Bank Debit Taxes: Productivity vs. Financial Disintermediation

Andrei Kirilenko and Victoria Summers*

Preliminary and Incomplete

Abstract

This paper makes the first formal attempt to estimate deadweight losses following the introduction of a bank debit tax. Using data from four Latin American countries, we find that, especially at higher rates, such taxes have coincided with significant welfare losses due to financial disintermediation. We find that following the introduction of the tax, deadweight losses reached up to 40 percent in Colombia, up to 60 percent in Venezuela and up to 90 percent in Ecuador. We do not find significant deadweight losses in Brazil. Our findings support a view that at low rates, bank debit taxes can be used as a quick temporary way to generate revenue, while the implementation of more traditional taxes is being improved. However, at higher rates or over an extended period of time, these taxes may lead to significant welfare losses due to financial disintermediation.

*Please do not quote or circulate without permission. The views expressed in the paper are our own and do not necessarily constitute an official position of the International Monetary Fund. Contact address: International Capital Markets Department, International Monetary Fund, Washington, DC 20431. Phone: (202) 623-5642, Fax: (202) 623-5392, E-mail: akirilenko@imf.org.

1 Introduction

In the last fifteen years, a number of countries, mostly in Latin America, imposed taxes on banking transactions. These taxes are usually levied on withdrawals from or other debits to bank accounts, including check clearance, cash withdrawals, and payments of loan installments.

Since 1988, bank debit taxes have been introduced in Argentina, Brazil, Colombia, Ecuador, Peru, and Venezuela. With the exception of Brazil, bank debit taxes were introduced at the time of crisis with the objective to quickly generate a burst of revenue.

These taxes have gained the support of some policymakers, while not resulting in much organized popular opposition. Collection and administration costs of these taxes are minimal, since financial institutions themselves collect the tax on behalf of the government. In addition, the government enjoys immediate and continuous revenue stream, since the taxes are collected from transactions in real time.

However, since bank debit taxes are levied on intermediated financial transactions, its imposition is likely to result in disintermediation. Disintermediation is broadly defined as a removal of funds from financial intermediaries, and conducting transactions in some other way (e.g., in cash, by barter, through accounts not subject to tax, etc.). Disintermediation results not only in the reduction of the tax base, but also in a possible misallocation of financial resources.

This paper investigates the efficiency of taxing bank debit transactions. We present a formal model and estimate deadweight losses following the introduction of the tax using data from four Latin American countries. We make two important assumptions. We assume that the entire burden of the bank debit tax is transferred to the borrowers. We also assume that in the first full month after its introduction, the bank debit tax has no impact on financial intermediation.

We find that, especially at higher rates, these taxes have coincided with significant welfare losses due to financial disintermediation. We find that following the introduction of the tax, deadweight losses reached up to 40 percent in Colombia, up to 60 percent in Venezuela and up to 90 percent in Ecuador. However, we do not find significant deadweight losses in Brazil.[1]

Our findings support a view that at low rates and for a limited time, bank debit taxes can be used as a quick and effective way to generate revenue, while the implementation of more traditional taxes is being improved.[2] However, at higher rates or over an extended period of time, the taxes may lead to significant welfare losses due to financial disintermediation.

Our findings are subject to a number of criticisms. In particular, our interpretation of results does not take into account the impact of other factors such as, for example, a bank

[1] In contrast, Albuquerque (2001) estimates the deadweight loss in Brazil to be 21.7 percent of the net tax revenue in 2000.

[2] See, Tanzi (2000).

run or a currency devaluation.

The rest of the paper is organized as follows. We give a brief description of bank debit taxes in Section 2, and discuss their productivity in Section 3. In Section 4, we present a formal model of bank debit taxes. In Section 5, we derive the formula for and estimate deadweight losses due to the taxes. Section 6 concludes.

2 Bank Debit Taxes in Latin America[3]

Bank debit taxes are currently in effect in several Latin American countries: Argentina, Brazil, Colombia, and Ecuador. Mexico and Venezuela are considering them. Peru had them in the past. A summary of Latin American experiences with bank debit taxes is in Table 1.

