

Financial Transaction Tax and Banking Margins: An Empirical Note for Colombia*

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Abstract

Taxes on financial transactions have been especially controversial because of their potential effects on banking disintermediation. A modality of such taxes (Bank Debit Tax, BDT) was introduced in Colombia since the late nineties. Using monthly panel data from 1996 to 2014 for the major depository institutions, this paper provides evidence on the effects of the BDT on bank intermediation spreads. For the total sample (thirteen banks), results suggest that nowadays the hypothetical elimination of the BDT would reduce spreads in 90 basis points, from 7,7% to levels close to 6,8%. The results do not provide clear evidence of differential impacts by bank size. Tests for a regime switch of the BDT are performed, but no evidence is found to support this conjecture.

Keywords: Banking margins, intermediary, financial regulation, tax distortions.

JEL: G12, G21, G28, H21

* The authors would like to express their gratitude to Lina Maria Ramirez for her valuable research assistance and Luisa Silva for providing information. The opinions and conclusions expressed in this paper are those of the authors and do not compromise the Banco de la República or its Board of Directors.

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1. Introduction

As some other Latin American Countries (LAC), Colombia adopted a financial transaction tax since the end of the last century. This tax, levied on bank debits, henceforth BDT or 4x1000, as it is commonly known, has been controversial and subject of many adjustments. It has been amended in the last eight tax reforms, after its establishment in November 1998 as a provisional contribution to alleviate the financial system crisis. The BDT has gone from temporary to permanent; its rates have been unified and increased; the tax basis has been readjusted several times; its gradual removal has been rescheduled three times; and, finally, the revenue collected has changed its purpose four times: to address the financial system crisis in 1999, for reconstruction in the aftermath of a 1999 earthquake, to fund the rainy season emergency during 2011 and to confront the agricultural sector crisis in 2013.

The main criticisms regarding the 4x1000 arise from the inefficiencies it may be generating in the financial intermediation market. On the one hand, it can increase the cost of financial repression faced by banks due to government regulation and, thereby, it could affect interest rates on deposits and loans. On the other hand, the tax represents an additional transaction cost for customers, therefore discouraging the use of bank services. The eventual increase in banking spreads as well as the higher transaction costs for the customers end up generating financial disintermediation. Additional critiques to the BDT are associated with the creation of incentives to informality and illegal activities, and changes in the usage of different means of payment.

The key objective of the majority of the financial transaction taxes adopted at the end of the nineties was to raise public revenue. In particular, revenue from the Latin American bank debit taxes has varied widely, but has typically been around 1% of the GDP. In Colombia, the 4x1000 has become one of the easiest taxes to collect and represents a non-negligible source of government funding (currently 6% of the tax revenues or 0,8% of the GDP, CEECT, 2015). A drop in productivity recorded over the last decade (from 25% to 15% between 2000 and 2009) was corrected mainly by the tax reform of 2010. Currently, the productivity of this tax has regained the levels seen 15 years ago. Finding new resources to replace those coming from 4x1000 is difficult, especially because of the falling oil revenues (MHCP, 2015). The eventual abolition of the BDT would require around a three percentage point increase of the added value tax. Hence, its elimination remains uncertain.

Literature on financial transaction taxes is ample. Interestingly, the majority of papers were published in the subsequent years to their adoption. LAC like Argentina, Bolivia, Brazil, Ecuador, Peru, and Venezuela introduced financial transaction taxes at the beginning of this century, though some have already repealed them (Brazil, Ecuador and Venezuela). The pioneering papers characterized the taxes approved in

each country and analyzed their collection and productivity. In addition, the introduction of this kind of taxes was associated with some stylized facts in the means of payment, clearing checks and monetary and financial aggregates (Lozano et al., 2000, Coelho et al., 2001, Arbeláez et al., 2004, Baca Campodonico et al., 2006). Subsequent papers have tried to capture the expected effects of these taxes on financial disintermediation (Zea and Hernández, 2006), on the demand for cash, and on the substitution between financial instruments issued by banks (Giraldo et al., 2011). The loss of efficiency caused by these taxes has been evaluated in diverse contexts (Kirilenko, et al., 2003) and has been compared with the inefficiencies arising from other taxes (Suescun, 2004).

