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The Rates and Revenue of Bank Transaction Taxes

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ABSTRACT/RESUMÉ

This paper provides cross-country empirical evidence on the productivity of bank transaction taxes (BTTs). Our data set comprises six Latin American countries that have levied BTTs since the late 1980s: Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela. We find that, for a given tax rate, revenue declines over time. Therefore, in order to meet a fixed revenue target in real terms, the tax rate needs to be raised repeatedly. However, we also find that successive increases in the tax rate erode the tax base by more than they raise revenue yield and that the higher the increase in the tax rate, the more and faster the tax base is eroded. We conclude that BTTs do not provide a reliable source of revenue, especially over the medium term.

JEL classification: G28, G29, H21, H22

Keywords: Bank transaction tax, bank debit tax, tax productivity

Ce document fournit une étude empirique de comparaison internationale sur la productivité des impôts sur les transactions bancaires (ITB). Notre base de données correspond à 6 pays d'Amérique latine qui ont un impôt sur les transactions bancaires: Argentine, Brésil, Colombie, Équateur, Pérou et Venezuela. Nous trouvons que le revenu diminue au fil du temps pour un taux d'imposition donné. Pour cette raison, le taux d'imposition doit être augmenté régulièrement en vue d'atteindre une cible de revenu en terme réel. Cependant, nous voyons que les augmentations successives des taux d'imposition réduisent l'assiette d'imposition plus que le rendement obtenu, et plus grande est la hausse du taux d'imposition, plus rapide est l'érosion de l'assiette d'imposition. Nous concluons que l'imposition des transactions bancaires ne fournit pas une source de revenu fiable, particulièrement sur le moyen terme.

JEL classification: G28, G29, H21, H22

Mots clés: Impôts sur les transactions bancaires, impôt sur les retraits bancaires, productivité des impôts

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The rates and revenue of bank transaction taxes

By

Jorge Baca-Campodónico, Luiz de Mello and Andrei Kirilenko¹

Introduction

When in 1898, the US government introduced a two-cent tax on bank cheques to finance the Spanish-American war, little did it know that a century later many Latin American countries would use similar taxes to fight their own fiscal battles. Since 1976, taxes on bank transactions have been introduced repeatedly in Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela. As of end-2004, such taxes were in effect in six Latin American countries: Argentina, Brazil, Bolivia, Colombia, Peru and Venezuela.

There is considerable variation across countries in the design of taxes on bank transactions. Usually, these taxes are levied on withdrawals from bank accounts, including the clearance of cheques and the use of ATMs, as well as on payments of loan instalments. In addition, in Argentina, Colombia and Ecuador, these taxes have been levied on all, or some, bank credit transactions. There is also considerable diversity in what these taxes are called, including bank debit taxes, bank account debit taxes and financial transaction taxes. In this paper, we use the term bank transaction taxes (BTTs), because it reflects accurately the fact that in several countries both debit and credit operations are liable to taxation.

A typical BTT works as follows. Suppose that the tax is levied at the rate of 0.2% and you write a cheque for 100 dollars to pay for your groceries. When the grocer takes your cheque to a bank, the bank charges your account 100 dollars and 20 cents: 100 dollars go to the grocer and 20 cents go to the government. In this simple example, the bank is assumed simply to shift the entire tax burden to the account holder, while the government raises 20 cents for every 100 dollars' worth of taxable bank transactions. In practice, the amount of government revenue depends on the behaviour of individuals and firms that use taxable banking services, as well as the behaviour of financial intermediaries.

Intuitively, as with any tax, the higher the statutory rate, the greater the incentive to evade the tax. But in the case of BTTs, the tax base is particularly elusive. If you pay cash for your groceries, charge them to your current account abroad, or endorse a cheque issued by someone else, the government does not raise any revenue. This begs a key question: Can a tax levied on such an elusive base be a reliable source of government revenue?