With the exception of Brazil, bank debit taxes were introduced at a time of, and in response to, general economic crisis, as an emergency means of raising government revenue. In all cases, the tax was explicitly introduced on a temporary basis, though in some cases it was then extended. When a bank debit tax was introduced in 1988 in Argentina, tax revenues were declining dramatically owing to hyperinflation, increased evasion, and depressed economic activity. The tax was reintroduced in Argentina under similar circumstances in April 2001. In 1989, when the Impuesto a los Débitos Bancarios y Financieros was introduced as a temporary and extraordinary revenue measure, Peru was immersed in a deep economic crisis and central government revenues fell from 14.9 percent of GDP in 1985 to 6.1 percent of GDP in 1989. In Colombia, when a temporary Impuesto a las Transacciones Financieras (known as the "dos por mil") was adopted in November 1998, the health of the financial sector had already deteriorated markedly and the government had declared an economic emergency.[4] In Ecuador, the tax was introduced in 1999, at a time when the economy plunged into a major economic and financial crisis. In Venezuela, a temporary bank debit tax was collected during May-December, 1994. The tax was reintroduced in Venezuela for 12 months beginning in May 1999.

Despite their widespread use in Latin America, there is considerable diversity in the design of these taxes from country to country. Transactions subject to or exempt from the tax as well as tax rates differ significantly.

Tax rates have ranged between 0.2 and 2.0 percent.[5] In all cases, the rates varied both across countries and across time, without any discernible trend.

The taxes were imposed on debits to (withdrawals from) checking, savings, and term accounts in banks and other financial institutions, and loan withdrawals (e.g., this is the case in Brazil and Colombia-in addition, the Colombian tax is imposed on credits of bank

[3] This section draws on Coelho, Ebrill and Summers (2001).

[4] In December 2000, the tax was made permanent and it rate was increased to 0.3 percent.

[5] The 2 percent tax rate was applicable in Peru during April-September 1990.

interest to accounts and on repos). In Ecuador, the base of the tax is somewhat different, with the tax being imposed not only on check cashing, but, notably, also on financial institution credits to checking, savings, term, loan, and other accounts, as well as on remittances abroad and on payments abroad by exporters and importers. As a result, in that case, both deposits to and withdrawals from the same accounts would be subject to the tax. The taxation of both debits and credits is also a feature of the tax introduced in Argentina in 2001.

Most countries provided exemptions for transactions by certain types of institutions (e.g, government agencies and charitable organizations) and some specific transactions, including, for example, repos and transactions with the central bank.

In two countries–Argentina (through 1992 and between April-December 2001) and Ecuador– a portion of the bank debit tax has been creditable against the income tax or the VAT.

During the more recent rounds, anti-avoidance measures have been implemented in various countries. The measures included, for example, restrictions on the use of cash for settlements, prohibition of multiple endorsements of checks, and application of the tax to all but the first endorsement upon final settlement.

3 Bank Debit Taxes: Productivity

As can be seen from Table 1, the short-term revenue performance of the taxes, particularly in Brazil, Colombia, and Ecuador, has been quite strong.

The taxes in Brazil and Colombia have produced revenues in the range of 0.6 to 1.33 percent of GDP for ad valorem tax rates in the range of 0.2 to 0.34 percent. This confirms that these taxes do serve, at least in the short term, their intended function. The performance of the tax in Ecuador in its first year was exceptionally strong. However, it must be noted that the tax had a broader base, applying to debits and credits, and that part of the gross revenues were creditable against other taxes. The taxes imposed in Argentina in 1988 and especially in Peru were significantly less productive as gauged by the ratio of revenues as a percent of GDP to the average statutory rate.

Overall, the more recent taxes have been more productive than those introduced a decade ago. In Brazil, a high revenue yield has been sustained over several years. However, in Colombia and Ecuador, monthly real revenues from the tax were on a declining trend. In Venezuela, revenues held up through end-1999 from the tax's introduction earlier in that year, but declined rapidly in 2000. It should also be noted that revenue productivity appears to decline with higher tax rates. For example, while the tax base in Ecuador was much broader than in the other cases, revenue productivity was considerably lower in Ecuador than in Brazil and in Colombia, where the tax rates are lower.

Table 1: Bank Debit Taxes

Country and Year	Tax Rate	Gross Revenue[1]	Productivity[2]
Argentina			
1989	0.70	0.66	0.94
1990	0.30	0.30	0.99
1991	1.05[3]	0.91	0.86
1992	0.60[3]	0.29	0.97[4]
2001	0.60[5]	1.46[4]	2.43
Brazil			
1994	0.25	1.06	4.24
1997	0.20	0.80	4.00
1998	0.20	0.90	4.50
1999	0.22[3]	0.83	3.79
2000	0.34[3]	1.33	3.96
2001	0.36[3]	1.45[7]	3.97
Colombia			
1999	0.20	0.73	3.66
2000	0.20	0.60	3.00
2001	0.30		
Ecuador			
1999	1.00	3.50[6]	3.50
2000	0.80	2.33[6]	2.91
Peru			
1990	1.41[3]	0.59	0.42
1991	0.81[3]	0.46	0.57
Venezuela			
1994	0.75	1.30	2.60[4]
1999-2000	0.50	1.12	2.24

Source: Coelho, Ebrill, and Summers (2001) and staff estimates.

