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The Impact of the GST on Mortgage Pricing of Australian Credit Unions: An Empirical Analysis

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Abstract
Purpose – The purpose of this paper is to investigate the impact of the GST on mortgage pricing and to measure the GST shifting ratio of Australian credit unions.
Design/methodology/approach – Using the proprietary data from 79 credit unions in Australia, we perform multivariate regression analysis on the effect of the GST on mortgage effective yield spreads and interest margins respectively. We also introduce a model that is used to measure the GST shifting ratio.
Findings – We document that the introduction of the GST in July 2000 led to the substantial rise in mortgage costs charged by credit unions in the post-GST periods. Overall, the GST alone contributed to the increase of effective yield spreads and interest margin by 65.3 and 70.1 basis points respectively. As measured by the GST-shifting ratio, credit unions passed more than twice of the GST rate. This suggests GST over-shifting and is generally consistent with tax over-shifting literature.
Originality/value –This is the first time the GST shifting ratio has been robustly measured with the use multivariate models on mortgage costs.
Keywords GST shifting, Credit unions, Mortgage pricing
Paper type Research paper

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1. Introduction

In Australia, the rise of mortgage cost and the decline in housing affordability has raised concern among consumers, banking regulators and the media. The Australian mortgage sector is largely comprised of three segments: the four major banks; mortgage corporations; and cooperative lenders. While the Australian lending sector is highly regulated there are concerns about high concentrations and the pricing behaviour (Swan, 2010)[i].

This is of potential concern as tax incidence research from the United States of America (USA) demonstrates that 'tax over-shifting' can occur when imperfect competition markets exist (Young and Bielinksa-Kwapisz, 2002; Besley and Rosen, 1994).

One potential tax cost in Australia is the introduction from July 2000 of the goods and services tax (GST). While financial supplies are largely not subject to GST, there is a restriction on the ability to claim the GST input tax credits back on acquisitions, thus increasing the cost. This is in addition to compliance costs that can be associated with obligations associated with the tax.

Recently, researchers have started investigating the GST impact on mortgage costs in Australia. Huang and Liu (2012) tested mortgage yield spreads of banks in response to the introduction of the GST and Huang and Liu (2013) tested mortgage yield spreads of mortgage corporations. These results would tend to indicate these institutions have engaged in tax over-shifting with the introduction of the GST in Australia. However, is the experience of credit unions different, especially given that they are cooperative lenders and non-profit-maximising organizations, with their clientele being members, concentrated in specific industries? Preliminary research by Liu and Huang (2012), using univariate models, examined the GST impact on the yield spreads of credit unions which found a significant increase. This study extends Liu and Huang's (2012) study by examining Australia's credit unions using a unique model to measure the GST shifting ratio more preciously; with multivariate tests being conducted to analyse yield spreads, as well as interest margins.

In particular by analysing monthly mortgage data of 79 Australian credit unions over 36 consecutive months straddling the introduction of the GST (January 1999 to December 2001) two research questions

are addressed in respect of Australian credit unions: (1) Has the introduction of the GST impacted on the mortgage pricing?; and (2) To what extent did the GST contribute to mortgage costs in respect of yield spreads and interest margins? The results would tend to indicate that there was a tax over-shifting by Australian credit unions, with greater effective yield spreads and effective interest margins. These results would question to what extent the Australian financial market is really competitive, resulting in greater costs to consumers.

The rest of the paper is structured as follows: Section 2 reviews the relevant literature; Section 3 describes the data and methodology while Section 4 presents and discusses the results. Conclusions are drawn in Section 5.

