

Relationship Lending, Foreign Banks and Financial Contagion: Evidence from Emerging Africa

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Abstract. Interbank markets are essential for the smooth functioning of the banking system. It has been observed that the relationships developed in these markets have adverse impacts on the propagation of financial shocks. Theory suggests that market completeness would minimize the effects of these shocks. Another area of concern is the presence of foreign banks in a country as it is expected that they are a main source of transmission of banking shocks globally. In order to check the impact of lending relationships and foreign bank presence on the banking system during a crisis situation, we take the unique case of the Ugandan banking sector. Uganda is one of the fastest growing economies in Africa. The Ugandan banking sector is distinctive as it is not only dominated by foreign banks but is also a perfect example of market completeness where all banks have lending relations with other banks. Using a unique data set comprising all interbank loan given from Jan 2006 to Dec 2010 we find out that relationships developed in the interbank market remain robust even during a crisis situation and also that market completeness eradicates the adverse effects caused by foreign bank presence in an economy.

Keywords: Relationship Lending, Financial Contagion, Interbank Market, Banking Crisis.

1. Introduction

Efficiently functioning interbank markets are essential to the stability of the banking system. These markets act as a buffer for banks short in liquidity by readily providing funds while the lenders are able to gain advantage of having access liquidity by lending at favourable rates. The recent financial crisis bore all the marks of a funding liquidity crisis as interbank markets globally suffered heavily. Liquidity dry ups caused banks to resort to the discount windows at the central banks. Systemic risk is very prominent in the banking system [1] recent work has focused on the impact of financial distress in the interbank markets [2] which represent a channel for shock propagation in the system through the linkages developed in the interbank markets. It is argued that banks which have developed linkages in normal times will continue these relationships during times of crisis. This relationship lending is what leads to propagation of shock as when one of the financial institutions in the chain is hit by shock it transfers to the other relations in the market [3]. Two structural characteristics of the interbank market have been identified by [4], completeness and interconnectedness where completeness refers to the condition where all banks lend to other banks in the system while interconnectedness refers to the situation where all banks are linked financially to other banks. They state that if the market is complete then the propagation of shocks would be minimized and if market is interconnected then the shocks would propagate. There is need to check whether relationship lending and market completeness impact the working of the interbank market, particularly during a crisis scenario.

One of the major limitations in the study of interbank markets is non-availability of loan data, leading to dubious results. We overcome this limitation by obtaining a unique data set comprising all interbank loans given between Jan 2006 to Dec 2010 in Uganda. The data has been obtained by the Bank of Uganda which acts as the regulator for all the financial institutions operating in the country. Uganda is a unique market as majority of the banks operating there are foreign bank subsidiaries, accounting for 87% of the total banking sector [5]. Through various regulatory reforms the Ugandan banking sector has developed sound regulations and a functioning interbank market, which is classified as a complete market as almost all banks have interbank relationships with one another.

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We follow similar approach to [6] in assessing the impact of relationship lending in the interbank market prior to and after the start of the financial crisis. The null hypothesis is that market completeness does not have an impact on bank lending. We identify banking relationships by using relationship variables and then use OLS regression analysis to estimate the coefficients.

To our knowledge no work has been done on the effects of relationships in the interbank market during the financial crisis of 2007-08 using actual interbank data from the regulator in context of a complete market such as Uganda. This research will contribute to the literature on interbank lending relationships by showing the effects of relationship lending and market completeness in the market of interbank loans.

2. Methodology

Our purpose is to show the impact of banking relationships on the interbank market in Uganda and to study the effects of financial crisis on these relationships. Having identified 289 unique bank pairs in the interbank market, we first establish the strength of the relationship between pairs using relationship variables. We find out the lender preference index (LPI) to check the significance of the borrower for the lender. We calculate the amount given to borrower j by lender i over some time period t and sum it over a period T and divide it by the sum of amounts lent by bank i over that period. The variable is set to zero if the denominator is zero. As the nature of interbank relationship is two-way hence the two-sided relationship between the lender and borrower bank is computed as the borrower preference index (BPI) which is the amount borrowed by bank j from bank i over a time period T relative to the sum of amounts borrowed by bank j as a measure of the importance of the lending bank for the borrower. Further we check for the frequency of interaction between two financial institutions using variable \log_rel . Where $I(\cdot)$ is indicator function and y_{ijt} denotes the amount lend from bank i to bank j at time t . We use this variable to measure the strength of the relationship shown through repeated interactions with a bank. Similar to before, we check the two sided nature of the banking relationship by calculating the \log_rel_rev as the number of days the current lender had taken a loan from the borrower.