[1]Gross revenue in percent of GDP.
[2]Gross revenue in percent of GDP divided by average statutory rate.
[3]Average of rates, adjusted for the period tax was in effect.
[4]Adjusted for the period tax was in effect.
[5]On each side of a transaction. Roundtrip tax rate is 1.2 percent.
[6]Tax was levied on both debit and credit transactions.
[7]Estimate based on 10 months of tax revenue data and projected GDP.

4 Bank Debit Taxes: Financial Disintermediation

This section presents a formal model of financial disintermediation due to a bank debit tax.

4.1 Model

Consider an economy populated by a continuum of identical risk-neutral agents indexed by i. Agents maximize the expected utility of consuming a single consumption good. Each agent is endowed with one unit of labor which can be allocated either to an investment project or to a constant returns to scale (CRS) technology. The CRS technology produces one unit of capital from one unit of labor. The investment project available to agent i returns y_i units of the consumption good from one unit of labor and one unit of capital. y_i is a realization of the normally distributed random variable y with mean equal to 1 and variance equal to σ_y^2.

Each agent can become either an entrepreneur (a borrower of capital) or a worker (a lender). The choice depends on the private value of a noisy signal, s_i about y_i. We assume that s_i is of the following form,

$$s_i = y_i + \epsilon, \tag{1}$$

where ϵ is an independently normally distributed random variable with mean zero and variance σ_ϵ^2.

The entrepreneur can borrow either from a bank by getting a loan or directly from the lenders by issuing claims on output. The banks accept deposits from workers and issue loans to entrepreneurs. In addition, unlike direct lenders, the banks can monitor the realization of returns on projects. Specifically, we assume that y_i is observable, but cannot be verified in court unless a (monitoring) cost $C > 0$ is spent. Therefore, without the ex post monitoring, contracts specifying y_i cannot be enforced. Accordingly, an entrepreneur can keep a fraction of the project's return without the investors' consent and escape punishment. However, if the value of y_i is discovered through monitoring, if the entrepreneur cannot deliver on her contractual obligations, the project is declared bankrupt, its assets liquidated, and all liquidation proceeds are transferred to the lender(s).

The timing is as follows. First, each of the i agents receives a signal s_i about y_i. Second, each agent makes a decision of whether to become an entrepreneur or a worker. Third, entrepreneurs borrow from banks or contract with the workers for a share of final output. Finally, y_i is realized, the consumption good is distributed and consumed.

The equilibrium consists of interest rates offered by banks, r_b, and in direct lending markets, r_m, and the corresponding face values of loans, H_b and H_m, such that (i) payoff functions are maximized, (ii) the supply of capital is equal to the demand for capital, and

(iii) the contracts are incentive compatible.

4.2 Optimal contract

From the lenders' perspective, because the optimal consumption cannot be negative and returns on investment projects are not verifiable without a cost, a standard debt contract dominates other types of contracts.[6] The standard debt contract is a contract which requires a fixed payment when the firm can pay the promised rate of return and, otherwise, requires the entrepreneurial project to be declared bankrupt, its assets liquidated, and liquidation proceeds transferred to the lender(s).

Denote by r the minimum expected rate of return (in units of consumption good per unit of capital) at which the lenders are willing to lend capital to the borrowers. We assume that r is no greater than the unconditional expected return on projects, $E(y) = 1$, so that entrepreneurs undertake their projects if they have enough capital resources available to them.

The optimal contract on project i is of the form,

$$S(y_i) = \begin{cases} H & \text{if } y_i \geq H, \\ \max\{y_i - C, 0\} & \text{otherwise,} \end{cases} \tag{2}$$

where H must satisfy the incentive compatibility constraint,

$$H Prob(y_i \geq H \mid s_i) + E(\max\{y_i - C, 0\} \mid s_i) Prob(y_i < H \mid s_i) = r. \tag{3}$$

H is the smallest face value of a debt contract which provides the lenders with the expected rate of return of at least r. The debt contract is not monitored if y_i is greater than the face value and is monitored otherwise.

