assets (*ROA*) and the capital adequacy ratios (*CAR*) to four-quarter standard deviations of *ROA*, and (iii) the risk weighted assets (*RWA*) as the ratio of risk weighted assets to total assets.

We note that capital adequacy ratio is highly correlated with leverage ratio, Z-score and RWA ratio, so in equation (5), we exclude CAR in the vector of control variables (X_{it}). Other independent variables and their parameters in Equation (5) are identical to Equation (3).

4.5 Test of the impact of the WGS on market discipline

The second set of regressions that we run are formulated to test the impact of bank capital and liquidity (*test*) on ADIs' funding costs after they were guaranteed:

$$FundingCost_{it} = \alpha(test_{it} * WGS_i * AfterGar_t) + \beta\left(test_{it} * WGS_{i_t}\right) + \gamma(test_{it} * AfterGar) + \delta(WGS_i * AfterGar_t) + \theta WGS_i + \mu AfterGar_t + \rho X_{it} + \tau IMR + \varepsilon_{it} \quad (6)$$

In Equation (6), we follow Equation (3) and test three distinct measures for bank funding costs: (i) the average funding cost as the ratio of interest expenses relative to total liabilities, (ii) the funding premiums as the differences between average funding costs and cash rate, and (iii) the rate sensitive funding costs as the ratio of incremental interest expenses paid on new liabilities to new liabilities. We test the sensitivity of two test variables on funding costs: the capital adequacy ratios (*CAR*) and liquid assets ratio (*LAR*). *WGS* is a dummy variable that is one for the ADIs that chose to take up the guarantee and is zero for the ADIs that did not. *AfterGar* is a dummy variable that is one for the period after the guarantee was introduced, and is zero for the period before the guarantee. *WGS*AfterGar* shows the effect of the guarantee on the funding costs after it was introduced. $test_{it} * WGS_i$ shows the effect of the test variables, either capital or liquidity, in relation to funding costs for the ADIs that entered into the guarantee. $test_{it} * AfterGar_t$ shows the effect of either capital or liquidity for the period after the guarantee was introduced.

$test_{it} * AfterGar_t * WGS_i$ is our difference-in-differences operator that shows the effect of either capital or liquidity for the banks that entered into the guarantee after the guarantee was introduced. X_{it} is a vector of bank-specific and macroeconomic control variables.

$\alpha, \beta, \gamma, \delta, \theta, \mu, \rho, \tau$ are the respective parameters that indicate the sensitivities of test and control variables with regard to the dependent variable. Note that the control variables have a parameter vector ρ.

4.7. Robustness checks: bond yield spread analysis

As a robustness check, we collect the bid and ask yields at origination of all bonds issued by Australian ADIs. We observe 217 bonds in total: 120 bonds are observed outside the WGS period and 97 bonds during the WGS period. During the WGS period, we observe 30 bonds that are guaranteed (information provided by the Reserve Bank of Australia) and 67 bonds are not guaranteed. We compute the bid ask spread as a measure for liquidity risk and the yield spread above the US treasury rate of equal maturity as all bonds were issued in US dollars.

In a first stage, we estimate the propensity of issuing a WGS guaranteed bond:

$$P(WGS_{it} = 1) = \phi(\delta X_{it}) \tag{7}$$

In a second stage, we control for the IMR and test the impact of WGS participation on the wholesale funding costs:

$$FundingCost_{it} = \alpha(WGSBond_i) + \beta Period_t * + \gamma B_{it} + \delta X_{it} + \theta IMR + \varepsilon_{it} \tag{8}$$

In Equation (8), the funding costs are measured by the bond yield spreads as the differences between mid-yields at issuance and the US treasury rates of equal maturity. The dummy variable *WGSBond* takes the value one if bonds are guaranteed by the WGS and takes value of zero if otherwise. $Period_t$ is a vector of variables that indicate four different periods: i) pre-guarantee, the first half of the guarantee period, the second half of the guarantee period and post-guarantee. B_{it} is a vector of bond-specific factors and X_{it} is a vector of bank-specific factors. Again, IMR is the Inverse Mills Ratio generated from guaranteed bond selection model in Equation (7) following Equation (2). Note that contrary to the bank models presented in prior sections (panel data) we analyze bond origination data and are unable to apply a difference in difference model due to multi-collinearity.

5. Empirical results

5.1 Data

In this paper, we analyze a total of 240 ADIs comprising 29 Australian banks (out of these, there are four major banks with 88 per cent of all domestic bank assets), 15 building societies, and 196 credit unions. The sample period that we study is from March 2002 to December 2014. The data is provided by APRA and submitted by ADIs to APRA at a quarterly frequency. The data includes information from bank balance sheets and profit and loss statements and measures of risk weighted capital adequacy. Information in relation to ADIs' specific balance sheet figures are collected periodically, however, only part of this information is published in their annual reports. For this reason information contained in our dataset is more detailed than annual report data. There is also a greater cross-sectional consistency as the data submission is subject to APRA's reporting standards common to all ADIs.

We collect the list of banks that participated in the WGS from the Reserve Bank of Australia. In this paper, we analyze three sub-samples of ADIs: i) pooled sample, ii) pooled sample excluding major banks, iii) mutuals (credit unions and building societies combined). These sub-samples are based on the consideration of participation rates in the WGS. Whilst the WGS was in effect, the participation rate was 27% of all ADIs in the pooled sample. As most Australian banks chose to adopt the WGS, we do not separate them into an individual sub-sample but rather we analyze the pooled sample with and without the major Australian banks. We are unable to run subsample regressions for major banks individually as they all made use of the wholesale funding guarantee, rendering no control group. We analyze the mutuals as a separate sub-sample as the participation rate for mutuals is comparatively small with only 19% of all building societies and credit unions taking up the WGS whilst it was in effect.[3]

Furthermore, we have analyzed the economic rationale for guaranteeing bond issuances in a robustness check by analysing the yields to maturity at origination of bonds issued before and during the WGS. We map the Moody's credit rating of each ADI at the time of WGS participation to the fee that ADIs had to pay for coverage under the WGS. The fee for ADIs to have their wholesale funds insured under the WGS was 70 basis points for ADIs rated AA- or higher, 100 basis points for ADIs rated between A- and A+, and 150 basis points for ADIs rated BBB+ or below, as well as for unrated ADIs (RBA, 2009).

Table 1 provides definitions of the variables used in this study.

< Insert Tables 1 here >

[3] As the potential impact of the WGS would depend on the extent to which ADIs relied on the scheme, we also have tested the maximum amount of the wholesale liabilities that was covered for each ADI (relative to their total assets) as a measure of their wholesale funding guarantee utilisation by replacing the WGS dummy variable by the utilisation ratio. The utilisation ratio is the ratio of guaranteed liabilities to all liabilities (i.e., bounded between zero and one) and the results are comparable to the WGS dummy.

5.1.1 Dependent variables: bank funding costs

Figure 1 describes the ADIs' average funding costs, funding premiums and rate sensitive funding costs over time. The WGS period is highlighted by the grey shaded area.

< Insert Figure 1 here >

The rate sensitive funding costs are based on the liabilities repriced within the next quarter and all liabilities. This information is only available since 2008 and we restrict all models using this variable as dependent variable to this period resulting in a lower number of observations.

Figure 1 shows the funding costs over time. The funding costs are also based on monetary policy (interest rate levels set by the Reserve Bank of Australia) which is why we control for the cash rate prevailing in the economy in the results for funding premiums. Bank funding premiums (funding costs relative to cash rate) were fairly stable but started to decline from 2006 in the lead up to the GFC as the market's risk appetite increased. There is a significant run-up in the funding costs faced by ADIs in the lead up to the height of the GFC. The implementation of the WGS may have helped ADIs to significantly reduce their funding costs. It should be noted that whilst the WGS was in place, ADI funding costs on average even reverted to their 2002 levels. With the help of quantitative easing around the world, in more recent years, ADIs' funding costs have reached new lows, while the funding premiums continued to rise. The rate sensitive funding costs are of a leading nature but similar to the average funding costs indicating a low average remaining maturity of wholesale funding.

5.1.2 Bank funding costs by WGS participation

Figure 2 describes ADIs' funding costs by participation in the WGS. It can be seen that banks that participated in the WGS have on average higher funding costs:

< Insert Figure 2 here >

Whilst the funding costs for ADIs that took up the WGS and those that did not moved closely together throughout the whole sample period, the difference in their funding costs were visually reduced whilst the WGS was in place, indicating that the WGS provided ADIs with a significant competitive advantage relative to those that did not take up the WGS. Although the gap in funding costs expanded briefly after the removal of the WGS, it has subsequently narrowed with the monetary easing implemented around the world. Even though existing guarantees remained in place until maturity after the WGS was removed, the funding costs advantage was substantially reduced. The difference of funding costs between participating and non-participating banks indicates the necessity to control for the selection of WGS participating banks.