The BDT in Colombia is paid by depositors when they make withdrawals from their sight bank deposits. However, in the case of term deposits (CDs), banks must pay the BDT on the liquidation of the deposits. This imposes a cost on banks that could be reflected in higher lending/deposit interest rate spreads. In this note we assess the effects of BDT on these spreads. The analysis is carried out on the basis of monthly panel data for the majority of banks, taken from their balance sheets for the period between 1996 and 2014. The estimation controls for key factors identified in the banking literature as interest spread determinants. Unlike previous studies (Salazar, 2005; Galindo et al., 2006 and Medellín et al., 2013), in this paper we identify the isolated impact of BDT on spreads for the aggregate banking system and for banks grouped according to their size. Moreover we evaluate possible regime changes for the collection of this tax. Following this introduction, we describe the model and data in section 2, in section 3 we present and analyze results and, in section 4, some conclusions are drawn.

2. Methodology

2.1 The Model

We start with a simple model for a representative bank j whose objective is to maximize profits (π_j) at each point in time t . We omit the time subscripts for simplicity. The bank produces loans (L_j) using as inputs deposits (D_j) and labor (N_j). Revenues for bank j come from the remuneration of its productive loans ($\delta_j i_{L,j} L_j$, where $\delta_j \in [0,1]$ is the share of productive loans), while its costs are associated with the remuneration of deposits ($i_{D,j} D_j$) and labor $C_j(L_j, D_j)$, which in turn depends on the volume of loans and deposits. Interest rates on loans and deposits are denoted by i_L and i_D , respectively.

We disaggregate deposits into term deposits (CD_j) and other deposits (OD_j). A share of these deposits (E_{CD} and E_{OD}) is required by the central bank as compulsory

reserves while the rest ($1-E_{CD}$ and $1-E_{OD}$) is available to be lent by banks. The representative bank faces additional costs generated by financial repression; in particular, we stress here those derived from the financial transaction tax on the liquidation of CDs. The problem for a bank which chooses between the two types of deposits is given by:

$$\begin{aligned} \max_{\{CD,OD\}} \pi_j &= \delta_j i_{L,j} L_j - i_{CD,j} CD_j - i_{OD,j} OD_j - C_j(L, CD, OD) - \alpha_j CD_j (1 + i_{CD,j}) \tau \\ \text{s.t. } L_j &= CD_j (1 - E_{CD}) + OD_j (1 - E_{OD}) \end{aligned} \quad (1)$$

where α is the share of CDs that reach its maturity date and are withdrawn each period and τ the financial transaction tax of flat rate (of 0,4%, hence its name 4x1000). From the two first order conditions derived from (1), we retake only the first $\left(\frac{\partial \pi_j}{\partial CD_j} = 0\right)$,

$$\begin{aligned} \frac{\partial \pi_j}{\partial CD_j} &= \delta_j i_{L,j} (1 - E_{CD}) - i_{CD,j} - \frac{\partial C_j}{\partial CD_j} - \frac{\partial C_j}{\partial L_j} (1 - E_{CD}) - \alpha_j (1 + i_{CD,j}) \tau = 0 \quad \text{or} \\ i_{L,j} - i_{CD,j} &= i_{CD,j} \left[\frac{1 + \alpha_j \tau}{\delta_j (1 - E_{CD})} - 1 \right] + \frac{\partial C_j}{\partial CD_j} \frac{1}{\delta_j (1 - E_{CD})} + \frac{\partial C_j}{\partial L_j} \frac{1}{\delta_j} + \frac{\alpha_j \tau}{\delta_j (1 - E_{CD})} \end{aligned} \quad (2)$$

Note that left side of (2) represents the banking spread defined as the difference between the interest rate received from loans and the interest rate paid on CDs. Clearly, the interest rate spreads will be positively affected by the financial transaction tax as long as $\alpha_j \frac{(i_{CD,j} + 1)}{\delta_j (1 - E_{CD})} > 0$.