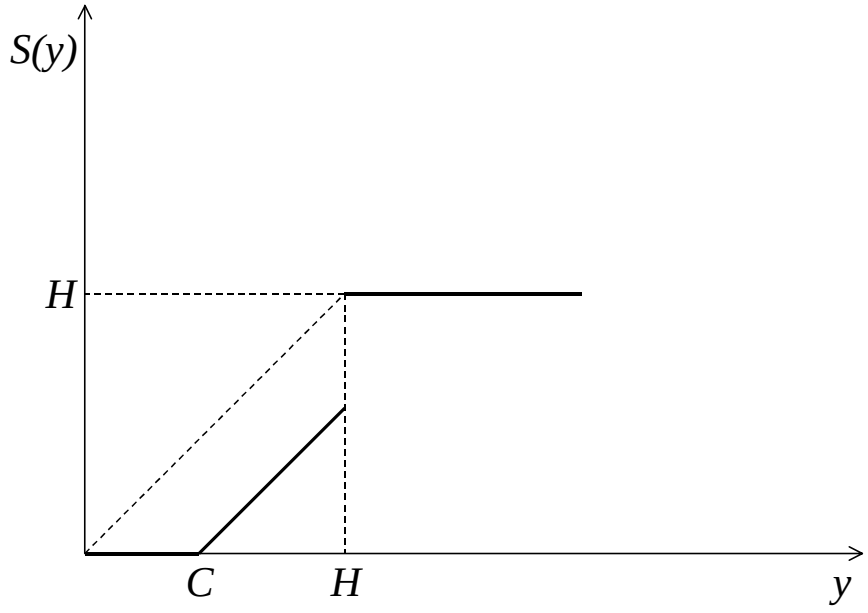
Graphically (Figure 1), the optimal contract is a function that is equal to zero for the values of $y_i < C$, equal to $y_i - C$ (an upward-sloping part) for the values of $C \leq y_i < H$, and equal to H for $y_i \geq H$. Although the function is not differentiable and has a discontinuity at $y_i = H$, it is Riemann-integrable.

From the borrowers' perspective, for a given face value of the optimal contract, $H > 0$, the expected profit function of borrower i when banks monitor, has the following form:

$$E\{\pi_b(y_i, H) \mid s_i\} = E\{y_i - H \mid s_i,\ y_i \geq H\} Prob(y_i \geq H \mid s_i). \tag{4}$$

[6] This is a standard result in the literature on financial contracting with costly state verification. See, for example, Townsend (1979), Diamond (1984), and Diamond (1991).

Figure 1: The Optimal Contract



From the incentive compatibility constraint, (3),

$$E\left\{\pi_b\left(y_i, H\right) \mid s_i\right\} = E\left(y_i \mid s_i\right) - r - CProb\left(y_i < H \mid s_i\right). \tag{5}$$

By assumptions about y_i and s_i,

$$E\left\{y_i \mid s_i\right\} = \frac{\frac{1}{\sigma_y^2} + \frac{s_i}{\sigma_z^2}}{\frac{1}{\sigma_y^2} + \frac{1}{\sigma_z^2}} = \alpha s_i + \left(1 - \alpha\right), \tag{6}$$

where $\alpha = \frac{\sigma_y^2}{\sigma_z^2 + \sigma_y^2}$ is a constant between zero and one.
Consequently, for $H = H_b$ and $r = r_b$,[7]

$$E\left\{\pi_b\left(y_i, H_b\right) \mid s_i\right\} = \alpha s_i + \left(1 - \alpha\right) - r_b - CProb\left(y_i < H_b \mid s_i\right). \tag{7}$$

[7]The derivation of the expected profit function for a borrower in the direct debt market is given in the Appendix.

Assuming a competitive banking industry, for a marginal bank borrower with a project y' and signal s',

$$\alpha s' + (1-\alpha) - CProb\left(y' < H_b \mid s'\right) = r_b. \tag{8}$$

4.3 Bank debit tax and disintermediation

Suppose that a bank debit tax of rate, $0 < \tau \leq 1$ is introduced in the model economy. Following the introduction of the tax, pre-tax return on deposits increases to $\frac{r_b}{1-\tau}$, where r_b is the minimum expected return at which the lenders are willing to lend capital to the borrowers through a bank. Consequently, banks require their borrowers to deliver a minimum return of $\frac{r_b}{1-\tau}$.[8] In other words, the entire burden of the bank debit tax is transferred to the borrowers.