Table 2 displays descriptive summary statistics before the implementation of the WGS. Statistics are provided for subsamples of the pooled sample of all ADIs, the pooled sample excluding major banks, and the sample that contains only mutuals.

< Insert Tables 2 here >

The funding premiums before the guarantee were negative for all ADIs, suggesting that average funding costs during that period were significantly lower than the cash rate. The funding costs for mutuals are relatively lower than for the pooled sample and for the pooled sample excluding major banks, which is reasonable because the funding structure for mutuals comprises approximately 95% deposits and 5% wholesale liabilities, while for Australian banks, the funding mix normally comprises 65% retail deposits and 35% wholesale liabilities. We control for these aspects by including the wholesale liabilities ratio (WLR) in all models.

Table 3 provides summary statistics after the introduction of the WGS separately for ADIs that did not take up the guarantee (WGS=0) and those that did (WGS=1).

< Insert Tables 3 here >

In Table 3, it can be seen that for all sub-samples, after implementation of the guarantee scheme, funding costs of ADIs that entered into the WGS were higher than for ADIs that did not. The reason for this is that, generally speaking, banks with a higher WLR and higher funding costs have a higher participation rate. Funding premiums of ADIs that chose to participate in the WGS were positive while funding premiums for those that did not participate were negative. Negative funding premiums imply that banks fund themselves at average interest rates which are less than the RBA cash rate. This is usually the case if the retail deposit funding is large in relative terms.

5.1.3 Control variables: bank characteristics and macroeconomic variables

Following the existing literature on bank funding costs, we include several accounting ratios as our independent variables which measure the amount of institutional (bank specific) risk. We control for the capital adequacy ratio (CAR) which is the amount of eligible Tier 1 and Tier 2 capital relative to total assets. We expect that the capital adequacy ratio would be negatively related to the banks' funding costs as a strong capital base is a financial safety net provision and that the ratio signals a lower level of default risk. Besides, we also control for liquidity risk and credit risk by using the liquid assets ratio (LAR), which is a ratio of cash and liquid assets relative to total assets and annualised loan loss provisions (LLP) measured as the provisions for bad and doubtful debts divided by total assets. We include the wholesale liabilities ratio (WLR) for wholesale funding relative to total liabilities as a control variable to account for differences in institutional size and funding structures. Large institutions, such as the major banks, may have access to different sources of wholesale funds, and consequently, exhibit different trends in their funding costs. We also include the size of ADIs as the natural logarithm of total assets. Larger banks are perceived to be less risky due to their greater diversification in asset holdings and funding sources. Furthermore, larger institutions are Too-Big-To-Fail, because these large institutions impose significant negative externalities if they are to fail and are more likely to be

rescued if faced with financial difficulties (Flannery and Sorescu, 1996, Park and Peristiani, 1998 and Yan et al., 2014). In the context of our research, we do not include a dummy variable for too-big-to-fail banks because of a multicollinearity problem between the participation indicator (WGS) and a TBTF indicator as all four Australian major banks participated in the guarantee scheme. Furthermore we do not control for the RWA ratio as it is highly correlated with CAR and we do not control for bank profitability (e.g., ROA) as it is related to the dependent variable funding costs.[4]

In terms of macroeconomic factors, we use the real gross domestic product growth rate (GDP) to proxy for economic conditions. As one of our dependent variables, funding premiums, takes into account the effect of monetary policies by taking out the cash rate prevailing in the Australian economy from overall funding costs, we choose not to include other market interest rates in our regressions. An inclusion of interest rates in the models for average funding costs and rate sensitive funding costs results in comparable models.

5.2 Regression results

Our results are divided into three parts. Firstly, we examine the effect of WGS participation on funding costs in relation to all types of ADIs, ADIs excluding major banks and mutuals by examining their average funding costs, funding premiums, and rate sensitive funding costs. Secondly, we investigate the impact of the WGS removal. Finally, we study the link between the WGS and bank risk taking as well as market discipline.

[4] However, the results are comparable when we include these terms in unreported tests, which are available upon request.

5.2.1. Adoption of WGS

Table 5 shows the parameter estimates of the selection model from Equation (1):

< Insert Table 5 here >

We find that large banks, banks with a greater wholesale liability ratio (WLR) and banks with a lower rating have a higher likelihood of participating in the WGS.

Table 6 reports the effect of the WGS on the different subsamples of ADI funding costs according to Equation (3) and controlling for the Inverse Mills Ratio (IMR) from Equation (2). We run these regressions multiple times for different subsamples of ADIs. Initially, we run a pooled regression, where all ADIs in our sample are included. We then run separate regressions for all ADIs in our sample excluding major banks and finally for mutuals (credit unions and building societies combined).

< Insert Table 6 here >

The *AfterGar* coefficients show that the average funding costs, and rate sensitive funding costs reduced after the WGS as the parameter estimate is negative and significant, while the WGS estimate is positive and significant indicating that the funding costs are generally higher for banks that participated in the WGS.

Most importantly, there is a noticeable difference in the DiD coefficient (*WGS* AfterGar)* for the pooled sample, pooled sample excluding major banks and mutuals. The negative and significant estimate of *WGS*AfterGar* suggests that banks that took up the guarantee scheme had lower funding costs relative to ADIs that did not take up the guarantee scheme

5.2.2. Removal of the WGS

Table 7 shows the estimates for Equations (4). We include the variable *RemovalGar* that takes the value of one for the periods after the removal of the guarantee and the value of zero, for the periods before and during the guarantee.

< Insert Table 7 here >

The result on the impact of the removal of the guarantee scheme is shown in Table 7. For all funding cost measures and data sub-segments, it can be observed that the estimates of the DiD estimator, *WGS*RemovalGar*, are insignificant. This indicates that unlike the decision to participate, the removal of the guarantee had no significant impact on ADIs' funding costs and funding premiums. This can be attributed to the fact that a large amount of wholesale funds remained insured until maturity (subject to a maximum period of five years), even after the removal of the guarantee. Moreover, the market potentially believed that an implicit government guarantee extended beyond the removal of the WGS.

5.2.3. Bank Risk Taking

Figure 3 compares the leverage by WGS participation over time.

< Insert Figure 3 here >

Leverage increase for WGS participating banks throughout the sample period highlighting the necessity to control for the selection of WGS participating banks.

Table 8 shows the parameter estimates for Equation (5)

< Insert Table 8 here >

We analyze three measures for bank risk taking: (i) bank leverage, (ii) Z-score, and (iii) risk-weighted assets ratio (RWA).

With regard to bank leverage, the *WGS*AfterGar* estimates are positive and significant for pooled sample and for pooled sample excluding majors, suggesting that banks increased financial risk after adoption of guarantee scheme. However, *WGS*AfterGar* is insignificant for mutuals, indicating that the WGS has no impact on leverage of mutuals. This is most likely due to the differences in their funding structure and business model, as building societies and credit unions typically rely less on wholesale funds and more on deposit funding from members as their primary source of funding.

The regression on Z-score and RWA show all insignificant coefficients of *WGS*AfterGar,* meaning that the WGS has no effects on assets quality or variation of profitability. This may partially be explained by a greater allocation of residential mortgage loans following increases in Australian house prises after the WGS period.

5.3.2. Interaction with bank capital and bank liquidity – market discipline tests

In this section, we determine the impact of the WGS on the significance of bank capital (Capital Adequacy Ratio, CAR). The results in Table 9 show the parameter estimates for Equation (6) and report the interaction of the WGS with the CAR and its impact on the dependent variables, average funding costs, funding premiums, and rate sensitive funding costs.

< Insert Table 9 here >

During the turbulent GFC period after the introduction of the guarantee ADIs were subjected to an increase in relative funding costs. As a bank's capital is a financial safety net provision, the literature has shown that when an ADI increases its capital, it is subject to lower funding costs (Yan et al., 2014). On the other hand, *CAR*WGS*AfterGar* is our DiD estimator with respect to capital. This coefficient shows the effect of an increase in capital after the guarantee was introduced for treated ADIs. The estimate for *CAR*WGS*AfterGar* shows that funding costs for

insured ADIs were no longer sensitive to capital levels after the implementation of the WGS. However, for mutuals, *CAR*WGS*AfterGar* are positively significant in all regressions, indicating that capital levels were less significant for mutuals. Market discipline was significantly weakened for banks but much less so for mutuals.

Table 10 shows the parameter estimates for Equation (6) and reports the interaction of WGS with bank liquidity (Liquid Assets Ratio, LAR).

< Insert Table 10 here >

Again, we expect liquidity has a negative relationship with funding costs.

However, looking at the interaction term of *LAR*WGS*AfterGar*, the insignificant coefficients of all *LAR*WGS*AfterGar* terms show that funding costs for insured ADIs are no longer sensitive to bank liquidity after the implementation of the WGS. In summary, market discipline is reduced for WGS participating banks.

5.4 Robustness check: bond yield spreads

To further improve our identification strategy, we analyze individual bond issues before, during and after the WGS period. Figure 4 shows the range of bond yield spreads over time using box plots. The ranges of the blue boxes indicate the 10^{th} percentile and 90^{th} percentile of yield spreads while the top and bottom of whiskers represent for the highest and lowest yield spreads.