We want to emphasize some potential alternatives employed by banks to compensate, via interest rates, the cost generated by the financial transaction tax. Following (1) and (2), the bank j may react by increasing the loan interest rates and/or by reducing the interest rates on deposits, both on CD's and/or on other deposits. In practice, either option should ultimately impact the banking margins as it will be examined below.

In order to run the estimations, the reduced form of the model is used to guide the econometric specification with some extensions. Firstly, we include additional sources of financial repression, which could result costly for banks in Colombia; secondly, we introduce further key factors in the determination of margins identified by literature; and, thirdly, we use the banking margins based on total deposits instead of the ones based on term deposits because of data availability.

Regarding additional sources of financial repression we add the so-called forced investments (IF_j) in agricultural development securities; the required reserves

by the central bank on all deposits (E_j) and the equity requirements (RC_j) enforced by macro-prudential regulation. Other financial repression channels with less noticeable costs, associated to controls on the interest rates, controls to competition, presence of public banks in the system, etc. are not included in our exercises¹.

Concerning the second point, we incorporate at least two additional factors identified in the literature. On the one hand, credit risk measures are included, given that riskier loans imply higher interest rates charged by banks. Barajas, et al., (1999) provide evidence on the importance of risk exposure in the banking margins formation in Colombia. On the other hand, the fees (commissions) charged by intermediaries by the services they provide are also taken into account, since under certain circumstances they could be a source of income that complements or even replaces income from interest on loans. Estrada, et al., (2006) explore the importance of this factor in the margin formation of the Colombian financial system.

With the above-mentioned considerations, the econometric specification that we use is the following:

$$i_{L,j,t} - i_{D,j,t} = \beta_1 \tau_{t-1} \gamma_{j,t-1} + \beta_2 C_{N,j,t-1} + \beta_3 IF_{j,t-1} + \beta_4 E_{j,t-1} + \beta_5 RC_{j,t-1} + \beta_6 \mathbf{x}_{j,t-1} + \mu_j + \lambda_t + \varepsilon_{j,t} \quad (3)$$

where \mathbf{x}_j is a vector of controls at the level of each intermediary (risks and commissions), and μ and λ represent the fixed effects at bank and time (month) level, respectively. The financial repression cost due to BDT is captured by $\tau\gamma_j$ where γ_j is the tax base. The explanatory variables are lagged one period in order to avoid endogeneity problems. The fixed-month effect (λ) captures especially seasonal events or macroeconomic episodes that could affect the margin of banks altogether.