The incentive compatibility constraint (3) takes the form,

$$HProb\left(y_i \geq H \mid s_i\right) + E\left(\max\left\{y_i - C, 0\right\} \mid s_i\right) Prob\left(y_i < H \mid s_i\right) = \frac{r_b}{1-\tau}. \tag{9}$$

Following the same derivation that led to Equation (8), after the introduction of the tax, for a marginal borrower with signal s'',

$$\alpha s'' + (1-\alpha) - CProb\left(y'' < H_b \mid s''\right) = \frac{r_b}{1-\tau}. \tag{10}$$

Combining equations (8) and (10), and assuming

$$Prob\left(y' < H_b \mid s'\right) \approx Prob\left(y'' < H_b \mid s''\right), \tag{11}$$

we get

$$s'' - s' \approx \frac{\tau r_b}{\alpha\left(1-\tau\right)} > 0. \tag{12}$$

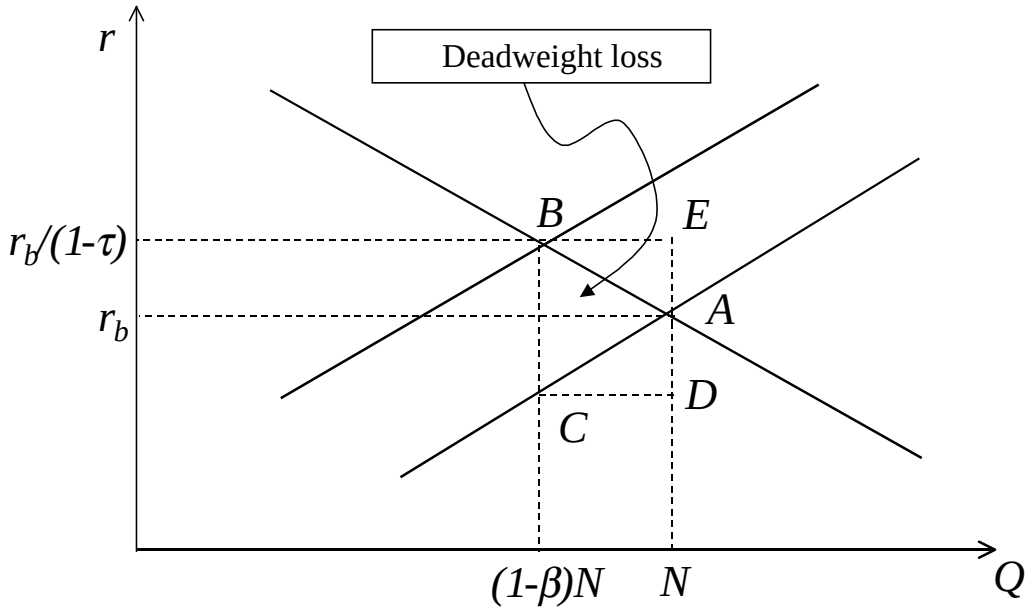
This means that a marginal bank lender has a higher value of the private signal if the banking system is subject to a bank debit tax than in the absence of it. Therefore, after the introduction of the tax, the number of borrowers goes down. As a result, the amount of funds intermediated by the banks goes down.

[8] This insight is due to Caminal (1997).

5 Disintermediation and the deadweight loss

In this subsection we derive a formula for the calculation of a deadweight loss due to a bank debit tax. Figure 2 provides an illustration of the concept.

Figure 2: Deadweight Loss from Bank Debit Tax



Suppose that before the tax, a total of N depositors brought one dollar each into the banks. Banks accepted N dollars in deposits and issued N dollars worth of loans, earning $r_b N$ on their lending operations. Point A in Figure 2 represents the equilibrium price and supply of loans without the tax.

After the introduction of a bank debit tax, $\tau \geq 0$, the marginal interest rate increases to $\frac{r_b}{1-\tau}$, and the amount of bank loans declines to $(1-\beta)N$, where $\beta = \frac{\tau r_b}{\alpha(1-\tau)} > 0$ from Equation (12).[9] Point B represents after-tax equilibrium values.

Tax revenues, T, are equal to the tax rate times the new tax base,

$$T = \frac{\tau r_b}{(1-\tau)} \left(1 - \frac{\tau r_b}{\alpha(1-\tau)}\right) N. \tag{13}$$

[9] Note that by assumption, the entire tax burden falls on the borrowers.