< Insert Figure 4 here >

Table 4 shows the summary statistics for our bond data during the guarantee period and over the full sample period.

< Insert Table 4 here >

We analyze 217 bonds issued by six Australian banks from 2008 to 2012. The bond yield spreads during the WGS are significantly lower than the average during the full sample period. Of these, 30 bonds issued by ADIs were insured by the WGS.[5]

All bond spreads relate to bank issuers with a rating of A3 by Moody's (respectively A- by Standard and Poor's) or better. The dispersion of yield spreads as indicated by the box plots is higher during the WGS period than before and after the WGS period. This is a reflection of the greater uncertainty during this period and the greater risk dispersion caused by the WGS introduction (lower risk for guaranteed bonds and higher risk for non-guaranteed bonds).

Table 11 analyzes the likelihood of seeking a WGS guarantee for a bond issue according to Equation (7):

< Insert Table 11 here >

The model controls for bond features such as market liquidity (bid-ask spread), maturity and the issuance amount, as well as characteristics of the issuing bank like CAR, LAR, LLR and WLR. It can be seen that banks with a higher wholesale liabilities ratio (WLR) have a higher propensity for their bonds to be guaranteed by the WGS.

Note that we do not control for issuer rating because the bond sample only has six Australian banks allocated in two neighbouring categories of ratings (Aa and A). From this model we compute the Inverse Mills Ratio (IMR) following Equation (2). Table 12 shows the estimates for the second stage model controlling for the Inverse Mills Ratio.

< Insert Table 12 here >

We run two regression models for bond yield spreads: the first model considers the standalone effect of the WGS on bond yield spreads and the second one controls for period fixed effects.

[5] The Reserve Bank of Australia provides a list of bond issues that were guaranteed by the WGS.

Model 1 shows that yield spreads for bonds insured by the WGS were significantly lower by an average of 57 basis points than bond yield spreads for non-guaranteed bonds. Model 2 shows the same result in that yield spreads for bonds insured by the WGS are significantly lower than yield spreads for non-guaranteed bonds. Model 2 also shows the impacts of each single period before, during and after the implementation of the guarantee scheme using four indicator variables. *PreWGS* indicates the three quarters prior to the adoption of the guarantee scheme and shows a positive and significant effect on bond yield spreads. During the first half of the WGS period, bond yield spreads were significantly reduced, which is supported by the negative and significant coefficient of *H1WGS.* In the second half of the guarantee scheme, banks seeking the government guarantee benefitted even more with their bond yield spreads dropping further, supported by a negative and significant coefficient of *H2WGS,* which is greater than the *H1WGS* coefficient in absolute terms. In the last three quarters after the closing of the guarantee scheme, bond yield spreads did not change much, as indicated by the insignificant coefficient of *PostWGS*. This also confirms our findings on the removal effect of the WGS, suggesting that the removal of the guarantee had no effect on banks' funding costs.

Furthermore, we are interested in the relative incentive of banks to guarantee their bond issues using the WGS. Table 13 quantifies the relative benefit of banks issuing bonds using the WGS.

< Insert Table 13 here >

The gross implied reduction in bond yield spreads for guaranteed bonds is computed by the standalone reduction of guaranteed bond yield spreads (estimate of *WGSBond)* plus the reduction by period effects in Model 2 of Table 12. We compute the gross implied reduction in yield spreads for two distinct sub-periods during the guarantee scheme. During the first half of the WGS period, bonds issued by guaranteed banks benefited by reducing the yield spreads as the sum of *WGSBond* and *H1WGS.* Similarly, if guaranteed bonds were issued in the second half of the WGS period, yield spreads were decreased by the sum of *WGSBond* and *H2WGS*.

The average fee paid on guaranteed bonds was computed by mapping bonds covered by the WGS and the fee paid on those bonds based on the issuer rating. The net benefit for guaranteed bonds is the difference between the gross implied reduction in yield spreads and the average fee paid. It can be seen that banks paid approximately 4.59 basis points less if a bond was issued in the first half of the WGS period but this benefit increased to 37.24 basis points for bonds issued in the second half of the WGS period. Hence, our security-level analysis lends further evidence to support that the government guarantee helped banks to significantly reduce their funding costs.

6. Conclusions

In this study, we investigate whether the recent introduction of the WGS by the Australian government, following the GFC, had consequences on the funding costs of banks. Firstly, we empirically examine the impact of WGS participation and guarantee removal on different types of deposit-taking institutions' average funding costs, funding premiums, as well as rate sensitive funding costs. Secondly, we analyze the effects of the removal of the WGS on bank funding costs. Thirdly, we analyze the impact of the WGS on bank risk taking and market discipline in relation to bank capital and bank liquidity.

We provide strong empirical evidence to indicate that Australian banks entering into the guarantee experienced a significant reduction in their funding costs and funding premiums. In contrast, we show that the subsequent removal of the guarantee did not result in a reduction of funding costs. Furthermore, we find greater risk taking after WGS participation in terms of bank leverage but not in terms of an increase in risk-weighted assets. This may partially be explained by a re-allocation of bank lending activities to residential mortgage loans following increases in house prises after the WGS period. Market discipline is reduced in the presence of a government guarantee showing market distortionary effects of government interventions consistent with the theoretical predictions of Allen et al. (2015a).

An analysis of guaranteed and non-guaranteed bonds confirms that the government guarantee reduced the funding costs of banks. Our findings support the economic rationale of banks participating in the WGS given the costs of the government guarantee were not fully internalized by the ADIs.

Our findings are important for policy makers in two ways: firstly, our results show the efficacy of the WGS. The introduction of the wholesale funding guarantee was effective in securing funding at a reasonable cost as it supported consumer confidence, by lowering actual and perceived risks, which in turn led to a reduction in bank funding costs. However, we found that the removal of the guarantee scheme had no effect on ADIs' funding costs, which is a unique finding as to our best knowledge, there has been no previous study on the effect of the removal of any wholesale funding guarantee scheme in the world, especially in a setting without prior provision of any government guarantees for banks. This suggests that the effects of the WGS may continue to persist in the form of implicit government guarantees. Secondly, as the adoption of the guarantee may have led to greater leverage and a reduction in market discipline from fund suppliers, it highlights the fact that sound regulation is required to restrict the moral hazard problem that is associated with a wholesale funding government guarantee. The funding costs of insured ADIs became less sensitive to bank capital and bank liquidity levels during the WGS period. Future research on government guarantees should focus on the ways in which removal of government guarantees can be least disruptive for banking systems.