2. Literature Review

2.1 Tax Incidence Theory

Research in the USA into the effects of taxes on consumer prices dates back several decades. Brown (1939), Due (1942), Rolph (1952), Musgrave (1959) and Bishop (1968) developed a tax incidence theory for studying the general sales taxes on particular goods. Empirical studies using the tax incidence theory document the fact that sales tax is fully reflected in prices borne by consumers. From the perspective of firms, this is known as tax shifting because the firms do not alter their profits. Some studies indicate that, when imperfect competition markets exist consumer prices may rise more than the amount of retail taxes levied, suggesting tax over-shifting (Haig and Shoup, 1934; Sidhu, 1971; Harris, 1987; Besley and Rosen, 1994; and Young and Bielinska-Kwapisz, 2002). In contrast, Poterba (1996) found that for the post-war period, retail prices rose by approximately the same amount as the sales tax. However, these studies are exclusively limited to the USA consumer goods industries and consider a retail tax as opposed to a value added tax (VAT).

To broaden the research using the tax incidence theory, it was important to consider mortgage lenders' pricing in response to the GST using Australian credit union data.

GST in Australia

The GST commenced in Australia on 1 July 2000, which replaced a range of indirect taxes including the Wholesale Sales Tax (WST). The GST applies at a rate of 10 per cent and is broadly similar to the VAT operating in several other countries. The GST applies to most forms of economic activities such as the supplies of goods and services, requiring the supplier of a taxable supply to remit the GST collected. However, GST registered enterprises are broadly able to claim a refund (input tax credit) of the GST in their acquisitions. In this way each enterprise remits just the GST on the value added to its particular product or service. However, as private consumers are not able to claim such a GST input tax credit the end cost of GST is passed on to them (Maclntyre, 2001; Bolton and Dollery, 2005).

The treatment of financial supplies, however, differs from other types of supplies. Firstly, financial supplies (such as taking securities and deposits, issuing loans and charging interest on loans) are not subject to GST. In other words, no GST is paid on the financial supplies that financial institutions acquire, nor is GST liable on financial supplies made by financial institutions. Secondly, no GST input tax credit is available for acquisitions that relate to making financial supplies. In this way, financial institutions are effectively treated as the end-consumer. This is somewhat altered by the allowance of a reduced GST input credit for a number of acquisitions that financial institutions have outsourced in recent years (such as processing account information) (s 70-5 of the GST Act).

This means that largely the GST on acquisitions will need to be absorbed by financial institutions and then allocated in their financial products (e.g. loans) to their customers through increasing the overall charges (Maclntyre, 2001). Although this pricing could be offset to some extent by the removal WST on some of the goods purchased by financial institutions, such as computers, how and to what extent the Australian financial institutions have passed the cost of GST to their mortgage customers remains largely unknown.

Since the introduction of the GST in Australia, studies have examined two aspects of its effects on consumer prices, being the general price level of goods and services, and the estimate of compliance costs - each of which is discussed below.

2.2 The GST Effects on Price Levels

The inflationary effect of the GST has raised concerns for governments. The consensus of government surveys is that the GST's effect on the goods and services included in the consumer price index (CPI) would be a one-off price-perturbation in the quarter of the introduction of the GST, with the magnitude of the effect varing within a small range. Part of the reason for this lower price effect relates to the removal of the WST which could apply at rates higher than GST and it was non-refundable for most enterprises. Due to these reasons, the Commonwealth Treasury estimated that the 10% GST could increase the overall CPI by just 2.75 per cent in July 2000 (Commonwealth Treasury, 2000, p. 11).

Academic researchers have also endeavored to study the effect of the GST on price levels. Before the GST, Johnson et al. (1999) and Warren et al. (1999) thoroughly evaluated the revenue, efficiency and equity effects of the government's tax package. Warren et al. (1999) also predicted the possible effect of the GST on inflation and estimate, under different assumptions, that this effect was likely to be between 0.8 and 3.6 per cent in July 2000.

Valadkhani and Layton (2004) examined the magnitude and duration of the GST effect on the overall rate of inflation. Using intervention analysis, Valadkhani and Layton (2004) found that the GST effect on inflation was only temporary (in the third quarter of 2000) and the size of the effect was 2.8 per cent. In another study, Valadkhani (2005), using the same methodology, investigates the price changes of goods and services in the four quarters before, and four quarters after, the third quarter of 2000. Valadkhani found that the overall effect was a one-off lift in inflation of approximately 3 per cent in the third quarter of 2000, with prices not increasing significantly before or after this quarter.