The deadweight loss, L, caused by the tax is the area of the "Harberger triangle", ABC.[10] ABC can be calculated as one half of the area of the rectangle, $BEDC$:

$$L = \frac{1}{2}\left(\frac{r_b N}{1-\tau} - \frac{r_b N}{1-\tau}\left(1 - \frac{\tau r_b}{\alpha(1-\tau)}\right) - \frac{\tau r_b N}{\alpha(1-\tau)}\left(1 - \frac{\tau}{(1-\tau)}\right) r_b\right), \tag{14}$$

which is equal to,

$$L = \frac{\tau r_b}{(1-\tau)}\left(N - \left(1 - \frac{\tau r_b}{\alpha(1-\tau)}\right) N\right). \tag{15}$$

Substituting Equation (13) into Equation (15), the deadweight loss is given by,

$$L = \frac{\tau r_b N}{(1-\tau)} - T. \tag{16}$$

The deadweight loss as a fraction of revenues is equal to

$$l = \frac{\frac{\tau r_b N}{(1-\tau)}}{T} - 1, \tag{17}$$

where $\frac{\tau r_b N}{(1-\tau)}$ is the amount of tax revenues if the introduction of the tax resulted in no disintermediation, while T is the amount collected from the tax base adjusted for disintermediation. Note that if $T = \frac{\tau r_b N}{(1-\tau)}$ (or $\tau = 0$), then $l = 0$ and if $\tau = 1$, then $l = \infty$.

Intuitively, this measure says that if the BDT has no impact on financial intermediation, then the deadweight loss is zero. Alternatively, if the tax leads to complete disintermediation, then the deadweight loss is infinite. In between the two extreme cases, a partial disintermediation would lead to a decline in bank debit transactions and an increase in interest rates. The deadweight loss is quadratic in the measure of financial disintermediation, i.e. $L = \alpha N(s'' - s')^2$.

5.1 Estimating the deadweight loss

Using Equation (17), we could estimate the impact of BDT on intermediation. We have monthly series of bank debit tax revenues for four countries: Brazil, Colombia, Ecuador, and

[10] See Hines (1999) for a comprehensive discussion on the Harberger triangle.

Venezuela. After adjusting these series for inflation and changes in tax rates, we construct an index of BDT revenues for each country.

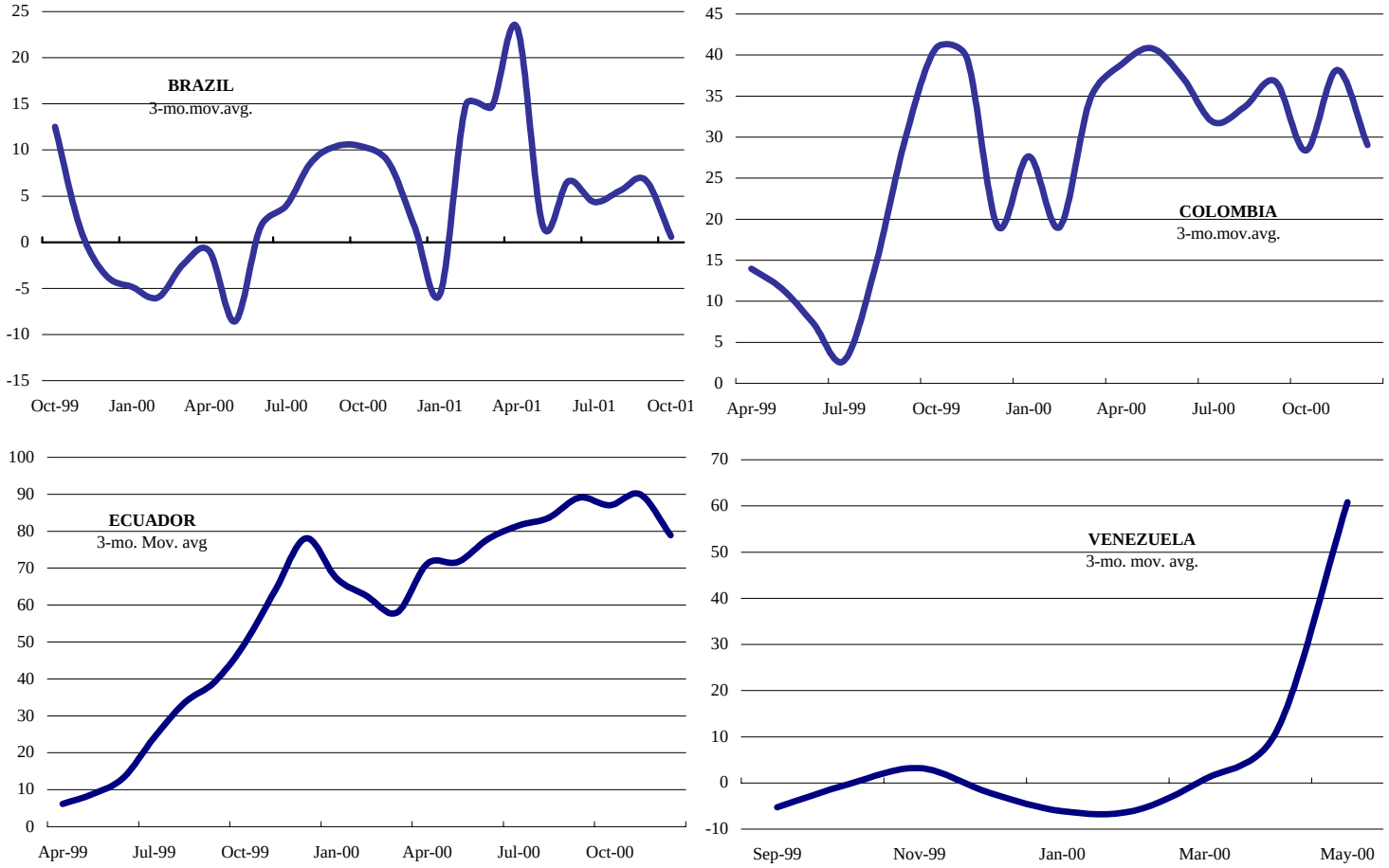
In order to calculate the deadweight loss, we must make an assumption about the amount of tax revenues if the introduction of the tax resulted in no disintermediation, $\frac{\tau r_b N}{(1-\tau)}$. Since we cannot observe this amount directly, we must estimate it. We conjecture that during the first month after the introduction of the tax, the adjustment in the behavior of borrowers and lenders (depositors) is minimal. Thus, we use bank debit tax revenues collected during the first full month as an estimate for $\frac{\tau r_b N}{(1-\tau)}$.