1. Luiz de Mello is at the Economics Department of the OECD and Andrei Kirilenko is at the International Capital Markets Department of the IMF. The views expressed in this paper are the authors' own and do not necessarily reflect those of the OECD or the IMF. The authors are indebted to Michael Keen, José Roberto Afonso, Andrew Dean, Vincent Koen, Peter Jarrett, Bob Price, and the participants of the 2006 Regional Seminar on Fiscal Policy, ECLAC, Santiago, Chile, for helpful comments and discussions, but remain responsible for any remaining errors and omissions. The authors also thank Mee-Lan Frank for excellent technical assistance.

As with financial transaction taxes more generally, there are theoretical arguments that either support or dispute the reliability of BTTs as a source of revenue. Thus, it is an empirical question. If the evidence is positive – that is, BTTs provide a reliable source of revenue over several years – then they can be used in some form alongside other types of taxes to finance government operations. If these taxes do not provide a reliable source of revenue – their revenue yield declines over time while distortions increase – they should be used as a means of raising revenue only in extraordinary situations and over a short period of time.

Moreover, even if BTTs are a reliable source of revenue, their enactment may not be desirable on efficiency grounds. Economic theory, supported by some empirical evidence, suggests that these taxes, by adding substantial transaction costs to certain financial exchanges, could entail significant deadweight losses. Consequently, stable revenue productivity should be interpreted only as a necessary, but not sufficient, criterion for the desirability of BTTs.

This paper provides cross-country empirical evidence that BTTs are not a reliable source of government revenue, especially over the medium term. We use a panel of quarterly data from six Latin American countries that have had BTTs during the last nine years – Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela – to answer three questions: What is the relationship between BTT rates and revenue? How does this relationship evolve over time? Which economic variables influence this relationship? We find that:

- For a given tax rate, BTT revenue declines in real terms over time. Therefore, in order to meet a given revenue target, the tax rate needs to be raised repeatedly. However, we also find that a 0.1 percentage point increase in the statutory tax rate reduces the revenue base (or productivity) by 0.18-0.30 percentage points. Thus, increasing the tax rate erodes the tax base by more than it raises revenue.
- Increasing the BTT rate accelerates the speed at which the tax base is eroded. In other words, over time, revenues decrease much more for higher BTT rates. For example, according to our estimation, for the tax rate of 0.2%, the second-year revenue is 9% lower than during the first year the tax is in effect, while for a tax rate of 0.3%, BTT revenue is nearly 30% lower in the second year compared to the first year..
- BTTs yield more revenue in countries with deeper financial markets or higher inflation and deposit-lending interest spreads. Intuitively, the deeper the financial market, the higher the opportunity cost of conducting transactions outside banks. The higher the inflation, the greater the opportunity cost of holding money. The higher the interest spread, the greater the risk of lending money outside banks.

The remainder of the paper is organised as follows. In Section II, we present a brief review of the literature. Section III summarises country experiences with BTTs. Section IV presents the theoretical considerations and econometric specification of the model. Section V contains the description of the data. Our main findings are reported in Section VI. Section VII concludes. A more detailed description of the experiences of Argentina, Brazil, Colombia, Venezuela, Ecuador, and Peru is reported in the Appendix.

A brief review of the literature

There are two papers that are closely related to our research: Coelho, Ebrill and Summers (2001) and Kirilenko and Perry (2004).² In their descriptive paper, Coelho, Ebrill and Summers (2001) argue that BTTs have been successful in raising revenue in the short term. They also document abundant anecdotal evidence that these taxes have resulted in financial disintermediation. The authors argue that BTTs should be avoided, unless there are significant fiscal needs that cannot be met by more appropriate tax instruments.