2.3 The Tax Compliance Costs

Other studies have focused on estimating the compliance costs of the GST. According to Tran-Nam (1999 and 2000) and others (Sandford et al., 1989), the introduction of a new tax (such as the GST) gives rise to two new types of costs: the implementation compliance costs and the recurrent compliance costs.

The implementation compliance costs are the costs incurred in complying with the GST when it was implemented and include mainly the administrative costs and the compliance costs of the implementation of the GST. The compliance costs of implementing the GST refer to the resources expended by the economy to comply with the GST.

In terms of empirical studies on VAT, the international evidence suggests that, in most countries, the introduction of a VAT results in significantly higher compliance costs for taxpayers than other forms of taxation (Vaillancourt, 1987; Pope, 2001); and that VAT compliance costs are disproportionately higher for small businesses than large businesses (Cnossen, 1994; Rametse and Pope, 2002; and Coolridge, 2012). In Australia, Tran-Nam and Glover have estimated both the net transitional cost and the recurrent GST compliance for small businesses (2002 & 2005).

The estimated implementation costs of the GST reviewed above are based on different assumptions, using different survey techniques with varying sample sizes and lumping the GST-related and normal upgrading computer and system costs together. According to Tran-Nam (2000), these estimates are either baseless or difficult to justify.

In summary, the existing research all suggests that the GST effect on prices and the GST compliance costs are substantial, which inevitably increases costs to both businesses and consumers (see Huang and Liu, 2012). However, the research that has been conducted to date, except for Huang and Liu's (2012) on bank mortgage costs, remains at the level of estimating either the general price effect or the overall compliance costs in the society. It is argued that more research is needed to enhance our understanding of the GST effects on mortgage costs charged by lenders in Australia, especially given concerns about competition in the finance sector.

3. Data and Methodology

3.1. Data

The mortgage data for analysis is extracted from Cannex's monthly survey of Australian lenders, which includes monthly information on mortgage interest rates, mortgage fees and charges, credit criteria

and other data of all credit unions operating in the country. Other data (i.e. 90-day bank bill rates, Treasury bond and corporate bond yields, and 3-month term deposit interest rates of banks) are collected from the statistics of the Reserve Bank of Australia (RBA). The time period selected for the analysis covers 36 consecutive months from January 1999 to December 2001 (that is, 18 months before and 18 months after the GST came into effect on 1 July 2000). The selection of the time period is mainly determined by the key research questions this paper addresses, that is, the impact of the introduction of the GST on mortgage costs. Hence, inclusion of both pre- and post-GST periods in the analysis would allow the authors to compare the mortgage costs before and after the implementation of the GST, although it would include some of the implementation costs of starting to comply with GST as well as ongoing costs.

Seventy nine credit unions, operating in the mortgage market during the period, are included in the analysis, which are listed in the Appendix. The data selection results in a total of 2805 monthly observations. To make comparisons between the pre- and post-GST periods more valid, only the standard products of residential mortgages, that is, the owner-occupied home loans with adjustable interest rates (with which about 80 per cent of Australian home loans are originated), are examined. Loans for other purposes are excluded from the analysis.

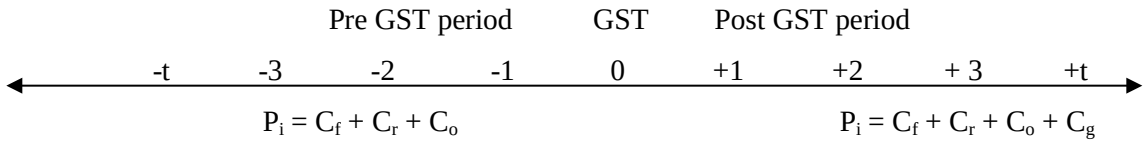
3.2. Variable and Model Specifications

We use the annualised average percentage rates (AAPR) which include the nominal interest rate and all other fees and charges (e.g., upfront fees for documentation, valuation and application, and ongoing service fees) levied on mortgages, that is, the effective rates. The AAPR adopted in this study is computed using the standard calculations required under the Australian Uniform Consumer Credit Code and is considered to be a benchmark for comparing mortgage products in Australia. When comparing mortgage costs, however, we use mortgage yield spreads and interest margins, rather than the interest rates. Effective yield spreads are the differences between AAPR rates and 90-day bank bill rates.