We calculate a series of estimates, l_i^j for each country, $j = 1, 2, 3, 4$ and each month (with the exception of the first month), $i = 2, ..$ for which we have the data. Three-months moving averages for each deadweight loss series is presented in Figure 3. Each l_i^j is expressed in percent of tax revenues. For example, $l_i^j = 20$ means that the deadweight loss is equal to 20 percent of collected revenues.

We find that deadweight losses following the introduction of the tax reached up to 40 percent in Colombia, up to 60 percent in Venezuela and up to 90 percent in Ecuador. Interestingly, we do not find significant deadweight losses in Brazil.

Figure 3. Deadweight Loss from Bank Debit Taxes

(In real terms; month following the introduction of the tax=100)



Source: Country data and IFS database.

5.2 Descriptive evidence

Anecdotal evidence suggests that bank debit taxes are distortionary and have contributed to significant financial disintermediation. First, following the introduction of the tax, individuals and businesses substitute out of bank-intermediated transactions into cash. In Brazil, Colombia, and Ecuador where taxes were in effect during 1998-2000, the ratio of currency outside banks to narrow money has increased by between 15 and 150 percent.[11]

Second, in order to avoid the tax, individuals and enterprises conduct a greater proportion of their bank transactions off-shore. For example, in order to avoid paying bank debit taxes, Argentinians opened bank accounts in Uruguay and Ecuadorians used Aquas Verdes, a town on the border with Peru.

Third, economic agents create new instruments and practices to minimize the impact of the tax. Multiple endorsement of checks is among the most common practices that emerge following the introduction of the bank debit tax. For example, in Colombia, the volume of cleared checks was cut in half from an average of about 60000 per month to about 30000 per month within days after the introduction of the tax. Another popular practice is to set up separate clearing and settlement bank accounts so that intraday payments between customers can be aggregated and debited on a net basis at the end of the day, with only that transaction being subject to the tax. In some cases, e.g., in Colombia, banks deposited the net payment into their tax-exempt accounts with the central bank, thus avoiding the tax altogether. In addition, financial institutions in Brazil offered investment and privatization funds in which an investor pays the tax only at the time of the initial transaction and subsequent transactions done on the behalf of the investor are not taxed, because money transfers between financial institutions are tax-exempt.[12]