Kirilenko and Perry (2004) estimate the degree of disintermediation (a permanent erosion of the tax base) resulting from the introduction of a BTT. They construct monthly series for real BTT revenue (nominal revenue adjusted for inflation and changes in the tax rate) for six countries (Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela) assuming that, during the first month after the introduction of the tax, there is no change in the behaviour of providers and users of banking services. This assumption allows them to use the decline in revenue from its starting value (first month of the tax) as an estimate of financial disintermediation. The authors show that on average the introduction of a BTT results in disintermediation of between 4 and 44 cents for every dollar in revenue. According to their estimation, financial disintermediation has reached maximum values of 46 cents in Argentina, 58 cents in Brazil, 64 cents in Colombia, 48 cents in Ecuador, 66 cents in Peru, and 49 cents in Venezuela. These numbers are equivalent to a loss of over 0.5% of GDP to disintermediation. The authors also find that disintermediation effects tend to cumulate as the taxes remain in place. While Kirilenko and Perry (2004) base their conclusions on some empirical evidence, their country-by-country calculations lack the persuasiveness of a fully-fledged panel study.

A complementary strand of literature focuses on the experiences of individual countries with BTTs. For example, Albuquerque (2003) argues that a BTT increases the cost of government borrowing in Brazil. He calculates the inflection point of a Laffer-type curve adjusted for the higher cost of government borrowing and argues that an increase of the actual average tax rate during the period of analysis (0.34%) to the estimated maximum rate (0.62%) would have yielded only about 16% of GNP more in revenue in 2000. The author also estimates that the losses for the actual and the calculated maximum tax rate are 21.5% and 57.8% of revenue (net of estimated higher government borrowing costs), respectively. In light of this evidence, he advocates against the use of this tax.

Arbeláez, Burman and Zuluaga (2002) use panel data analysis to estimate the effect of a BTT on interest margins and profitability of 43 financial institutions in Colombia during 1995-2001. They find that the BTT increased the cost of credit and led to significant disintermediation. As a result, profits of financial institutions declined in the short term by more than the amount of revenue raised by the government. The authors recommend abolishing the tax.

Lastrapes and Selgin (1997) investigate the impact of a two-cent cheque tax on the US economy during the 1930s. They estimate the impact of the tax on the currency-deposit ratio and the money stock using a vector autoregressive model and monthly data from August 1921 to December 1936. They show that the tax led to significant disintermediation. As a result, the monetary contraction in the United States during the 1930s is estimated to have been 15% higher than it would have been without the tax. The authors also argue that policymakers were aware of the likely adverse effect of the tax and yet deliberately chose to overlook it in order to raise revenue. They present the two-cent cheque tax as a typical example of the Depression era policies that disregarded the impact of fiscal measures on monetary and financial outcomes.

2. The methodology used by Kirilenko and Perry (2004) was first presented in Kirilenko and Summers (2003).

There is also a broad body of literature on the taxation of financial intermediation. For example, a comprehensive volume edited by Honohan (2003) presents an analytical overview of the four main types of tax bases in the financial sector: income, expenditures, assets and transactions. In the introduction to the volume, the editor points out many theoretical considerations and practical hurdles that need to be addressed in designing a tax system for the financial sector.

Finally, there is a large related body of literature on corrective financial transaction taxes. The literature argues that these taxes can correct distortions in financial markets to some extent. This argument runs counter to our view that these taxes cause greater financial disintermediation and are more harmful to revenue mobilisation capacity than the distortions that they are purported to rectify. Similarly to our views, Habermeier and Kirilenko (2003) examine research on market microstructure, asset pricing, rational expectations and international finance with a view to assessing the impact of securities transaction taxes on financial markets. They argue that transaction taxes can obstruct price discovery and price stabilisation, increase volatility, reduce market liquidity and inhibit the informational efficiency of financial markets.

The experience of Latin American countries with BTTs

This section provides a summary of the experiences of Latin American countries with BTTs. As of end-2004, such taxes were in effect in six Latin American countries: Argentina, Brazil, Bolivia, Colombia, Peru and Venezuela. Ecuador levied such taxes in the past.

BTTs have generally been introduced as an emergency means of raising revenue in times of, and in response to, economic crises. In each case the tax was introduced on a temporary basis, although in some cases it was subsequently extended. Tax rates have ranged between 0.2 and 2.0%, varying widely both across countries and over time. Moreover, BTTs have not been levied continuously in most countries.