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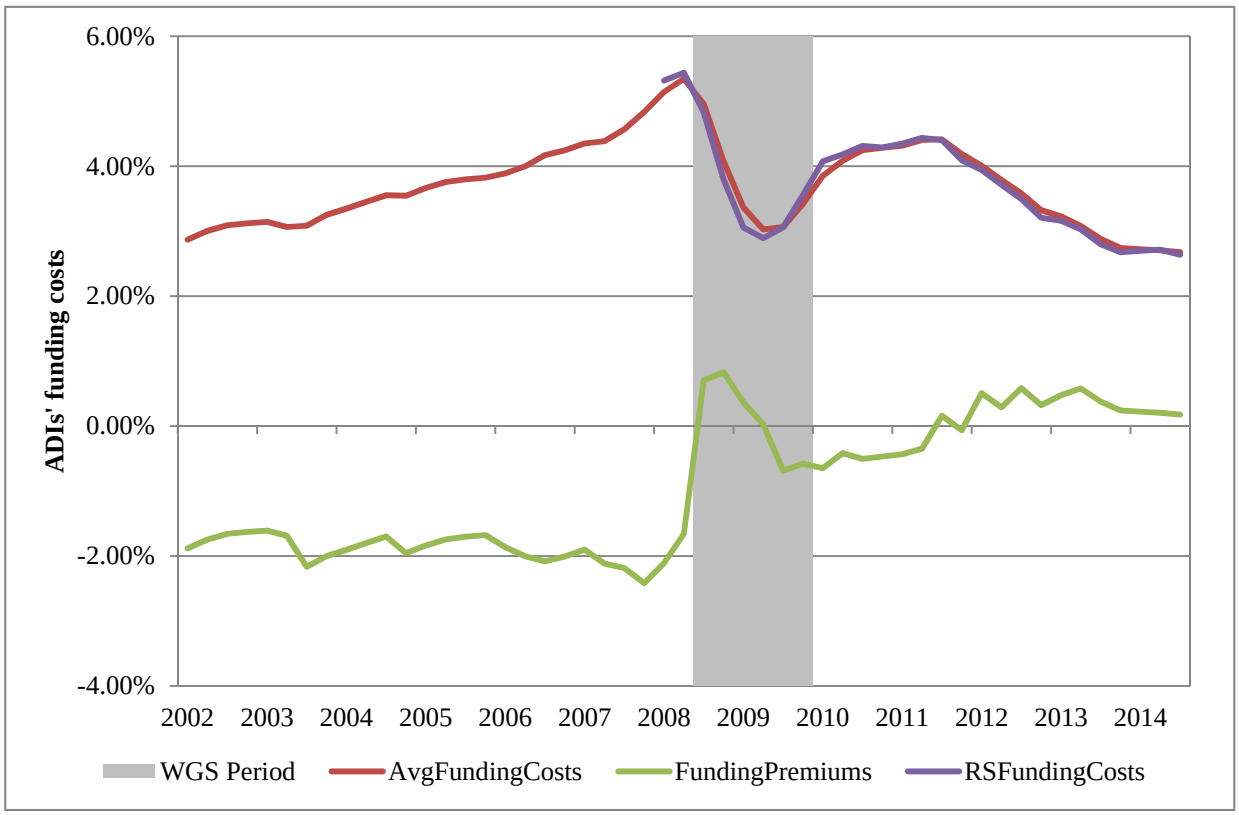
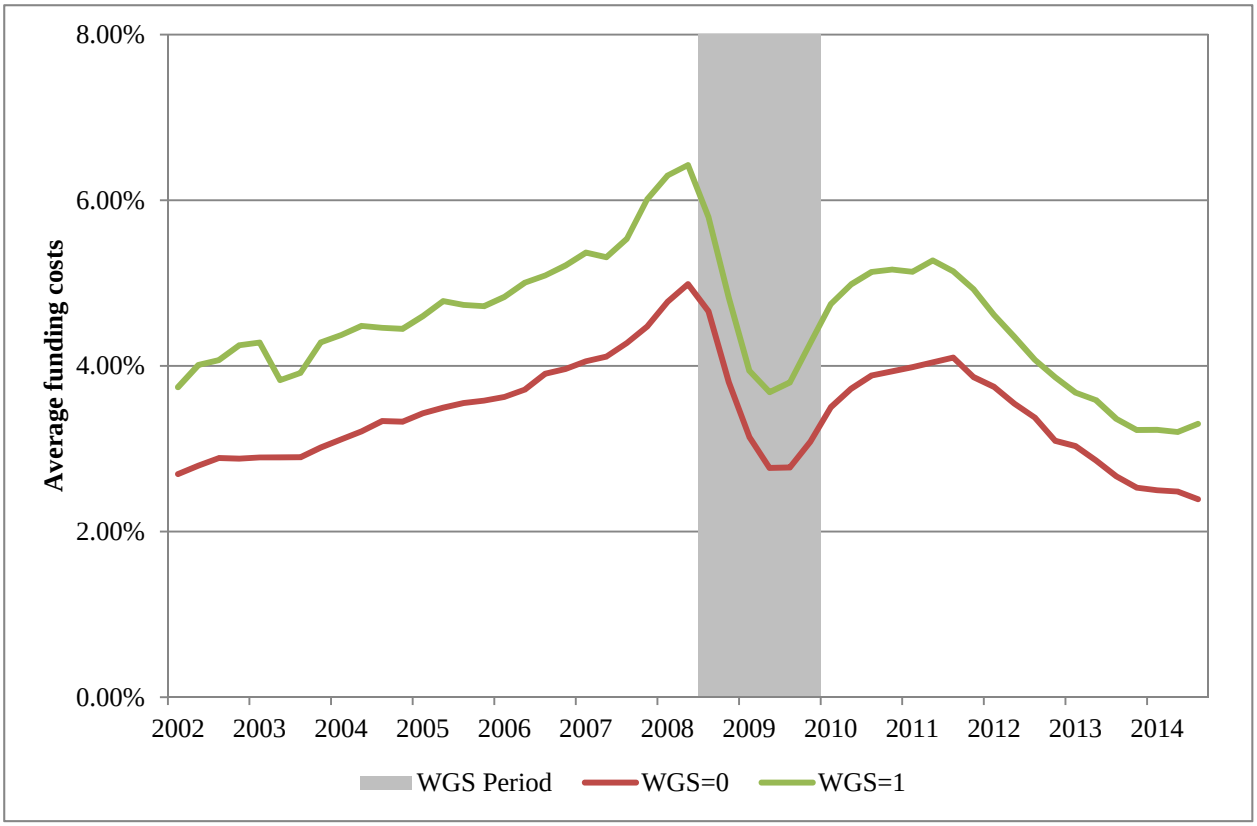
Figures

Figure 1: Average funding costs, funding premiums and rate sensitive funding costs



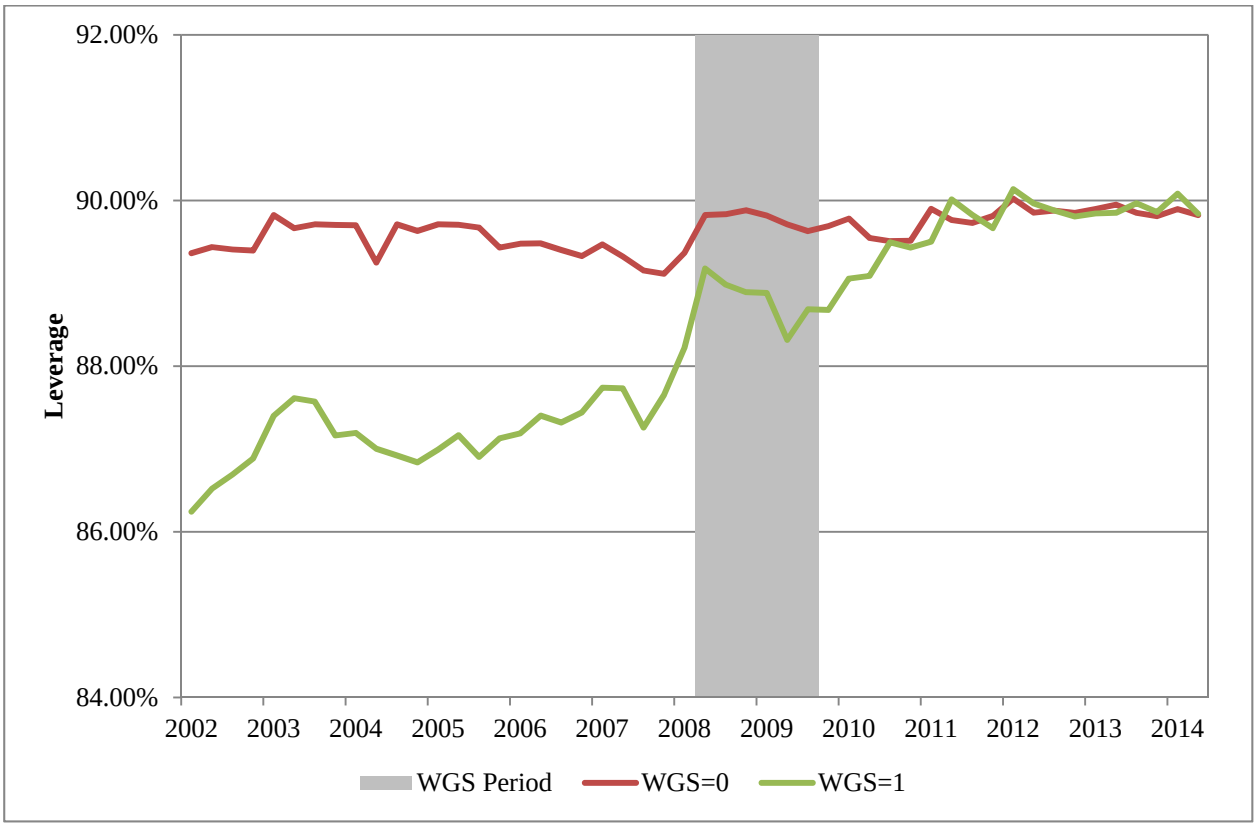
This figure shows the annualised average funding costs (AvgFundingCosts), funding premiums (FundingPremiums) and rate sensitive funding costs (RSFundingCosts) over time. AvgFundingCosts is the ratio of annual interest expenses to total assets, FundingPremiums is the difference between average funding costs and the cash rate and RSFundingCosts is the ratio of incremental interest expenses paid on new liabilities relative to new liabilities. AvgFundingCosts and FundingPremiums data is available at the quarterly frequency from 2002 to 2014. RSFundingCosts data is available at the quarterly frequency from 2008 to 2014. The grey bar indicates the WGS period from November 2008 to March 2010.