Finally, trading volume in the domestic treasury bill, foreign exchange, equity, and interbank money markets may fall, if transactions in these markets are subject to the tax. For example, in Colombia, immediately after the introduction of the tax in November 1998, the volume in interbank foreign exchange and money markets declined to about 20 percent of the average pre-tax level, while the volume in the Treasury bill market declined to about 10 percent of the average pre-tax level. In Venezuela, according to the Caracas Stock Exchange annual report, after the tax was introduced in 1999, trading volume on the exchange dropped

[11] This substitution can sometimes lead to a systemic crisis. For example, the introduction of a one percent tax on any bank transaction in Ecuador in December 1998, led to a widespread preference for cash which seriously exacerbated the ongoing liquidity crisis in the banking system. A blanket deposit insurance guarantee introduced at the same time as the financial transaction tax, was not sufficient to restore confidence in the banking system. In the three months after the introduction of the tax, amidst a run on the currency, 6 small banks and the second largest bank had to be closed. In March 1999, fearing a run on the whole banking system, the government froze all demand and savings deposits for six months and all time deposits for one year.

[12] Such funds were authorized by the central bank in order to minimize the disintermediation effects of the tax.

by 47 percent compared to the previous year.

6 Conclusion

This paper was motivated by the incidences of taxes on banking transactions which are usually levied on debits to bank accounts. In the last twenty years, a number of countries in Latin America repeatedly implemented and revoked these taxes. These taxes are currently in effect in Argentina, Brazil, Colombia, and Ecuador, where they have been quite effective in generating revenue in the short run.

This paper makes the first formal attempt to estimate deadweight losses following the introduction of the tax using data from four Latin American countries. We find that, especially at higher rates, these taxes have coincided with significant welfare losses due to financial disintermediation. We find that deadweight losses following the introduction of the tax reached up to 40 percent in Colombia, up to 60 percent in Venezuela and up to 90 percent in Ecuador. However, we do not find significant deadweight losses in Brazil.

Our findings support a view that at low rates and for a limited time, bank debit taxes can be used as a quick and effective way to generate revenue, while the implementation of more traditional taxes is being improved. However, at higher rates or over an extended period of time, the taxes may lead to significant welfare losses due to financial disintermediation.

Appendix

For a minimum face value of a direct debt contract, H_m and a minimum required rate of return r_m, the expected profit of borrower in the direct market (without monitoring) is given by

$$E\left\{\pi_m\left(y_i, H_m\right) \mid s_i\right\} = \alpha s_i + (1-\alpha)\left(1 + Prob\left(y_i < H_m \mid s_i\right)\right) - r_m. \tag{18}$$

In a competitive equilibrium,

$$r_b + CProb\left(y_i < H_b \mid s_i\right) = r_m - E\left(y_i \mid s_i\right) Prob\left(y_i < H_m \mid s_i\right). \tag{19}$$

As an intuitive check, for $E\left(y_i \mid s_i\right) + C > 0$, if $r_b = r_m = r$, then in equilibrium $H_b < H_m$. Similarly, if $H_b = H_m = H$, then $r_b < r_m$. Intuitively, at the same minimum required rate of return, the equilibrium face value of debt in the direct market is higher than that of a bank loan. Similarly, for the same face value, the minimum required rate of return on a bank loan is lower than the rate on a direct debt contract.

References

[1] Albuquerque, Pedro H., 2001, How bad is BAD taxation? Disintermediation and illiquidity in a Bank Account Debits tax model, mimeo, University of Wisconsin - Madison.

[2] Caminal, Ramon, 1997, Financial intermediation and the optimal tax system, Journal of Public Economics 63, 351-382.

[3] Coelho, Isaias, Ebrill, Liam, and Victoria Summers, 2001, Bank debit taxes in Latin America: An analysis of recent trends, Working paper 01/67, International Monetary Fund.

[4] Diamond, Douglas, W. 1984, Financial intermediation and delegated monitoring, Review of Economic Studies 51, 393-414.

[5] Diamond, Douglas, W. 1991, Monitoring and reputation: The choice between bank loans and directly placed debt, Journal of Political Economy 99, 689-721.

[6] Hines, James R., Jr., 1999, Three sides of Harberger triangles, Journal of Economic Perspectives, 13, 167-188.

[7] Tanzi, Vito, 2000, Taxation in Latin America in the last decade, Working paper 76, Center for Research on Economic Development and Policy Reform, Stanford University.

[8] Townsend, Robert M., 1979, Optimal contracts and competitive markets with costly state verification, Journal of Economic Theory 21, 1-29.