The list of taxable financial transactions also differs across countries. In most cases, only bank debits, including cheque clearance, withdrawals from ATM outlets and loan repayments are liable for taxation. In addition, in Argentina in 2001-04 and Ecuador in 1999-2000, bank credits were also taxed. In Colombia only bank credits were taxed during 1999-2004.

In most countries, certain institutions (*e.g.* government agencies and charitable organisations) and specific transactions (*e.g.* transactions with the central bank and among different government agencies) are exempted from taxation. In Argentina (through 1992 and April-December 2001) and Ecuador, a portion of the BTT liability was creditable against the income or value added taxes.

The revenue performance of BTTs has been quite diverse (Table 1). It has been particularly strong in Brazil and Colombia, with annual revenue in the range of 0.6-1.6% of GDP for effective tax rates in the range of 0.2-0.38%. However, BTT productivity – as measured by the ratio of revenues in relation to GDP to the average statutory rate – has been in general on a declining trend. In particular, there appears to be greater variation in the data across than within countries, as well as a strong negative nonlinear correlation between BTT rate and productivity (Figure 1). This is the basic relationship that we investigate in greater detail in the remainder of the paper.

Theory and econometrics

Theoretical argument

This section presents a theoretical relationship between the BTT rate and productivity (or base). According to the static partial equilibrium model of Kirilenko and Perry (2004), following the introduction of a BTT at rate r , the equilibrium volume of funds intermediated by banks declines by a fraction

$\beta(r) = \lambda r / (1 - r)$, where $\lambda > 0$ is the risk-adjusted interest rate. Normalising to one the equilibrium volume of funds intermediated by banks in the absence of a tax, BTT revenue is equal to $R(r) = r(1 - \beta(r)) = r(1 - \lambda r / (1 - r))$.

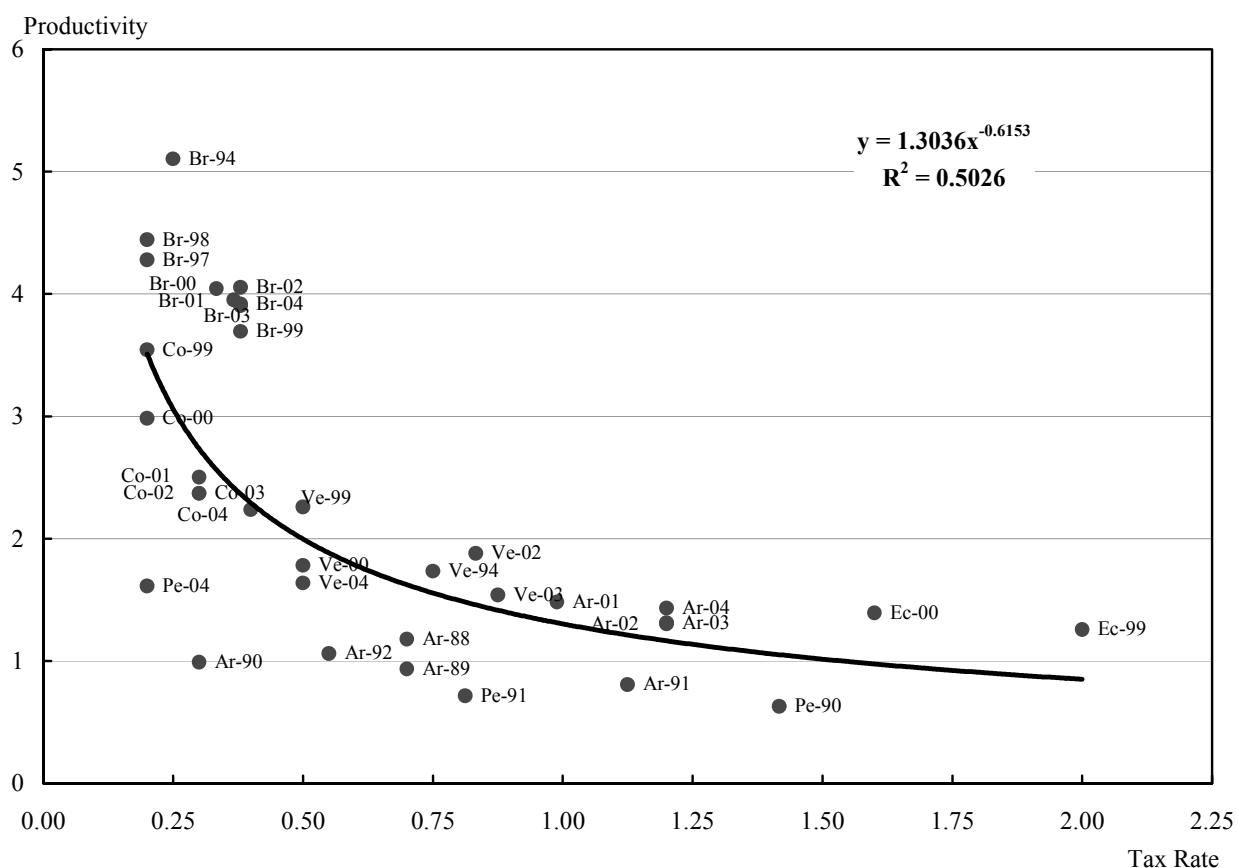
The relationship between the tax rate, r , and revenue, $R(r)$, defines a Laffer-type curve. When the tax rate is equal to zero, revenue from the tax is also zero. When the tax rate increases, revenue rises to a maximum point and then begins to fall. The shape of the curve is a function of the risk-adjusted cost of borrowing, λ . The higher the risk-adjusted interest rate, the sooner (and faster) the fall in revenue, as the tax rate increases. There is a positive, less-than-one tax rate at which revenue is again equal to zero. Beyond that point, revenue asymptotically approaches minus infinity (due to disintermediation) as the tax rate approaches one.