To perform robustness tests, we also use the effective interest margin (differences between the AAPR rates and the 3-month term deposit interest rates) to more precisely reflect the degree of GST cost shifting. The use of yield spreads or interest margins is a standard approach in measuring mortgage costs, as it helps overcome the impact of inflation and adjustments of monetary policy over time on the interest rates (Liu and Skully, 2005 and 2008).

We follow markup theory for pricing banking products (Rousseas, 1985). According to the literature, mortgages are regarded as special kinds of products of lenders (see Ambrose et al., 2004; Liu and Skully, 2005 and 2008). For simplicity, mortgage unit price (the interest rate, P_i) of lender *i* at time *t* can be unit funding cost (C_f)+ risk (C_r) + unit operating cost (C_o) + profit margin (P_m). Considering credit unions as nonprofit seeking lenders, profit margin (P_m) is assumed to be zero, we derive unit price:

$$P_i = C_f + C_r + C_o. \quad (1)$$



Rearranging Equation (1), we derive: For the pre GST period, $P_i = C_f + C_r + C_o$ and for the post GST period, $P_i = C_f + C_r + C_o + C_g$ while C_g stands for the GST cost levied in mortgages. so for an adjustable rate mortgage, $P_i - C_f$ is either the yield spread (YSP) or interest margin (MGN). C_o and C_r are further assumed to remain constant for the two short periods.

Because there is no GST charge on mortgages and funding of the lender, C_g (the GST cost) for a lender is resulted from a 10% GST levied on lender operating items, such as rentals, electricity, etc. Therefore, in theory, C_g should be around 10% of C_o. If $C_g/C_o > 10\%$, we can say there is GST over-shifting; if $C_g/C_o < 10\%$, there is GST under-shifting. In this paper, C_g/C_o is defined as GST shifting ratio.

In a competitive funding market, all credit unions are assumed to have the same funding cost. As explained above, the 90-day bank bill rate and 3-month term deposit interest rates of banks act as proxies for funding costs. Other variables used in our analysis include the introduction of the GST as a dummy

variable, the credit criteria variables (that is, loan to value ratios and maximum loan amounts), a market default risk variable and seasonal effect variables. Definitions of all variables and their predicted signs in detail are provided in Table 1.

[Insert Table 1 about here]

To answer the research questions, we develop multivariate models (pooled cross-sectional regression) to examine the GST effects on mortgage costs using monthly data. The regression analysis estimates the effective yield spreads (EYSP) in regression equation (2) below.

$$EYSP_i = \begin{cases} \beta_0 + \beta_1 GST_i + \beta_2 MAXNO_i + \beta_3 MAXLOAN200_i + \beta_4 MAXLOAN100_i \\ + \beta_5 MAXLOAN50_i + \beta_6 MAXLTV95_i + \beta_7 MAXLTV90_i + \beta_8 MAXLTV85_i \\ + \beta_9 MDFT(-1)_i + \beta_j \sum MON_{ji} \text{ or } + \lambda_j \sum QUT_{ji} + e_i \end{cases} \quad (2)$$

In Equation (2), the dependent variable is the effective mortgage yield spreads (EYSP) of credit unions. The independent variables are the GST, lending criteria, market default risk and seasonal effects. As of July 1, 2000 when the GST was implemented, a difference on mortgage costs between the pre and post GST periods was expected. In the regression model, therefore, a dummy variable for the GST is considered, with the pre-GST date with a value of 0 and otherwise 1 (see Table 1). In Equation (2), β_0 is constant consisting of credit risk (C_r) and operating cost (C_o). If $\beta_1 / \beta_0 > 10\%$, this shows GST over-shifting in the context of yield spreads as $C_g / C_o > C_g/(C_r + C_o)$.