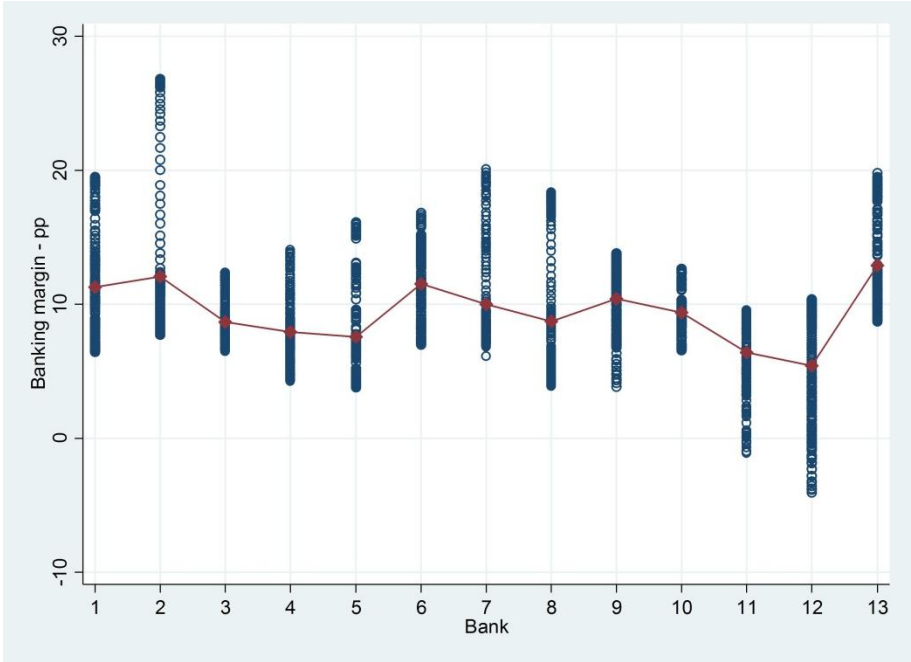
2.2 The Data

Our sample involves thirteen banks which are the biggest in terms of their asset value within the banking system (about two-thirds). The data is coherent through time, meaning that it takes into account mergers and acquisitions of financial institutions reported in the last 20 years. Information for intermediaries comes from their monthly balance sheets covering the period 1996.01 to 2014.12. Interest rates are calculated as the ratio between remuneration (payments) on loans (deposits) of twelve consecutive months and the corresponding average stock of loans (deposits). Therefore, spreads are defined as the difference between the annual average effective

¹ Carrasquilla and Zarate (2002), and Villar et al., (2005) identify some other components of the financial repression in Colombia.

interest rates on loans and deposits (Figure 1). Following the empirical literature, most of the explanatory variables must be incorporated in terms of (total) liabilities or assets of each bank; that is, forced investment to liabilities; reserve requirements to liabilities; equity requirements to assets; labor costs to assets; net commissions to assets; and expenditures in provisions (as a risk measure) to loans. The Annex summarizes the descriptive statistics of the variables included in the estimates.

Figure 1. Banking Spreads: 1996-2014
(Average in continuous line)



Source: Calculations by the authors

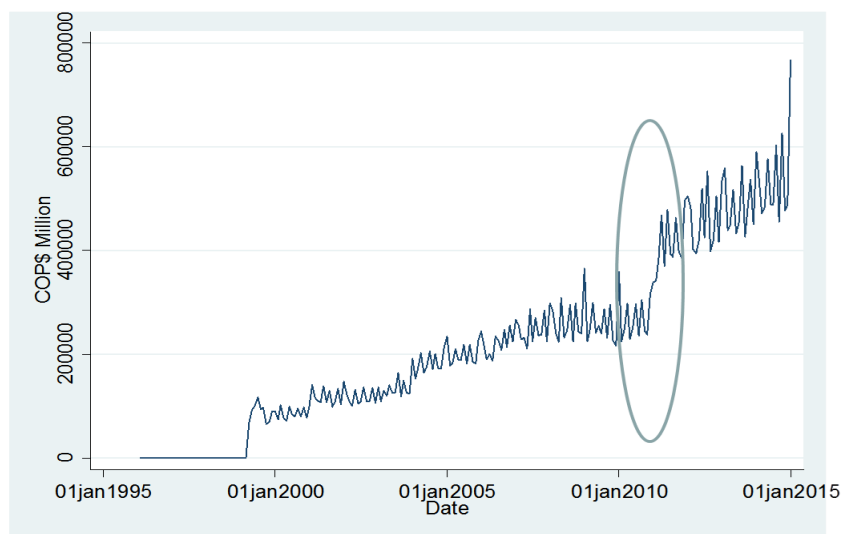
Regarding the BDT it is necessary to remark two aspects. The first is related to the revenue collected, since it has undergone numerous adjustments. The Figure 2 highlights the leap it took at early 2011, which seems to be associated with the measures undertaken by the government on operations that were used to avoid the tax (Tax Reform N° 1430 of 2010)². So, the average monthly revenues from BDT went from COP\$258 billion in the first half of 2010 to COP\$406 billion in the same period of 2011 (an increase of 58%). This dynamic allowed recovering the revenue productivity from 15% to 20% between these two years³. Revenue collected by BDT could have

² In particular, Articles 4 and 5 of this tax reform included transaction payment to third parties for concepts such as payroll, services, suppliers, purchase of goods, etc.

³ Productivity is calculated as the ratio between revenue (as percentage of GDP) and the tax rate, in points per thousand

undergone a structural change which should be taken into account in the estimates (apparently through both slope and intercept).