Figure 2: Average funding costs by WGS participation



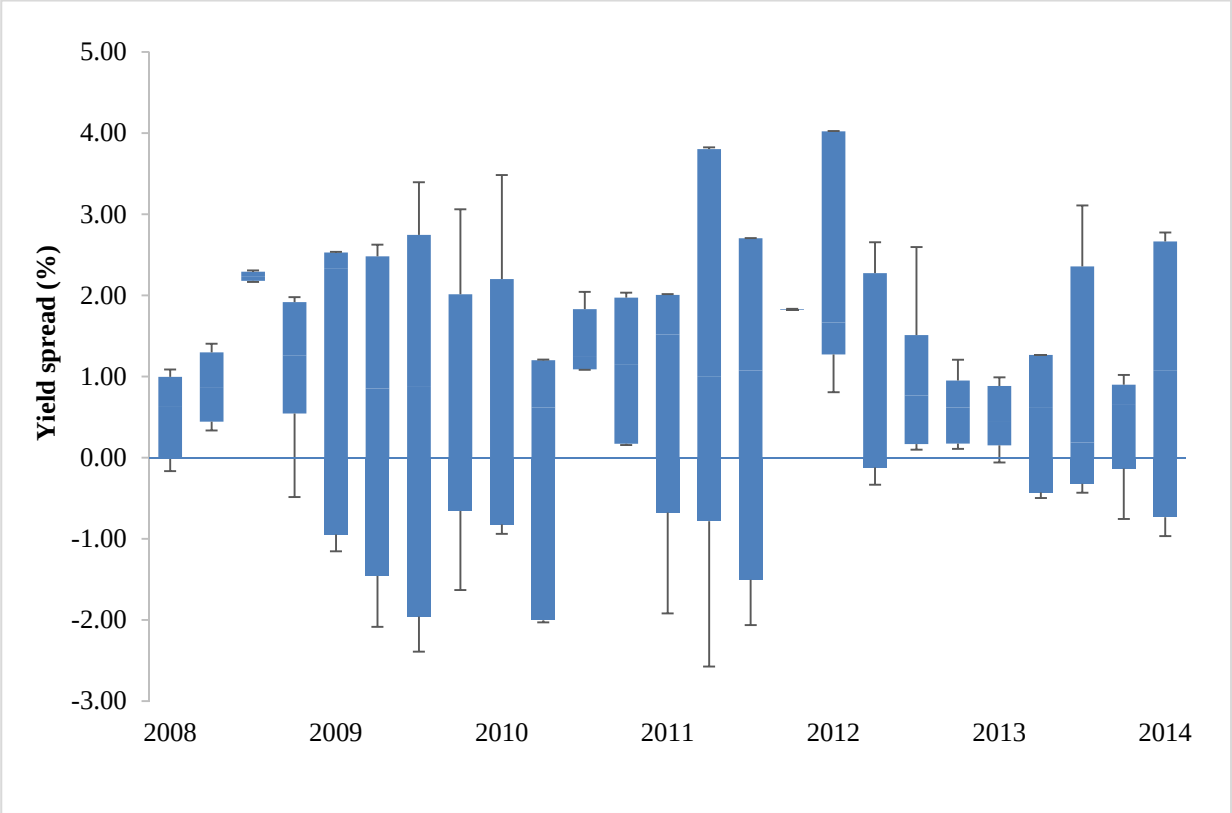
This figure shows the annualised average funding costs separately for ADIs accessing the WGS (WGS=1) and for those that did not (WGS=0). The grey bar indicates the WGS period from November 2008 to March 2010.

Figure 3: Leverage by WGS participation



This figure shows bank leverage over time for ADIs accessing the WGS (WGS=1) and for those that did not (WGS=0). The grey bar indicates the WGS period from November 2008 to March 2010.

Figure 4: Robustness check: bond yield spreads



This figure shows the quarterly bond yield spreads at issuance from 2008 to 2014. The ranges of the blue boxes indicate the 10th percentile and 90th percentile of yield spreads while the top and bottom of whiskers represent the highest and lowest yield spreads observed.

Tables

Table 1: Definition of variables

Variable name	Definition
Panel A: Dependent Variables	
Average funding costs (AvgFundingCosts)	Ratio of interest expenses to total liabilities.
Funding premiums (FundPremiums)	Difference between average funding costs and cash rate.
Rate sensitive funding costs (RSFundingCosts)	Ratio of incremental interest expenses paid on new liabilities to new liabilities.
Leverage	Ratio of total liabilities to total assets.
Z-score	Ratio of sum of four-quarter average return on assets (ROA) and capital adequacy ratio (CAR) to four-quarter standard deviation of ROA.
Risk weighted assets (RWA)	Ratio of risk weighted assets to total assets.
Bond yield spread (YieldSpread)	Difference between mid-yield at issuance and the US treasury rate of equal maturity.
Panel B: Test variables	
Participation in Wholesale Guarantee Scheme (WGS)	Dummy variable that is one if ADIs participate in the WGS and zero otherwise.
Bond guaranteed by Wholesale Guarantee Scheme (WGSBond)	Dummy variable that is one for bonds guaranteed by the WGS and zero otherwise.
Introduction of the guarantee scheme (AfterGar)	Dummy variable that is one for the period after the WGS was introduced and zero otherwise.
Removal of the guarantee scheme (RemovalGar)	Dummy variable that is one for the after of closing the WGS and zero otherwise.
Time prior to WGS period (PreWGS)	Dummy variable that is one for period from March 2008 to December 2008 (three quarters before introduction of guarantee scheme) zero otherwise.
First half of WGS period (H1WGS)	Dummy variable that is one for period from December 2008 to June 2009 (the first half of guarantee period) and zero otherwise.
Second half of WGS period (H2WGS)	Dummy variable that is one for period from June 2009 to March 2010 (the second half of guarantee period) and zero otherwise.
Time after WGS period (PostWGS)	Dummy variable that is one for period from March 2010 to December 2010 (three quarters after closing guarantee scheme) and zero otherwise.
Panel C: Control variables	
Capital adequacy ratio (CAR)	Ratio of eligible Tier 1 and Tier 2 capital to total assets.
Liquid assets ratio (LAR)	Ratio of cash and liquid assets to total assets.
Loan loss rate (LLR)	Ratio of provisions for bad and doubtful debts to total assets.
Wholesale Liabilities Ratio (WLR)	Ratio of wholesale liabilities to total liabilities.
Real gross domestic product growth rate (GDP)	Annual growth rate of real GDP.
Bank size (Size)	Natural logarithms of total assets.
Aaa to Aa3 rating (RatingAa)	Dummy variable that is one if a bank is rated Aaa, Aa1, Aa2 or Aa3 and zero otherwise.
A1 rating (RatingA1)	Dummy variable that is one if a bank is rated A1 and zero otherwise.
A2 rating (RatingA2)	Dummy variable that is one if a bank is rated A2 and zero otherwise.
A3 rating (RatingA3)	Dummy variable that is one if a bank is rated A3 and zero otherwise.
Bid-ask spread of bond yield (BidAskSpread)	Difference between bid yield to maturity and the ask yield to maturity at issuance of a bond.
Bond maturity (Maturity)	Time to maturity of a bond in months.
Principal amount issued (AmountIssued)	Natural logarithm of issued amount of a bond.
Inverse Mills Ratio (IMR)	Control variable for participation selection bias.

Table 2: Summary statistics for the period before the WGS introduction

	Pooled sample Mean (SD)		Pooled sample excluding majors Mean (SD)		Mutuals Mean (SD)	
	(1)		(2)		(3)	
AvgFundingCosts	3.72	(1.31)	3.65	(1.21)	3.55	(1.10)
FundingPremiums	-1.88	(1.15)	-1.94	(1.05)	-2.03	(0.93)
RSFundingCosts	5.38	(1.57)	5.29	(1.48)	5.19	(1.44)
Leverage	89.05	(6.0)	89.43	(5.45)	89.76	(4.64)
Zscore	6,585.69	(6770.54)	6,684.33	(6806.14)	6,822.40	(6,851.64)
RWA	53.72	(13.41)	53.80	(13.01)	53.05	(8.54)
WGS	20.07	(40.06)	18.34	(38.71)	14.76	(35.47)
AfterGar	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
RemovalGar	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)
CAR	10.49	(4.25)	10.51	(4.28)	10.49	(4.17)
LAR	7.97	(9.05)	8.08	(9.12)	8.27	(9.22)
LLR	0.16	(0.25)	0.16	(0.25)	0.16	(0.25)
WLR	5.97	(11.95)	5.18	(10.21)	3.54	(5.29)
GDP	0.85	(0.46)	0.85	(0.46)	0.85	(0.46)
Size	1,855.09	(227.57)	1,838.70	(200.48)	1,815.35	(172.40)
RatingAa	2.66	(16.10)	0.56	(7.47)	0.33	(5.71)
RatingA1	0.20	(4.51)	0.21	(4.55)	0.0	(0.0)
RatingA2	1.63	(12.65)	1.66	(12.78)	0.13	(3.62)
RatingA3	0.24	(4.93)	0.25	(4.99)	0.0	(0.0)

This table shows the summary statistics of the variables by showing the mean and standard deviation (SD) for different subsamples before the WGS was implemented.