With respect to the credit criteria, prior studies (e.g., Hendershott and Shilling, 1989; Ambrose et al., 2004) have used loan-to-value ratios (LTV) and loan size to test models for credit risk of mortgages. A similar approach is adopted in this study. LTV ratios are divided into three categories (i.e., maximum LTV > 90%; 90% ≥ maximum LTV ≥ 85%; and maximum LTV < 85%) and loan size are divided into four groups (see Table 1 for details), following Liu and Skully (2005). As loans with higher LTV ratios are considered to have higher credit risk (see, Ambrose et al., 2004; Liu and Scully, 2005), a positive

relationship is expected between the yield spreads and LTV ratios. Similarly, as larger loans are considered to have higher risk, a positive relationship is also expected between the yield spreads and the loan size.

In addition, the market default premium is proxied by the yield differences between AAA- and A-rated corporate bonds with a 2–4 year constant maturity, which has also been used by prior studies (see, Ambrose et al., 2004; Liu et al., 2005). A positive relation is expected between the market default premium (a lag) and the mortgage yield spreads. In the model, individual months or quarters are included to detect seasonal effects, which are similarly used in prior studies (Ambrose et al., 2004).

To perform robustness checks, we further develop a multivariate model to test mortgage interest margins. As one may argue that not all credit unions use 90-day bank bills as a funding channel and a funding cost benchmark, we use 3-month deposit interest rates as a proxy for a funding cost benchmark for credit unions. In the following model (Equations 3), the dependent variable is the effective mortgage interest margin (EMGN). The independent variables are the same as those in Equation (2). The ω_0 in Equation (3) is constant consisting of credit risk (C_r) and operating cost (C_o). If $\omega_1/\omega_0 > 10\%$, this shows GST over-shifting in the context of interest margins as $C_g/ C_o > C_g/(C_r + C_o)$.

$$EMGN_i = \begin{cases} \omega_0 + \omega_1 GST_i + \omega_2 MAXNO_i + \omega_3 MAXLOAN200_i + \omega_4 MAXLOAN100_i \\ + \omega_5 MAXLOAN50_i + \omega_6 MAXLTV95_i + \omega_7 MAXLTV90_i + \omega_8 MAXLTV85_i \\ + \omega_9 MDFT(-1)_i + \omega_j \sum MON_{ji} \text{ or } + \mu_j \sum QUT_{ji} + e_i \end{cases} \quad (3)$$

4. Empirical Results

4.1 Results on Mortgage Yield Spreads

[Insert Table 2 about here]

As shown in Panels A and B of Table 2, the GST increased the effective yield spreads by 65.3 (with quarterly effects) and 65.1 (with monthly effects) basis points (both significant at $p<0.01$), indicating that the GST contributed significantly to the rise in mortgage costs in the post GST periods. As we discussed,

if $\beta_1/\beta_0 > 10\%$, this suggests the GST over-shifting. In Panels A and B, β_1/β_0 is 32.0% (=0.653/2.039) and 32.6% (=0.651/1.998) respectively.

These increases are much higher than those of banks (see Huang and Liu, 2012), generally consistent with prior research in relation to the impact of the GST on price levels (e.g., Johnson, et al., 1999; Tran-Nam, 2000 and 2001). As we discussed, if $\beta_1/\beta_0 > 10\%$, this shows the GST over-shifting in the context of yield spreads as $C_g/ C_o > C_g/(C_r + C_o)$. This may relate to tax compliance literature that has found that smaller businesses can have greater regressive compliance costs compared to larger operations (Evans et al. 1997).