Figure 2. BDT Revenues: 1999-03 to 2014-12 (COP\$ Millions)



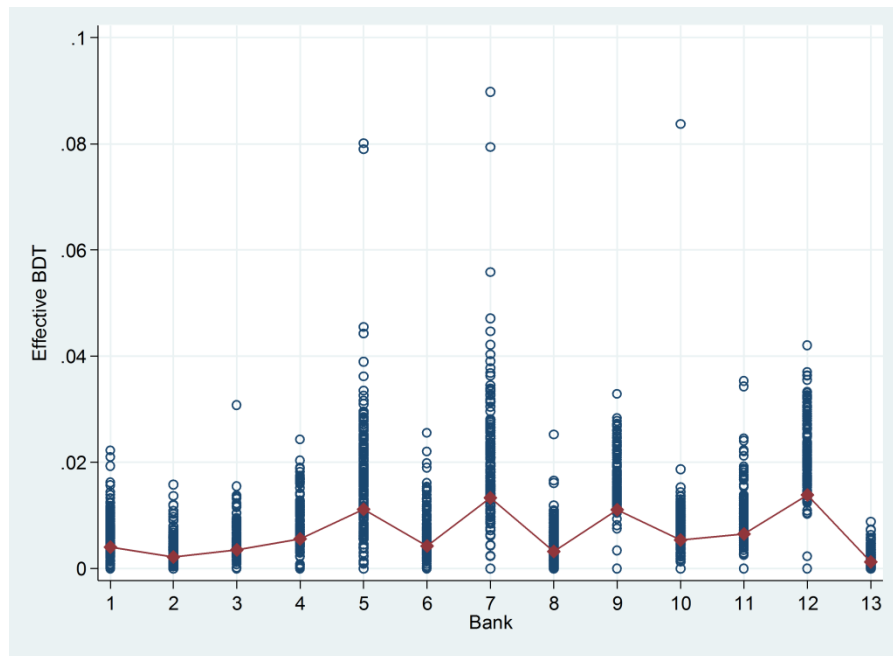
Source: Calculations by the authors

The second relates to the tax burden assumed by each bank, which is not so evident nor is available in the data sets at hand. The DIAN (Agency of National Taxes and Customs) does not provide that information for confidentiality reasons. As noted in (3), the tax burden of BDT is given by $\tau\gamma_j$, where τ is the flat tax rate and γ_j is a tax base that differs between intermediaries. Indeed, the tax base should correspond to the value of CDs that are reimbursed in each period of time. Consequently, we infer γ_j using information on the monthly stock of CDs and the new issues of this kind of deposits. This measurement strategy of γ_j is quite different with regard to the one designed by Galindo et al. (2006).

The reason why the BDT would affect the banking cost and, therefore, their margins, ultimately has to do with the Law 788 of 2002, which established that the tax burden on liquidation of CDs should be assumed by the entity issuing the term deposits. In this regard, the cost of BDT is not only supported by customers, but also by intermediaries. Figure 3 shows our estimates of tax burden (effective) of BDT for each of the thirteen intermediaries which correspond to $\tau\gamma_j$ as proportion of liabilities subject to reserve requirements⁴.

⁴ We use liabilities subject to reserve requirements instead of term deposits for the BDT-tax burden definition to keep coherence with our endogenous variable (margins based on total deposits).

Figure 3. BDT-Effective rates: 2003-2014
(Average in continuous line)



Source: Calculations by the authors

3. Results

Equation 3 is estimated by OLS using robust standard errors clustered by bank⁵. Making use of test of IPS (2003) and Choi (2001), the existence of unit root can be ruled out in both the dependent variable and the residuals of the estimated models. Hence we will assume the process is stationary. The data allow us to run estimates for all banks as well as for groups according to the size of their assets (large banks and medium and small ones). The BDT variable takes positive values from January 2003 through the end of the sample, on the basis that ever since the banks were obliged to pay this tax, while tax payments were zero before.