Table 3: Summary statistics for period after WGS introduction

	After guarantee and WGS=0						After guarantee and WGS=1					
	Pooled sample Mean (SD)		Pooled sample excluding majors Mean (SD)		Mutuals Mean (SD)		Pooled sample Mean (SD)		Pooled sample excluding majors Mean (SD)		Mutuals Mean (SD)	
	(1)		(2)		(3)		(4)		(5)		(6)	
AvgFundingCosts	3.37	(0.99)	3.37	(0.99)	3.37	(0.99)	4.30	(1.13)	4.16	(1.06)	4.0	(0.91)
FundingPremiums	-0.21	(0.93)	-0.21	(0.93)	-0.22	(0.93)	0.75	(0.90)	0.62	(0.87)	0.36	(0.70)
RSFundingCosts	3.32	(1.0)	3.32	(1.0)	3.33	(1.01)	4.26	(1.25)	4.11	(1.19)	3.95	(0.96)
Leverage	89.79	(4.12)	89.79	(4.12)	89.77	(4.14)	89.46	(6.27)	91.29	(4.06)	91.85	(2.31)
Zscore	7,744.74	(6692.30)	7,744.74	(6692.30)	7,673.27	(6618.33)	7,349.11	(7,120.12)	7,995.38	(7,385.40)	8,772.52	(7,695.30)
RWA	49.71	(7.21)	49.71	(7.21)	49.72	(7.24)	53.58	(12.89)	52.91	(13.13)	49.51	(5.11)
WGS	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	100.0	(0.0)	100.0	(0.0)	100.0	(0.0)
AfterGar	100.0	(0.0)	100.0	(0.0)	100.0	(0.0)	100.0	(0.0)	100.0	(0.0)	100.0	(0.0)
RemovalGar	72.66	(44.58)	72.66	(44.58)	72.22	(44.80)	74.70	(43.51)	75.16	(43.24)	71.38	(45.24)
CAR	10.09	(3.76)	10.09	(3.76)	10.11	(3.79)	7.94	(2.07)	8.06	(2.13)	8.0	(1.87)
LAR	6.06	(5.97)	6.06	(5.97)	6.09	(6.0)	3.78	(3.87)	4.01	(4.08)	4.32	(4.37)
LLR	0.09	(0.19)	0.09	(0.19)	0.09	(0.20)	0.15	(0.25)	0.12	(0.23)	0.09	(0.16)
WLR	3.21	(3.42)	3.21	(3.42)	3.13	(3.34)	14.47	(15.46)	11.48	(14.23)	5.55	(7.03)
GDP	0.58	(0.44)	0.58	(0.44)	0.58	(0.45)	0.59	(0.43)	0.59	(0.43)	0.59	(0.45)
Size	1,873.42	(148.53)	1,873.42	(148.53)	1,869.30	(145.91)	2,204.02	(245.02)	2134.50	(178.06)	2,051.54	(127.98)
RatingAa	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	13.31	(34.0)	0.13	(3.56)	0.0	(0.0)
RatingA1	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	4.07	(19.78)	4.69	(21.15)	0.0	(0.0)
RatingA2	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	7.59	(26.51)	8.75	(28.27)	0.0	(0.0)
RatingA3	0.0	(0.0)	0.0	(0.0)	0.0	(0.0)	4.07	(19.52)	4.69	(21.15)	2.23	(14.78)

This table shows the summary statistics of the variables by showing the mean and standard deviation (SD) for different subsamples after the WGS was implemented.

Table 4: Robustness check: summary statistics for bonds issued by Australian banks

	Full time-series period from 2008 to 2012 Mean (SD)	During guarantee period from November 2008 to March 2010 Mean (SD)
	(1)	(2)
YieldSpread (bps)	49.28 (120.15)	12.33 (117.80)
WGSBond (%)	13.82 (35.36)	31.25 (46.59)
PreWGS (%)	0.92 (9.83)	0.00 (0.00)
H1WGS (%)	13.82 (35.36)	31.25 (46.59)
H2WGS (%)	30.41 (44.35)	68.75 (46.59)
PostWGS (%)	10.14 (30.96)	0.00 (0.00)
BidAskSpread (bps)	9.88 (31.22)	12.61 (43.98)
Maturity (months)	59.88 (37.11)	52.00 (23.07)
AmountIssued ($US Million)	980.50 (736.41)	1,281.61 (655.85)

This table shows the summary statistics of the variables by showing the mean and standard deviation (SD) for bonds issued by Australian banks.

Table 5: Selection model for bank-level WGS participation

	Probability of participation
CAR	-5.4385
	(14.9302)
LAR	-14.6865
	(16.8024)
LLR	174.5000
	(138.90)
WLR	5.0696**
	(1.9851)
Size	0.4651*
	(0.2699)
RatingAa	1.4584*
	(0.8430)
RatingA1	4.8509***
	(1.6630)
RatingA2	6.9571***
	(1.6092)
RatingA3	7.4338***
	(1.2914)
Intercept	-11.6669
	(7.4993)
Obs	601
R-Square	45.48%

This table shows the selection model for the probability that a bank participates in the WGS based on bank characteristics. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 6: Impact of WGS participation on funding costs

	Average funding cost			Funding premiums			Rate sensitive funding cost		
	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WGS*AfterGar	**-0.0037*** **	**-0.0025*** **	**-0.0011***	**-0.0029*** **	**-0.0016*** **	**-0.0009***	**-0.0071*** **	**-0.0058*** **	**-0.0057*** **
	(0.0005)	(0.0003)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0014)	(0.0015)	(0.0016)
WGS	0.0057***	0.0051***	0.0043***	0.0054***	0.0048***	0.0042***	0.0106***	0.0094***	0.0091***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0014)	(0.0014)	(0.0015)
AfterGar	-0.0025***	-0.0025***	-0.0025***	0.0179***	0.0179***	0.0178***	-0.0164***	-0.0165***	-0.0164***
	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0002)	(0.0002)	(0.0007)	(0.0007)	(0.0007)
CAR	-0.0173***	-0.0192***	-0.0191***	-0.0281***	-0.0303***	-0.0321***	-0.0361***	-0.0380***	-0.0360***
	(0.0031)	(0.0030)	(0.0030)	(0.0027)	(0.0027)	(0.0027)	(0.0058)	(0.0058)	(0.0058)
LAR	-0.0315***	-0.0326***	-0.0319***	-0.0114***	-0.0122***	-0.0116***	-0.0374***	-0.0372***	-0.0360***
	(0.0016)	(0.0015)	(0.0015)	(0.0014)	(0.0013)	(0.0014)	(0.0036)	(0.0036)	(0.0058)
LLR	-0.3438***	-0.3488***	-0.4366***	-0.2657***	-0.2562***	-0.3228***	0.1249	0.1311	-0.2178**
	(0.0488)	(0.0484)	(0.0497)	(0.0429)	(0.0428)	(0.0445)	(0.0870)	(0.0904)	(0.0957)
WLR	0.0158***	0.0216***	0.0216***	0.0164***	0.0203***	0.0141***	0.0295***	0.0288***	0.0394***
	(0.0017)	(0.0018)	(0.0018)	(0.0015)	(0.0016)	(0.0022)	(0.0032)	(0.0032)	(0.0048)
GDP	-0.1212***	-0.1134***	-0.1149***	-0.1708***	-0.1618***	-0.1586***	-0.0726*	-0.0728*	-0.1170***
	(0.0250)	(0.0246)	(0.0245)	(0.0220)	(0.0218)	(0.0219)	(0.0415)	(0.0419)	(0.0416)
IMR	-0.0270***	-0.0206***	-0.0384***	-0.0260***	-0.0207***	-0.0309***	-0.0053**	-0.0030	-0.0108**
	(0.0017)	(0.0019)	(0.0038)	(0.0015)	(0.0017)	(0.0034)	(0.0025)	(0.0027)	(0.0050)
Intercept	0.0613***	0.0563***	0.0703***	0.0045***	0.0004	0.0088***	0.0590***	0.0575***	0.0635***
	(0.0014)	(0.0015)	(0.0029)	(0.0012)	(0.0014)	(0.0026)	(0.0022)	(0.0023)	(0.0039)
Obs	8,036	7,812	7,293	8,036	7,812	7,293	3,420	3,293	2,993
R-square	32.61%	27.30%	19.40%	62.22%	60.76%	57.61%	37.73%	33.90%	32.16%

This table shows the impact of the WGS participation by a bank on bank funding costs. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 7: Impact of WGS removal on funding costs