The loan size, as a measure of credit risk, is found to have a positive relation to the spreads, as predicted in Table 1. When MAXLOAN100 (A$1,000,000 > maximum loans ≥ A$500,000) is controlled, larger loans MAXLOAN200 (maximum loans ≥ A$1,000,000) and MAXNO (no maximum loans required by the lender), have positive coefficients, indicating higher yield spreads. However, smaller loans MAXLOAN50 (maximum loans < A$500,000) also have higher yield spreads, contrary to the predicted sign. This result is perhaps due to the fact that credit unions may not have the economies of scale in making smaller loans cheaper (see Liu and Skully, 2005). The results for LTVs show that, when the MAXLTV 95 group (maximum LTV > 90%) is controlled, MAXLTV 80 (maximum LTV < 85%) have higher effective yield spreads (with positive coefficients), again contrary to the predicted sign. This means the mutual lenders do not consider the loan to value ratio (maximum LTV) as a credit risk in pricing a loan due to the fact that if the LTV ratio exceeds 80%, the borrower is required to buy mortgage insurance. Therefore, the lender is not exposed to higher credit risk associated with maximum LTV's loans..

In Table 2, the market default risk variable (MDFT-1) is significant to the yield spreads, which is again consistent with our prediction and previous literature (e.g., Hendershott and Shilling, 1989). With respect to seasonal effects, when the third quarter (Qut 3) is controlled, the other three quarters are significantly positive, indicating the third quarter is the cheapest season.

In relation to model fit in Table 2, the overall models achieve significant regression results with *F*-statistics ($p<0.001$). Adjusted R^2 slightly improves from 0.431 with quarterly effects to 0.459 with monthly effects, indicating the model with monthly effects is better one.

4.2 Robustness Tests on Mortgage Interest Margins

[Insert Table 3 about here]

Table 3 shows, after other variables are controlled, the GST alone led to an increase in the margins by 70.1 (with quarterly effects) and 70.3 (with monthly effects) basis points (both significant at $p<0.01$). The GST shifting ratio (ω_1/ω_0) is equal to 22.5% (=0.701/3.112) and 22.9% (=0.703/3.057) respectively, suggesting GST over-shifting in the context of interest margins.

The findings on effective interest margins are more robust and meticulous. As credit unions in Australia are non-profit seeking firms, one may question why credit unions over shift the GST costs not only to borrowers (the members) but also to depositors (the members) as the margins come from both sides of lending and funding. Perhaps the reasons for such GST costs charged in mortgages may be the result of the allocation of their compliance costs for the implementation of the GST, as they operate on a smaller scale compared to banks, as well as the GST levied on operational items.

5. Conclusion

The key findings of this study are that the introduction of the GST in July 2000 led to the substantial rise in mortgage costs charged by credit unions in the post-GST periods. Overall, the GST alone contributed to the increase of effective yield spreads by 65.3/65.1 basis points and of effective interest margins by 70.1/70.3 basis points. Furthermore, measured by the GST-shifting ratio, credit unions passed more than twice of the GST amount they paid to their mortgage holders, suggesting GST over-shifting.

The mortgage burdens on Australian borrowers have risen substantially and housing affordability has declined sharply in the past decade. The findings of this study may have some practical implications for regulators and policymakers in the banking industry in their contemplation of the proper regulations and policies to control and curb mortgage costs – especially the need to provide for greater competition in the sector. For the borrowers, the evidence suggests that lenders have passed the GST costs and more to them each year.

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Table 1 Definition and Predicted Signs of Variables