Table 1 summarizes the results. In columns (1) through (4) the estimates for the aggregate banking system (thirteen banks) are presented, initially leaving aside all components of financial repression (column 1) and then adding them one at a time (columns 2 and 3) to check the robustness of the BDT parameter. Column (4) represents the most complete specification of the model and the one that will be used to interpret our results.

Column (5), in turn, shows the results, grouping banks according to their size. The empirical strategy is to include a dummy variable set to zero for small and

⁵ See Wooldridge (2013) and Arellano (2003) for the advantages of this technique.

medium banks and equal to the BDT variable for large banks (five entities). This allows us to derive the differential impact on the margins of large banks. The corresponding effect on large banks margins is deduced, thereafter, taking into account the last two rows of the column (5). The estimates also include possible changes in the BDT regime, both through the intercept and slope. The signs we obtain are the expected and the majority of parameters are statistically significant and robust across estimates. The goodness of fit (R^2) of the models is close to 60%, which is satisfactory in this type of exercises.

Table 1. Results of the estimated models

Explanatory variables:	Total Banking System				Medium and Small Banks
	(1)	(2)	(3)	(4)	(5)
Forced Investments (% LSRR)				0.62**	0.55**
Required Bank Reserves (% LSRR)			0.38***	0.38***	0.37***
Equity Requirements (% Assets)		0.34**	0.26***	0.22**	0.23**
Labor Costs (% Assets)	1.20***	1.18***	0.98***	0.90***	0.86***
Risks (Provis. Expenditure/ Loans)	0.03	0.10	0.20	0.15	0.16
Net Commissions (% Assets)	1.25	0.95	1.41	1.15	1.19
BDT (Bank Debit Tax)	70.36**	69.39**	73.42**	64.26**	75.08***
BDT 2011 (Intercept)	0.01	-0.00	-0.00	-0.00	-0.00
BDT * Dummy 2011 (Slope)	88.47	109.74*	79.27	70.09	70.77
Constant	0.00	-0.04**	-0.05***	-0.06***	-0.05***
BDT for Large Banks (Intercept)					0.00
BDT for Large Banks (Slope)					-65.04
R-Squared	0.41	0.49	0.58	0.60	0.61
Number of observation	2930	2930	2930	2929	2929
Fixed month effects	Yes	Yes	Yes	Yes	Yes

LSRR: Liabilities subject to reserve requirements. BDT: Bank Debit Tax;. Statistical significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Estimation with robust standard errors clustered at bank level (Arellano, 2003).

The main instruments of financial repression positively impact the margins of the banking system as we expected. The size of the coefficients of forced investments, required bank reserves and equity requirements ($\beta_3=0,62$, $\beta_4=0,38$ and $\beta_5=0,22$ of equation 3, respectively) suggests that their costs are not negligible and there are no

substantial differences by size of banks. Results also confirm that the level of bank efficiency ($\beta_2=0,90$ of equation 3), as measured by labor costs, matters in spread setting, so that the lower it is (higher labor costs), the higher spreads will be set. Findings for some control variables included in vector x_j are not conclusive (the impact of credit risk and net commissions on margins are not statistically different from zero).

The impact of the BDT on intermediation spreads reveals novel details. On the one hand, the expected sign and statistical significance of the parameters are confirmed through all estimates (five in all), corroborating its robustness. Like other forms of financial repression, this tax is onerous; therefore, banks partially or totally transfer this cost to the interest rates of loans and/or deposits. On the other, there is not clear evidence of a differential impact on spreads between small, medium and large banks. That is because the parameters of the last two lines applicable to large banks (column 5) are not statistically different from zero. Finally, notice that the size of the impact remains stable for the whole period; i.e. the econometric estimates did not capture any effect of the apparent change of regime of 2011 neither through the slope nor the intercept. Despite the dynamics of the BDT revenue shown in Figure 2, this result is not a surprise because such reform did not modify anything related to the tax burden on CDs.