Table 1. BTTs in Latin America

Country	Year	Effective rate	Collection in % of GDP	Productivity
Argentina	1988	0.70	0.83	1.18
	1989	0.70	0.66	0.94
	1990	0.30	0.30	0.99
	1991	1.13	0.91	0.81
	1992	0.55	0.58	1.06
Brazil	1994	0.25	1.28	5.10
	1997	0.20	0.86	4.28
	1998	0.20	0.89	4.44
	1999	0.38	1.40	3.69
	2000	0.33	1.35	4.04
	2001	0.37	1.45	3.95
	2002	0.38	1.54	4.05
	2003	0.38	1.48	3.90
Colombia	1999	0.20	0.71	3.54
	2000	0.20	0.60	2.98
	2001	0.30	0.75	2.50
	2002	0.30	0.71	2.37
	2003	0.30	0.71	2.37
Venezuela	1994	0.40	0.89	2.24
	1999	0.75	1.30	1.73
	1999	0.50	1.13	2.26
	2000	0.50	0.89	1.78
	2002	0.83	1.56	1.88
Peru	2003	0.88	1.35	1.54
	2004	0.50	0.82	1.64
	1990	1.42	0.89	0.63
	1991	0.81	0.58	0.71
	2004	0.10	0.16	1.61

Source: National sources and authors' calculations.

Figure 1. BTTs in Latin America: Tax rate and productivity



Source: National sources and authors' calculations.

A useful way to see how well a tax performs is to look at its revenue productivity. If revenue productivity is stable or increases over time, then the tax is a reliable source of revenue. If it does not, the tax can be used only as an emergency tool over a short period of time. Productivity is defined as the ratio of tax revenue (in per cent of GDP) to the tax rate, $\Pi(r) \equiv R(r)/r$, and, in the model, it is defined as other words, there is a negative, nonlinear relationship between productivity and the BTT rate.