$$LPI_{ijt} = \frac{\sum_{t' \in T} y_{ijt'}}{\sum_j \sum_{t' \in T} y_{ijt'}} \quad (1)$$

$$BPI_{ijt} = \frac{\sum_{t' \in T} y_{ijt'}}{\sum_i \sum_{t' \in T} y_{ijt'}} \quad (2)$$

$$\log_rel_{ijt} = \log(1 + \sum_{t' \in T} I(y_{ijt'} > 0)) \quad (3)$$

$$\log_rel_rev_{ijt} = \log(1 + \sum_{t' \in T} I(y_{jit'} > 0)) \quad (4)$$

$$i_{ijt}^T = \frac{i_{ijt}^t - i_m^t}{i_a^T} \quad (5)$$

We have calculated the interest rate i_{ijt} as difference between the rate from lender L to borrower B and the overnight interest rates and taken an average over a certain time period T . According to literature on interbank borrowing and lending, it is seen that big banks are generally net borrowers in the market for interbank loans as they are considered safer while smaller banks have to pay a premium for the amount borrowed due to their riskiness. In order to take the effect of size into the data we use total assets of the banks, taken in logarithmic terms, as a control variable of size which effects lending and borrowing decisions. We have divided the banks into three categories, big (TA >1200million Ugandan sterling), medium (total assets <1200 million Ugandan sterling >400 million Ugandan sterling) and small (total assets < 400million Ugandan sterling). Explanatory variables have been computed to explain the various factors involving the lender and borrower in the interbank market. The summary statistics for these explanatory variables in terms of bank size are provided in Table I also a mean comparison test for these variables where the mean before and after the crisis have been computed is given in Table II. First we compute the unconditional correlations between two of the relationship metrics (LPI $_{ijt}$ and BPI $_{ijt}$) and the loan interest rate. The use of the LPI and

BPI variables shows the importance of the relationship for both the lender and borrower, which proves as a proxy for the quality of information about the counter party:

$$i_{ijt} = \beta_1 + \beta_2 LPI_{ijt} + \beta_3 BPI_{ijt} + u_{ijt} \quad (6)$$

where

u_{ijt} is the residual. Further we introduce the control variable for total assets ($Size_j$) in order to check the impact of size of the institutions on the lending relationship:

$$i_{ijt} = \beta_1 + \beta_5 Size_j^t + \beta_2 LPI_{ijt} + \beta_3 BPI_{ijt} + u_{ijt} \quad (7)$$

After establishing the strength of the relationship between the two institutions we now check for the frequency of interaction by introducing the variables \log_rel and \log_rel_rev into the equation. Thus we repeat the previous analysis using these measures:

$$i_{ijt} = \beta_1 + \beta_5 Size_j^t + \beta_2 LPI_{ijt} + \beta_3 BPI_{ijt} + \beta_4 \log_rel_{ijt} + \beta_5 \log_rel_rev_{ijt} + u_{ijt} \quad (8)$$

In order to check for the effects of the financial crisis we repeat the following regressions by introducing a dummy crisis which equals 1 for dates beginning from September 1, 2008 as in [7] the crisis hit Uganda during that time period. This equation tells us the impact of the relationship variables on the rate offered and also it controls for bank size effects. The results of the regressions are shown in the section below in Table III.

3. Empirical Results

Table I shows the summary statistics of relationship variables computed in terms of bank sizes, there are 9 banks with asset size less than 400 Million Ugandan Sterling, 9 banks with asset size between 401-1200 Million Ugandan Sterling and 6 banks with asset size greater than 1200 million Ugandan Sterling. Variable num_br shows the number of borrowers the bank lent to, num_len is the number of lenders the bank borrowed from. Lender/borrower indicated the frequency with which the bank acted as a lender/borrower. Amount_lend/amount_bor shows the amount lend/borrowed in Billion Ugandan Sterling. Net position is the difference between the amounts lends and borrowed.

Table I: Summary Statistics of Explanatory Variables by Bank Asset Size

Asset Size	num_br	num_len	lender	borrower	amount_lend	amount_bor	net_pos
0-400 Mil Ug							
Mean	10	8	60	21	70.92	15.95	54.97
Max	16	14	902	370	1211	565.8	1100.1
Min	12.6	10.8	538.2	124.4	691.806	157.214	534.592
401-1200Mil Ug							
Mean	8	13	76	56	96.15	77.6	-550.31
Max	15	16	1133	1008	3418.22	1862.6	1981.55
Min	12.4	14.4	604.8	646.2	1535.536	1169.792	365.744
>1200 Mil Ug							
Mean	11	13	117	176	188.4	261.85	-2522.1
Max	15	16	1931	2920	4764	6331.89	-734.5
Min	13.2	14.4	1033	1405.4	2642.658	3543.108	-900.45

[8] Classified banks into various categories according to their sizes to check for the effects of bank size on lending and borrowing behaviors. They stated that small banks are expected to be net lenders due to less public information about their credit worthiness while large banks are net borrowers due to ease of monitoring of these institutions. Our results are similar to these as we have found that larger banks are net borrowers in the markets while the smaller banks are net lenders, in our dataset the banks classified as medium show mixed behavior on an individual level but are net lenders on an aggregate level. It is observed that the big banks engage in more transactions in the interbank market and are better at finding lenders and borrowers in the market, supporting the view that superior information about big institutions mitigates market frictions.