Panel A: Dependent variables		**Equations**	
EYSP	standard adjustable interest rates plus sum of all other fees and charges on mortgage over 90-day bill rates	√	~
EMGN	standard adjustable interest rates plus sum of all other fees and charges on mortgage over 90-day deposit rates	~	√
Panel B: Independent variables			
GST	=Dummy variable, pre-July 2000 = 0; otherwise = 1	β_1 (+)	ω_1 (+)
MAXNO	=No maximum loans required by the lender	β_2 (+)	ω_2 (+)
MAXLOAN200	=Maximum loans ≥ A$1,000,000	β_3 (+)	ω_3 (+)
MAXLOAN50	=Maximum loans < A$500,000	β_5 (-)	ω_5 (-)
MAXLTV90	=90% ≥ maximum loan to value ratio ≥ 85%	β_7 (-)	ω_7 (-)
MAXLTV85	=maximum loan to value ratio < 85%	β_8 (-)	ω_8 (-)
MDFT(-1)	=lag of yield differences between AAA- and A-rated corporate bonds with a 2–4 year maturity constant maturity, proxying the market default risk	β_9 (-)	ω_9 (-)
Mon 1	=January each year from 1999 to 2001	β_{10} (+)	ω_{10} (+)
Mon 2	=February each year from 1999 to 2001	β_{11} (+)	ω_{11} (+)
Mon 3	=March each year from 1999 to 2001	β_{12} (+)	ω_{12} (+)
Mon 4	=April each year from 1999 to 2001	β_{13} (+)	ω_{13} (+)
Mon 5	=May each year from 1999 to 2001	β_{14} (+)	ω_{14} (+)
Mon 6	=June each year from 1999 to 2001	β_{15} (+)	ω_{15} (+)
Mon 7	=July each year from 1999 to 2001	β_{16} (+)	ω_{16} (+)
Mon 9	=September each year from 1999 to 2001	β_{18} (+)	ω_{18} (+)
Mon 10	=October each year from 1999 to 2001	β_{19} (+)	ω_{19} (+)
Mon 11	=November each year from 1999 to 2001	β_{20} (+)	ω_{20} (+)
Mon 12	=December each year from 1999 to 2001	β_{21} (+)	ω_{21} (+)
Qut 1	=The first quarter each year from 1999 to 2001	λ_1 (+)	μ_1 (+)
Qut 2	=The second quarter each year from 1999 to 2001	λ_2 (+)	μ_2 (+)
Qut 4	=The fourth quarter each from 1999 to 2001	λ_4 (+)	μ_4 (+)
Panel C: Control variables			
MAXLOAN100	=A$1,000,000 > maximum loans ≥ A$500,000	β_4	ω_4
MAXLTV95	maximum loan to value ratio > 90%	β_6	ω_6
Mon 8	=August each year from 1999 to 2001	β_{18}	ω_{18}
Qut 3	=The third quarter each year from 1999 to 2001	λ_3	μ_3

Table 2 Regression estimate on effective yield spreads

In this table, we report the cross-sectional regression results of effective yield spreads in relation to the GST impact. The regression equation is:

$$EYSP_i = \begin{cases} \beta_0 + \beta_1 GST_i + \beta_2 MAXNO_i + \beta_3 MAXLOAN200_i + \beta_4 MAXLOAN100_i + \beta_5 MAXLOAN50_i \\ + \beta_6 MAXLTV95_i + \beta_7 MAXLTV90_i + \beta_8 MAXLTV85_i + \beta_9 MDFT(-1)_i + \beta_j \sum MON_{ji} \text{ or } + \lambda_j \sum QUT_{ji} + e_i \end{cases}$$

See Table 1 for a definition of each of these variables.

	Panel A **Effective Yield Spreads (EYSP)**			Panel B **Effective Yield Spreads (EYSP)**		
Explanatory Variables	Coefficient	*t*-statistic	VIF	Coefficient	*t*-statistic	VIF
Intercept	2.039	47.667***	~	1.998	43.138***	~
GST	0.653	38.917***	1.199	0.651	39.664***	1.204
MAXNO	0.072	3.618***	1.690	0.071	3.657***	1.690
MAXLOAN200	0.150	3.775***	1.174	0.152	3.921***	1.175
MAXLOAN50	0.102	4.527***	1.645	0.101	4.591***	1.645
MAXLTV90	0.018	1.086	1.095	0.018	1.117	1.095
MAXLTV80	0.052	2.141**	1.084	0.052	2.201**	1.084
MDFT(-1)	-0.022	-23.041***	1.119	-0.023	-24.246***	1.140
Month Effects:						
Mon 1	~	~	~	0.565	14.032***	1.596
Mon 2	~	~	~	0.673	16.907***	1.590
Mon 3	~	~	~	0.441	12.237***	1.854
Mon 4	~	~	~	0.489	13.593***	1.860
Mon 5	~	~	~	0.194	5.388***	1.859
Mon 6	~	~	~	0.226	6.284***	1.858
Mon 7	~	~	~	0.106	2.979***	1.825
Mon 9	~	~	~	0.118	3.335***	1.827
Mon 10	~	~	~	0.185	5.215***	1.853
Mon 11	~	~	~	0.131	3.703***	1.871
Mon 12	~	~	~	0.083	2.345**	1.843
Quarter Effects:						
Qut 1	0.468	20.375***	1.469	~	~	~
Qut 2	0.230	10.567***	1.567	~	~	~
Qut 4	0.056	2.670***	1.500	~	~	~
No. of observations	2540			2540		
Adjusted R-square	0.431			0.459		
F-statistic	193.17			120.576		
p-value	0.000			0.000		