Econometric considerations

The main hypothesis to be tested is that BTT productivity is negatively correlated with the tax rate. A reduced form of this relationship can be written as:

$$\Pi_{it}(r, C) = f(r_{it}, C_{it}), \quad (1)$$

where, for country i at time t , $\Pi_{it} = R_{it}/r_{it}$ denotes productivity, R_{it} is the ratio of BTT revenue to GDP, r_{it} is the effective tax rate, and C_{it} is a vector of control variables.

We recognise that there might be alternative specifications of function f in Equation (1) that are consistent with a robust relationship between BTT productivity and its effective rate. For this reason, we

entertain several functional forms in the empirical analysis, including quadratic, logistic and linear specifications.

We also acknowledge the fact that the estimation of Equation (1) poses several challenges. *First*, the effective BTT rate is likely to be endogenous. This may occur because revenue-maximising policymakers react to the behavioural responses of financial intermediaries/institutions and their customers to various forms of taxation. *Second*, the error terms are likely to be heteroscedastic and serially correlated. Finally, the main explanatory variables are likely to be jointly correlated and measured with errors.

In order to mitigate the reverse causality bias, we could use instrumental-variable estimation (2SLS). However, the problem of choosing adequate instruments would remain. Using a large number of instruments can result in substantial second-order bias when GMM estimators are used. In the case of the 2SLS estimator, using additional instruments, when available, leads to asymptotic efficiency gains. Consequently, we perform our estimation using both estimation techniques.

Data

We collected data on the statutory rates and revenues of BTTs at the monthly frequency for six Latin American countries: Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela. For Argentina, our raw series consists of two episodes of BTT collection: from January 1988 to December 1993 and from April 2001 to December 2004. For Brazil, our series span three episodes: from January 1994 to December 1994, from February 1997 to February 1999 and from June 1999 to December 2004. For Colombia, our series covers the period from March 1999 to December 2004. For Ecuador, data are available from January 1999 to December 2000. For Peru, the data spans the period from January 1990 to December 1992 (the observations for September and November 1992 are missing) and March-December 2004. Finally, for Venezuela, we have raw data for two episodes: from May 1999 to May 2000 and from March 2002 to December 2004. Our last observation for the countries where BTTs remain in effect – Argentina, Brazil, Colombia, Peru and Venezuela – is December 2004.

Because we do not have reliable data for monthly GDP, we aggregated our raw monthly data for tax revenues into quarterly observations and used quarterly GDP to compute productivity. In addition, the pre-1993 period was excluded from the panel for Argentina because of the lack of reliable quarterly GDP data. We calculated effective tax rates for each quarter as a weighted average of the effective monthly rates during each month within the quarter. To compute the effective monthly rates, we used the actual dates of introduction of the tax, which often took place during, rather than at the beginning of, the month. Whenever the tax is levied on both debits and credits, we multiplied the statutory tax rate by two.

We are left with an unbalanced panel of at most 114 quarterly observations for BTT productivity. We supplemented this data with publicly available series on monetary aggregates, inflation, interest rates and equity prices for the six countries in our sample. A brief description of the data is presented in Table 2.

Main findings

Baseline models

We begin with the estimation of Equation (1) without the control variables. Regression results are reported using the pooled OLS, fixed effects (FE), 2SLS and GMM estimators for a linear specification of function f , as well as the GMM estimator for logistic and quadratic specifications. In all cases, we find a statistically significant negative relationship between BTT effective rates and productivity.