Table II shows the mean comparison test for a group of explanatory variables. From here it is visible that there is no major difference in the number of transactions before and after the crisis, while the amount has been increased representing the liquidity concerns of the banks since the start of the crisis which is supported by the increase in the average loan size. Also the spread has increased as prior to the crisis the spread between the relationships was below the market rate while after the crisis it has increased. While the number of lenders and borrowers remains same before and after the crisis, this goes to support the view that if market completeness persists then interbank relationships remain robust even during a crisis situation.

Table II: Mean Comparison Test for Aggregate Variables

	Pre Crisis	Post Crisis	diff.	t.stat
total_trans	11.29	11.35	-0.07	-0.16***
total_amount	9.89	11.30	-1.41	-6.10***
avg_loan_size	1.99	2.84	-0.86	-10.23***
spread_avg	-0.41	0.07	-0.47	-8.74***
num_len	7.21	7.45	-0.24	-0.60***
num_borr	7.21	7.45	-0.24	-0.60***

Where *, ** and *** indicate level of significance at 10% 5% and 1% level.

Table III: Model results using relationship and control variables

	Model 1		Model 2		Model 3	
	Pre Crisis	Post Crisis	Pre Crisis	Post Crisis	Pre Crisis	Post Crisis
LPI	0.1577*** (12.6079)	0.1044*** (5.4410)	0.1545*** (12.3032)	0.1020*** (5.3062)	0.0532 (3.5956)	0.1509*** (6.8026)
BPI	-0.0183 (-1.5050)	-0.0943*** (-4.9244)	-0.0145 (-1.1569)	-0.0927*** (-4.6991)	0.0151 (1.1758)	-0.0376* (1.6805)
Ln_Size			-0.0023 (-1.4542)	0.0031* (-1.8645)	0.0028 (1.6350)	-0.0007 (-0.4508)
Log_Rel					0.0094*** (11.0465)	-0.0008*** (-0.6280)
Log_Rel_Rev					-0.0045*** (-5.6054)	-0.0112*** (-9.3758)

Value in parenthesis are t-statistics and *, ** and *** indicate level of significance at 10% 5% and 1% level.

Table III show the results for equations (6), (7) and (8), depicted as model 1, 2 and 3 respectively. Results are divided into pre and post crisis to show for the effects of the financial crisis on the interbank market. For model 1, coefficient of $\beta_1 > 0$ and is significant showing that the lender prefers to give to borrowers with whom they have developed a relationship and receive higher rates while $\beta_2 < 0$ implying the

borrower pay a lower rate to the lender with whom they have a relationship. The relationships remain robust in lieu of the crisis showing that financial shocks are absorbed. The coefficient $\beta_3 < 0$ in model 2 implies that bank lending is inversely related to the rate offered showing that larger banks were not willing to borrow at higher rates but after the crisis the coefficient β_3 reverts signs and is significant showing that after the crisis the banks were willing to pay higher rates for obtaining liquidity. These results show that bank lending and borrowing decisions are endogenous and correlated to bank specific characteristics, similar to [6] results. After the introduction of \log_rel and \log_rel_rev variables in model 3 the coefficient $\beta_4 > 0$ and significant showing that lenders receive higher rates from borrowers with whom they have a frequent relationship while $\beta_5 < 0$ and significant showing that borrowers pay lower rates to the counter parties with whom they have frequent borrowing relationship and after the crisis we see that the coefficient $\beta_4 < 0$ and significant showing that lenders were willing to lend to their relations at a lower rate. Overall we notice that the relationship variables give consistent significant results pre and post crisis thus we can reject the null hypothesis that market completeness has no effects on shock propagation in an interbank market dominated by relationship lending.

4. Conclusion

This paper contributes to the literature of relationship lending in interbank markets by studying the impact of banking relationships in the context of a market characterized by completeness furthermore the impact of shocks in the market are studied using the financial crisis of 2007-8 as a case in point. The results show the robustness of the Ugandan banking sector to external financial shocks as well as interbank market with strong relationship based lending, the finding is similar to [9] who stated that lending relationships function well during the crisis. We also observe the effects of bank size on the lending (borrowing) patterns of banks and find that in line with previous literature on bank specific characteristics and lending as in [10] where in the big banks in Uganda are net borrowers while the small banks are net lenders. Policy implications of the findings will help the regulators understand the effects foreign bank presence in the domestic market, it is believed that such banks are very prone to spread contagion in the market as in [11] but in presence of a well-functioning interbank market the adverse effects of foreign banks presence can be reduced and the market can remain functioning even in the wake of a financial crisis. Further work can be done by introducing more control variables such as the bank ROA and non-performing loans into the analysis to better control for bank effects in the analysis.

5. References

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