*, ** and *** denote the 10%, 5% and 1% levels of significance respectively. VIF is the variance inflating factor to detect the multicollinearity problem among independent variables.

Table 3 Regression estimate on effective interest margins

In this table, we report the cross-sectional regression results of effective interest margin in relation to the GST impact. The regression equation is:

$$EMGN_i = \begin{cases} \omega_0 + \omega_1 GST_i + \omega_2 MAXNO_i + \omega_3 MAXLOAN200_i + \omega_4 MAXLOAN100_i + \omega_5 MAXLOAN50_i \\ +\omega_6 MAXLTV95_i + \omega_7 MAXLTV90_i + \omega_8 MAXLTV85_i + \omega_9 MDFT(-1)_i + \omega_j \sum MON_{ji} \text{ or } + \mu_j \sum QUT_{ji} + e_i \end{cases}$$

See Table 1 for a definition of each of these variables.

	Panel C			Panel D		
	Effective Interest Margin (EMGN)			**Effective Interest Margin (EMGN)**		
Explanatory Variables	Coefficient	*t*-statistic	VIF	Coefficient	*t*-statistic	VIF
Intercept	3.112	82.446***	~	3.057	73.945***	~
GST	0.701	47.337***	1.199	0.703	48.036***	1.204
MAXNO	0.065	3.735***	1.690	0.065	3.752***	1.690
MAXLOAN200	0.141	4.006***	1.174	0.140	4.039***	1.175
MAXLOAN50	0.100	5.040***	1.645	0.099	5.066***	1.645
MAXLTV90	0.025	1.668*	1.095	0.025	1.712*	1.095
MAXLTV80	0.057	2.643***	1.084	0.056	2.656***	1.084
MDFT(-1)	-0.004	-4.654***	1.119	-0.004	-5.113***	1.140
Month Effects:						
Mon 1	~	~	~	0.295	8.208***	1.596
Mon 2	~	~	~	0.236	6.639***	1.590
Mon 3	~	~	~	0.269	8.367***	1.854
Mon 4	~	~	~	0.255	7.935***	1.860
Mon 5	~	~	~	0.147	4.592***	1.859
Mon 6	~	~	~	0.147	4.598***	1.858
Mon 7	~	~	~	0.040	1.268	1.825
Mon 9	~	~	~	0.165	5.232***	1.827
Mon 10	~	~	~	0.162	5.121***	1.853
Mon 11	~	~	~	0.166	5.249***	1.871
Mon 12	~	~	~	0.013	0.402	1.843
Quarter Effects:						
Qut 1	0.197	9.718***	1.469	~	~	~
Qut 2	0.114	5.951***	1.567	~	~	~
Qut 4	0.044	2.372**	1.500	~	~	~
No. of observations	2540			2540		
Adjusted *R*-square	0.490			0.504		
F-statistic	245.285			144.413		
p-value	0.000			0.000		

*, ** and *** denote the 10%, 5% and 1% levels of significance respectively. VIF is the variance inflating factor to detect the multicollinearity problem among independent variables.

[i] Opposition bill to take on banks a 'thought bubble' in the Australian", November 21, 2010, http://www.theaustralian.com.au/national-affairs/people-in-politics/opposition-bill-to-take-on-banks-a-thought-bubble-treasurer-wayne-swan-says/story-fn5nzhg1-122595783352.