Table 2. Descriptive statistics, definitions of variables and data sources

	No. obs.	Mean	Standard deviation	Minimum	Maximum	Definition	Source
RATE	140	0.5	0.3	0.2	2.0	BTT statutory rate	National sources
REVGDP	114	0.9	0.6	0.1	2.7	Ratio of BTT revenue to GDP	Authors' calculations
PRODUCT	114	2.3	1.4	0.2	4.7	BTT productivity	Authors' calculations
MONGDP	192	18.4	12.7	0.0	45.9	Ratio of money to GDP	IMF-IFS
QMONGDP	186	42.0	32.7	0.1	106.0	Ratio of quasi-money to GDP	IMF-IFS
MONQMON	369	60.8	35.4	0.0	172.2	Ratio of money to quasi-money	IMF-IFS
COBLIAB	276	11.2	5.5	0.4	24.8	Ratio of currency (outside banks) to banks' liquid assets	IMF-IFS
CLAIM	378	15.6	21.9	-67.2	69.1	Ratio of claims on government to domestic credit	IMF-IFS
LLIABGDP	192	62.3	42.3	0.1	132.9	Ratio of banks' liquid assets to GDP	IMF-IFS
SHARE	332	230.4	273.8	0.0	1 898.2	Share price index	IMF-IFS
CPI	284	150.3	172.5	0.0	1 047.9	CPI inflation	IMF-IFS
SPREAD	341	52.2	361.1	-14.9	5 921.1	Interest spread (lending minus borrowing rate)	IMF-IFS

Table 3 presents the results of our baseline regressions. For the linear models, the results of the pooled OLS, 2SLS and GMM regressions suggest that a 0.1 percentage point increase in the effective rate reduces productivity by about 0.23-0.30 percentage points. Based on the sample's mean effective rate (0.6%) and productivity (2.4%), if the effective rates were to be increased by a third (from 0.6% to 0.8%), productivity would fall by about one-fifth (from 2.4% to about 1.9%).

When the baseline regression is estimated by fixed effects, the elasticity is much lower in magnitude but still statistically significant at classical levels. This may be due to a simultaneity bias. The GMM and 2SLS estimates are larger in absolute value, which suggests that simultaneity biases the coefficient on the BTT rate estimated by fixed effects towards zero. Indeed, the coefficient on the BTT rate is much larger in absolute value when the regression is estimated by fixed effects while controlling for simultaneity (FE/IV).

Similarly, the results of the baseline nonlinear regressions suggest that an increase in the mean effective rate by one-third would reduce mean productivity by about 10% in the case of a logistic specification. We test the validity of the moment conditions in the GMM estimation by applying the Sargan test of over-identifying restrictions. Test statistics, also reported in Table 3, confirm the validity of our results.

Full model and robustness assessment

We proceed by estimating an augmented version of Equation (1), including several control variables. Because of the likely reverse causality and joint endogeneity of the regressors, we use the GMM estimator and a logistic functional form to account for possible nonlinearity in the estimated relationship. We find that BTT productivity is inversely related to its effective rate, as expected, in a nonlinear fashion. The results are reported in Table 4.

The set of controls includes conventional proxies for financial deepening, which creates more sophisticated financial instruments, as well as opportunities for tax avoidance, and increases the opportunity cost of financial disintermediation induced by the taxation of bank transactions. The proxies for financial deepening are the ratio of money to quasi-money (MONQMON), the ratio of claims on government to private-sector credit (CLAIM) and the interest-rate spread (SPREAD), defined as the difference between lending and borrowing rates.³ The ratio of currency outside banks to banks' liquid liabilities (COBLIAB) is also generally considered as an alternative proxy for financial deepening.

Our emphasis on proxies for financial deepening is justified on the grounds that BTTs are expected to promote financial disintermediation through the use of currency and bank account substitutes, such as repeatedly endorsed cheques; to encourage the migration of capital market transactions overseas, through the increased use of instruments such as ADRs and offshore banking; and to encourage

3. Bank transaction taxes could in principle be borne by depositors, through a lower net return on their investments; by borrowers, to the extent that banks increase deposit rates to compensate, wholly or in part, for the BTT burden, and reflect the higher cost of resources in lending rates; or by the banks themselves, through a reduction in their net spreads (*i.e.*, the difference between the rate charged by banks on loans (the lending rate) and the remuneration rate paid by banks on deposits (their cost of raising funds)); or by a combination thereof, with the mix reflecting, among other factors, the respective demand elasticities and competition in the financial sector.