	Average funding cost			Funding premium			Rate sensitive funding cost		
	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals
	Average funding cost			Funding premium			Rate sensitive funding cost		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WGS*RemovalGar	**-0.0012**	**-0.0016**	**0.0010**	**-0.0008**	**-0.0010**	**0.0002**	**-0.0011**	**-0.0014**	**0.0009**
	(0.0010)	(0.0011)	(0.0010)	(0.0010)	(0.0011)	(0.0007)	(0.0010)	(0.0010)	(0.0009)
WGS*AfterGar	-0.0029**	-0.0013	-0.0018*	-0.0023*	-0.0009	-0.0011	-0.0064***	-0.0047*	-0.0063**
	(0.0014)	(0.0013)	(0.0010)	(0.0014)	(0.0012)	(0.0009)	(0.0023)	(0.0024)	(0.0026)
RemovalGar	0.0001	0.0000	0.0002	-0.0004	-0.0005	-0.0005	0.0014***	0.0014***	0.0016***
	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)
AfterGar	-0.0025***	-0.0025***	-0.0026***	0.0182***	0.0183***	0.0182***	-0.0174***	-0.0174***	-0.0175***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0007)	(0.0007)	(0.0007)
WGS	0.0057***	0.0051***	0.0043***	0.0054***	0.0048***	0.0042***	0.0106***	0.0094***	0.0091***
	(0.0012)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0011)	(0.0027)	(0.0028)	(0.0030)
CAR	-0.0172	-0.0191	-0.0190	-0.0281**	-0.0302**	-0.0321**	-0.0358**	-0.0377**	-0.0355**
	(0.0125)	(0.0125)	(0.0133)	(0.0126)	(0.0127)	(0.0136)	(0.0159)	(0.0160)	(0.0157)
LAR	-0.0315***	-0.0325***	-0.0319***	-0.0114*	-0.0121**	-0.0115*	-0.0381***	-0.0378***	-0.0368***
	(0.0056)	(0.0055)	(0.0059)	(0.0061)	(0.0061)	(0.0064)	(0.0085)	(0.0085)	(0.0079)
LLR	-0.3476**	-0.3505**	-0.4363**	-0.2707	-0.2587	-0.3238*	0.1345	0.1381	-0.2071
	(0.1504)	(0.1552)	(0.1735)	(0.1701)	(0.1762)	(0.1958)	(0.2562)	(0.2758)	(0.2804)
WLR	0.0158**	0.0215***	0.0215***	0.0164**	0.0202***	0.0141	0.0295***	0.0287***	0.0391***
	(0.0078)	(0.0077)	(0.0077)	(0.0066)	(0.0069)	(0.0096)	(0.0070)	(0.0071)	(0.0146)
GDP	-0.1189***	-0.1103***	-0.1181***	-0.1649***	-0.1553***	-0.1540***	-0.0991***	-0.0978***	-0.1606***
	(0.0120)	(0.0101)	(0.0097)	(0.0113)	(0.0091)	(0.0083)	(0.0286)	(0.0288)	(0.0216)
IMR	-0.0271***	-0.0207***	-0.0386**	-0.0261***	-0.0208***	-0.0309	-0.0052	-0.0029	-0.0112
	(0.0076)	(0.0060)	(0.0159)	(0.0073)	(0.0066)	(0.0192)	(0.0063)	(0.0061)	(0.0120)
Intercept	0.0614***	0.0564***	0.0705***	0.0045	0.0005	0.0087	0.0591***	0.0576***	0.0640***
	(0.0060)	(0.0048)	(0.0122)	(0.0058)	(0.0052)	(0.0148)	(0.0049)	(0.0048)	(0.0092)
Obs	8,036	7,812	7,293	8,036	7,812	7,293	3,420	3,293	2,993
R-square	32.63%	27.33%	19.42%	62.24%	60.79%	57.62%	37.86%	34.04%	32.54%

This table shows the impact of the WGS removal on bank funding costs. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 8: Impact of WGS participation on bank risk taking

	Leverage			Zscore			RWA		
	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
WGS*AfterGar	**0.0237*** **	**0.0196** **	**0.0019**	**12.0762**	**12.6348**	**13.4626**	**0.0003**	**-0.0089**	**-0.0098**
	(0.0084)	(0.0090)	(0.0046)	(7.4430)	(8.1221)	(10.4408)	(0.0314)	(0.0340)	(0.0092)
WGS	0.0033	0.0030	0.0103	-0.8364	-1.2738	-1.6270	0.0184	0.0267	0.0158
	(0.0083)	(0.0084)	(0.0065)	(5.3554)	(5.3452)	(5.6520)	(0.0360)	(0.0383)	(0.0137)
AfterGar	-0.0014	-0.0017	-0.0017	4.3057	4.2574	3.6050	-0.0278***	-0.0279***	-0.0304***
	(0.0032)	(0.0031)	(0.0031)	(3.6414)	(3.6411)	(3.6423)	(0.0057)	(0.0058)	(0.0057)
LAR	-0.1327***	-0.1227***	-0.1063***	-111.4559***	-109.5614***	-103.6404***	0.1199	0.1199	0.1507
	(0.0360)	(0.0355)	(0.0358)	(19.9174)	(19.9005)	(19.5601)	(0.3177)	(0.3177)	(0.3046)
LLR	-1.6081*	-1.7305*	-1.0494	-2758.1225***	-2769.7822***	-2686.6969***	6.3424	5.7260	1.4567
	(0.9488)	(0.9514)	(0.6868)	(477.4039)	(491.7538)	(530.9424)	(4.9028)	(5.2950)	(3.9676)
WLR	-0.1194**	-0.1304**	-0.0784	-31.4995	-37.0922	-80.4210***	0.1549	0.1528	-0.1423
	(0.0529)	(0.0572)	(0.0669)	(19.5639)	(23.2839)	(26.6184)	(0.1814)	(0.1943)	(0.1602)
GDP	0.1255***	0.1268***	0.0755*	-104.3780	-112.5704	-92.8468	-0.1174	-0.2730	-0.2840*
	(0.0475)	(0.0471)	(0.0389)	(122.8836)	(126.1005)	(131.3202)	(0.2551)	(0.2267)	(0.1665)
IMR	0.1082	-0.0100	-0.2102**	71.7189***	55.7495***	22.1385	-0.0059	-0.0154	0.0523
	(0.0674)	(0.0684)	(0.0827)	(19.7392)	(21.4062)	(42.0995)	(0.0998)	(0.1046)	(0.1254)
Intercept	0.8278***	0.9198***	1.0724***	28.2455*	40.8371**	67.7338**	0.5122***	0.5212***	0.4826***
	(0.0537)	(0.0543)	(0.0650)	(16.3970)	(17.7404)	(33.5402)	(0.0831)	(0.0844)	(0.0974)
Obs	8,036	7,812	7,293	8,036	7,812	7,293	3,420	3,293	2,993
R-square	20.80%	11.80%	11.73%	5.75%	4.68%	3.71%	9.30%	7.61%	4.37%

This table shows the regressions to test the impact of the guarantee scheme on bank risk taking. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 9: Impact of WGS participation on market discipline with regard to bank capital

	Average funding cost			Funding premium			Rate sensitive funding cost		
	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CAR*WGS*AfterGar	**0.0614**	**0.0370**	**0.0736***	**0.0608**	**0.0461**	**0.0821****	**0.0909***	**0.0814**	**0.2330*****
	(0.0623)	(0.0615)	(0.0380)	(0.0613)	(0.0604)	(0.0330)	(0.0525)	(0.0545)	(0.0815)
CAR*WGS	0.0149	0.0129	-0.0210	0.0296	0.0234	-0.0234	-0.0612	-0.0643	-0.1917**
	(0.0370)	(0.0368)	(0.0294)	(0.0369)	(0.0353)	(0.0312)	(0.0594)	(0.0615)	(0.0913)
CAR*AfterGar	-0.0236	-0.0238	-0.0233	-0.0304*	-0.0306*	-0.0302*	-0.0009	-0.0008	-0.0035
	(0.0165)	(0.0165)	(0.0165)	(0.0157)	(0.0158)	(0.0157)	(0.0309)	(0.0310)	(0.0301)
WGS*AfterGar	-0.0089*	-0.0058	-0.0076**	-0.0080	-0.0057	-0.0083***	-0.0147**	-0.0126**	-0.0252***
	(0.0050)	(0.0048)	(0.0032)	(0.0049)	(0.0046)	(0.0028)	(0.0059)	(0.0062)	(0.0089)
WGS	0.0043	0.0040	0.0063**	0.0027	0.0027	0.0065**	0.0156**	0.0148**	0.0252**
	(0.0035)	(0.0034)	(0.0029)	(0.0034)	(0.0034)	(0.0030)	(0.0069)	(0.0073)	(0.0102)
AfterGar	-0.0001	0.0000	-0.0001	0.0210***	0.0210***	0.0209***	-0.0164***	-0.0164***	-0.0160***
	(0.0016)	(0.0016)	(0.0016)	(0.0015)	(0.0015)	(0.0015)	(0.0030)	(0.0030)	(0.0030)
CAR	-0.0143	-0.0151	-0.0124	-0.0252*	-0.0259*	-0.0235	-0.0371	-0.0378	-0.0339
	(0.0159)	(0.0159)	(0.0159)	(0.0151)	(0.0152)	(0.0152)	(0.0326)	(0.0328)	(0.0321)
LAR	-0.0307***	-0.0318***	-0.0317***	-0.0102	-0.0111*	-0.0112*	-0.0372***	-0.0372***	-0.0360***
	(0.0057)	(0.0057)	(0.0059)	(0.0062)	(0.0061)	(0.0065)	(0.0084)	(0.0084)	(0.0079)
LLR	-0.3677**	-0.3655**	-0.4319**	-0.3023*	-0.2838	-0.3165	0.1137	0.1299	-0.2241
	(0.1505)	(0.1564)	(0.1734)	(0.1695)	(0.1766)	(0.1951)	(0.2624)	(0.2813)	(0.2822)
WLR	0.0145*	0.0205***	0.0216***	0.0145**	0.0187***	0.0141	0.0288***	0.0284***	0.0403***
	(0.0077)	(0.0076)	(0.0079)	(0.0065)	(0.0068)	(0.0097)	(0.0072)	(0.0075)	(0.0142)
GDP	-0.1208***	-0.1133***	-0.1147***	-0.1704***	-0.1617***	-0.1583***	-0.0727***	-0.0731***	-0.1174***
	(0.0124)	(0.0108)	(0.0103)	(0.0119)	(0.0101)	(0.0094)	(0.0268)	(0.0266)	(0.0217)
IMR	-0.0286***	-0.0216***	-0.0386**	-0.0280***	-0.0222***	-0.0310*	-0.0061	-0.0033	-0.0109
	(0.0078)	(0.0061)	(0.0156)	(0.0073)	(0.0066)	(0.0187)	(0.0068)	(0.0066)	(0.0126)
Intercept	0.0622***	0.0567***	0.0697***	0.0058	0.0011	0.0079	0.0598***	0.0578***	0.0633***
	(0.0063)	(0.0050)	(0.0120)	(0.0059)	(0.0053)	(0.0144)	(0.0062)	(0.0061)	(0.0102)
Obs	8,036	7,812	7,293	8,036	7,812	7,293	3,420	3,293	2,993
R-square	32.85%	27.49%	19.58%	62.52%	61.01%	57.79%	37.82%	33.96%	32.40%