To illustrate our findings, we consider the estimated model for the banking system as whole (column 4). Given the historical average ratio of 0,04 (γ_j) between the reimbursed value of CDs and the total liabilities subject to reserve requirements ($LSRR_j$), which is a usual figure for a typical bank, the BDT parameter of 64,26 implies that the banking spread increases by about 0,00257 per each tax rate point ($64,26 \times 0,04 \times 0,001$). Due to the fact that the tax rate has been four points, this parameter suggests that historically the BDT has increased the margins, on average, 0,0103 (equivalent to 103 basis points). Finally, using the results to assess the current impact of a hypothetical abolition of the BDT (i.e., employing the latest information of 2014, with $\gamma_j=0,035$), we conclude that nowadays the intermediation spreads could be reduced in 90 basis points (from 7,7% to levels close to 6,8%).

4. Conclusions

Based on monthly data from 1996 to 2014 for the thirteen largest banks in Colombia, this paper provides evidence of the effects of BDT on the interest rates spreads. The effects are valued for the banking system as whole and for grouped intermediaries according to their asset size. The exercise introduces controls for the most relevant factors in spread setting, as identified in the literature.

The results illustrate that traditional mechanisms of financial repression (forced investments in TDAs, required reserves and capital requirements) affect interest rate margins in the expected direction and parameters do not vary substantially by including an ample set of control variables. The level of efficiency of banks (measured by labor costs) matters in spread setting, so that the greater the inefficiency (higher labor costs) the higher the spreads. Additionally, we found that credit risk and net commissions charged by banks for their various services seem not to have significant effects.

We found novel estimates regarding the impact of BDT on intermediation margins of banks. Results indicate that this tax became costly for banks, so they ended up transferring (partially or fully) this cost to the lending or deposit interest rates. Thus, the BDT increased intermediation margins by about 103 basis points on average for the banking system as whole. There is no clear evidence of a differential impact on spreads between small, medium and large banks. Taking as reference the effective average spread recorded for the banking system in 2014 (7.7%), our results imply that nowadays the hypothetical elimination of the BDT would reduce margins to levels close to 6,8%. Even though data on the tax revenue of BDT shows an apparent change of regime in 2011, the econometric estimates did not capture this event, so the estimated impact remains along for the whole period.

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Annex. Descriptive Statistics Panel 13 Banks

Variable		Mean	Std. Dev.	Min	Max	Obs
Intermediation Margin	overall	0.0941	0.0399	-0.0403	0.2684	N = 2964
	between		0.0224	0.0544	0.1288	n = 13
	within		0.0336	-0.0006	0.2418	T = 228
Forced Investments (% LSRR)	overall	0.0287	0.0148	0.0000	0.1121	N = 2963
	between		0.0119	0.0004	0.0418	n = 13
	within		0.0095	-0.0043	0.1015	T = 227.9
Required Bank Reserves (% LSRR)	overall	0.0764	0.0302	0.0140	0.3486	N = 2964
	between		0.0092	0.0645	0.0952	n = 13
	within		0.0289	0.0142	0.3373	T = 228
Equity Requirements (% Assets)	overall	0.1138	0.0404	-0.2273	0.2253	N = 2963
	between		0.0297	0.0476	0.1577	n = 13
	within		0.0286	-0.1610	0.2123	T = 227.9
BDT (Effective rate, (% LSRR)	overall	0.0002	0.0001	0.0000	0.0007	N = 1851
	between		0.0001	0.0000	0.0003	n = 13
	within		0.0001	-0.0001	0.0006	T = 142.4
Labor costs (% Assets)	overall	0.0567	0.0212	0.0122	0.1402	N = 2964
	between		0.0096	0.0478	0.0818	n = 13
	within		0.0191	0.0140	0.1382	T = 228
Risks (Provis. Expenditure / Loans)	overall	0.0513	0.0310	-0.0046	0.2987	N = 2964
	between		0.0144	0.0381	0.0875	n = 13
	within		0.0278	-0.0164	0.2625	T = 228
Net Commissions (% Assets)	overall	0.0086	0.0050	-0.0012	0.0325	N = 2964
	between		0.0042	0.0018	0.0158	n = 13
	within		0.0030	0.0015	0.0253	T = 228



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