This table shows the market discipline with regard to the capital adequacy ratio. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 10: Impact of WGS participation on market discipline with regard to bank liquidity

	Average funding cost			Funding premium			Rate sensitive funding cost		
	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals	Pooled sample	Pooled sample excluding majors	Mutuals
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
LAR*WGS*AfterGar	**0.0135**	**0.0042**	**0.0386**	**0.0061**	**-0.0047**	**0.0259**	**-0.1064**	**-0.1033**	**-0.1059**
	(0.0335)	(0.0330)	(0.0288)	(0.0311)	(0.0307)	(0.0231)	(0.1264)	(0.1250)	(0.1261)
LAR*WGS	0.0449*	0.0447*	0.0249**	0.0386	0.0396	0.0190	0.1444	0.1423	0.1573
	(0.0243)	(0.0237)	(0.0111)	(0.0264)	(0.0266)	(0.0147)	(0.1434)	(0.1429)	(0.1478)
LAR*AfterGar	-0.0068	-0.0071	-0.0064	-0.0156**	-0.0157**	-0.0143**	0.0141	0.0144	0.0148
	(0.0069)	(0.0069)	(0.0071)	(0.0071)	(0.0071)	(0.0071)	(0.0107)	(0.0107)	(0.0104)
WGS*AfterGar	-0.0041**	-0.0024*	-0.0027*	-0.0032**	-0.0014	-0.0022*	-0.0036	-0.0023	-0.0018
	(0.0017)	(0.0013)	(0.0015)	(0.0016)	(0.0012)	(0.0012)	(0.0031)	(0.0028)	(0.0029)
WGS	0.0034**	0.0028*	0.0030**	0.0035**	0.0029*	0.0033**	0.0053	0.0042	0.0029
	(0.0015)	(0.0015)	(0.0014)	(0.0015)	(0.0015)	(0.0014)	(0.0036)	(0.0034)	(0.0036)
AfterGar	-0.0021***	-0.0021***	-0.0021***	0.0188***	0.0189***	0.0187***	-0.0172***	-0.0172***	-0.0171***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0008)	(0.0008)	(0.0008)
CAR	-0.0147	-0.0165	-0.0166	-0.0248**	-0.0269**	-0.0291**	-0.0340**	-0.0358**	-0.0333**
	(0.0126)	(0.0127)	(0.0136)	(0.0125)	(0.0126)	(0.0136)	(0.0155)	(0.0156)	(0.0155)
LAR	-0.0344***	-0.0351***	-0.0330***	-0.0122*	-0.0127**	-0.0109	-0.0551***	-0.0552***	-0.0543***
	(0.0059)	(0.0059)	(0.0062)	(0.0063)	(0.0063)	(0.0067)	(0.0105)	(0.0105)	(0.0106)
LLR	-0.3469**	-0.3525**	-0.4393**	-0.2681	-0.2596	-0.3210*	0.1436	0.1563	-0.1928
	(0.1492)	(0.1540)	(0.1731)	(0.1656)	(0.1716)	(0.1924)	(0.2509)	(0.2708)	(0.2744)
WLR	0.0126*	0.0181***	0.0192***	0.0142**	0.0179***	0.0129	0.0255***	0.0245***	0.0322***
	(0.0069)	(0.0066)	(0.0073)	(0.0062)	(0.0065)	(0.0093)	(0.0064)	(0.0064)	(0.0118)
GDP	-0.1217***	-0.1137***	-0.1158***	-0.1720***	-0.1629***	-0.1600***	-0.0729***	-0.0734***	-0.1169***
	(0.0126)	(0.0109)	(0.0104)	(0.0121)	(0.0101)	(0.0095)	(0.0274)	(0.0271)	(0.0218)
IMR	-0.0308***	-0.0239***	-0.0430**	-0.0286***	-0.0228***	-0.0333*	-0.0091	-0.0068	-0.0174
	(0.0074)	(0.0057)	(0.0167)	(0.0073)	(0.0065)	(0.0194)	(0.0058)	(0.0055)	(0.0124)
Intercept	0.0643***	0.0590***	0.0739***	0.0063	0.0018	0.0104	0.0629***	0.0613***	0.0695***
	(0.0058)	(0.0045)	(0.0128)	(0.0057)	(0.0052)	(0.0150)	(0.0046)	(0.0045)	(0.0095)
Obs	8,036	7,812	7,293	8,036	7,812	7,293	3,420	3,293	2,993
R-square	33.37%	28.07%	19.99%	62.66%	61.22%	57.87%	38.34%	34.58%	33.23%

This table shows the market discipline with regard to the liquid assets ratio. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table11: Robustness check: selection model for bond-level WGS participation

	Probability of bonds taking up guarantee
BidAskSpread	-0.2185
	(0.1390)
Maturity	-0.0005
	(0.0017)
AmountIssued	0.3279***
	(0.1047)
CAR	-9.9767
	(10.4659)
LAR	-8.6396**
	(3.6861)
LLR	60.2205***
	(9.8902)
WLR	5.7005***
	(1.4093)
Intercept	-9.5767***
	(2.0280)
Obs	342
R-square	0.1175

This table shows the selection model for bonds taking up the guarantee scheme. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 12: Robustness check: impact of WGS participation on bond yield spreads

	Bond yield spread	
	(1)	(2)
WGSBond	**-0.5721*** **	**-0.3577*** **
	(0.1193)	(0.0789)
PreWGS		0.8628***
		(0.1640)
H1WGS		-0.4739*
		(0.2298)
H2WGS		-0.7334**
		(0.2576)
PostWGS		-0.3345
		(0.3368)
BidAskSpread	0.4268	0.4382
	(0.2463)	(0.2703)
Maturity	0.0080***	0.0092***
	(0.0009)	(0.0005)
AmountIssued	0.2230	0.2920*
	(0.1440)	(0.1246)
CAR	3.6067	3.5779
	(7.8887)	(6.4193)
LAR	5.3119	2.0688
	(3.9869)	(2.0686)
LLR	-12.1409	6.0049
	(25.1143)	(17.8592)
WLR	3.4650*	4.5098**
	(1.6520)	(1.2102)
IMR	5.5489	6.0079*
	(3.6063)	(2.4236)
Intercept	-9.7593	-11.6374*
	(5.8020)	(4.5445)
Obs	217	217
R-square	30.85%	36.31%

This table shows the regressions to test the impact of the guarantee scheme on bond yield spread. Standard errors are clustered at the bank level and presented in parentheses. *, **, and *** represent statistical significance at the 10%, 5%, and 1% level, respectively.

Table 13: Robustness check: implied savings for bonds covered by the WGS

Time	Gross implied reduction in yield spreads for guaranteed bonds	Average fee paid on guaranteed bonds	Net benefit for guaranteed bonds
	(1)	(2)	(3)
H1WGS	0.8316	-0.7857	0.0459
H2WGS	1.0911	-0.7188	0.3724

This table shows the computation of implied savings for bonds covered by the WGS relative to bonds not covered by the WGS. The net benefit for guaranteed bonds is the difference between the gross implied reduction in yield spreads and the average fee paid.