Table 3. The determinants of BTT productivity: Baseline model

Dep. variable: BTT productivity

	Linear models					Nonlinear models ²	
	Pooled OLS	2SLS ¹	GMM ¹	FE	FE(IV) ¹	Logistic	Quadratic
Intercept	3.47 ** (16.709)	3.98 ** (17.615)	4.00 ** (14.910)			5.37 ** (7.294)	4.79 ** (12.224)
RATE	-2.27 ** (-7.216)	-3.03 ** (-7.876)	-3.06 ** (-7.114)	-0.46 ** (-2.592)	-0.87 ** (-5.50)	-1.76 ** (-4.532)	-6.00 ** (-6.146)
RATESQ							2.04 ** (4.443)
Nobs.	114	72	91	114	98	91	91
R-squared	0.29	0.42	0.41	0.85	0.13	0.46	0.45
FE test (p -value)	0.00
Overid. test (p -value)	...	0.77	0.67	...	0.40	0.85	0.81

Note: Significance at the 1 and 5% levels is indicated by (**) and (*), respectively. The numbers in parentheses are t -ratios (z -ratios in the case of the FE/IV equations), computed using heteroscedasticity-consistent standard errors.

1. The instruments are contemporaneous, lag 1, and lag 2 values of the right hand-side variables.

2. Estimated by GMM. The instruments are contemporaneous, lag 1, and lag 2 values of the right hand-side variables.

Source: National sources, IMF/FS and authors' estimations.

Table 4. **The determinants of BTT productivity: Full model and robustness analysis**
 Dep. variable: BTT productivity

	Full model	Robustness				
		1	2	3	4	5
Intercept	2.32 ** (9.801)	4.57 ** (9.985)	3.15 ** (6.813)	2.87 ** (10.853)	1.88 ** (7.819)	1.65 ** (4.943)
RATE	-1.94 ** (-4.303)	-2.26 ** (-7.241)	-2.66 ** (-7.357)		-1.49 ** (-3.249)	-1.62 ** (-3.931)
RATESQ						
TREND					0.02 ** (3.028)	0.04 * (2.376)
TRENDSQ						-0.01 + (-1.673)
MONQMON	-0.01 * (-2.319)			-0.02 ** (-6.810)	0.00 (0.174)	-0.02 (-0.446)
COBLIAB		-0.06 ** (-6.867)				
CPI	0.01 ** (7.926)	0.01 ** (7.574)	0.01 ** (2.881)	0.01 ** (5.947)	0.00 * (2.467)	0.01 * (2.540)
SPREAD	0.01 ** (3.489)	0.00 ** (3.166)		0.01 ** (2.692)	0.01 ** (4.980)	0.01 ** (3.573)
CLAIM	-0.01 * (-2.097)	0.00 (0.124)		-0.02 ** (-7.290)	-0.01 ** (-3.185)	-0.01 ** (-3.506)
SHARE	0.00 + (-1.688)	0.00 (-0.772)	0.00 (0.626)	0.00 (-1.556)	0.00 ** (-3.368)	-0.01 * (-2.386)
Nobs.	68	75	80	68	68	68
R-squared	0.76	0.81	0.68	0.73	0.78	0.76
Overid. test (p-value)	0.55	0.71	0.15	0.18	0.32	0.31

Note: Significance at the 1, 5, and 10% levels is indicated by (**), (*), and (+), respectively. The numbers in parentheses are t-ratios, computed using heteroscedasticity-consistent standard errors.

All models are estimated by GMM based on the logistic specification of the estimating equation. The instruments are contemporaneous, lag 1, and lag 2 values of the right hand-side variables.

Source: National sources, IMF/IFS and authors' estimations.

inefficient merging and vertical integration among firms.⁴ The proxies for the opportunity cost of disintermediation include inflation (CPI), measuring losses when agents hold assets outside the banking system to avoid paying the BTT, rather than interest-bearing financial assets in the banking system, and a share price index (SHARE), measuring the opportunity cost of holding cash to avoid paying the tax rather than investing in equity.

Based on the results reported in Table 4, the ratio of money to quasi-money, proxying for financial depth, is negatively signed and statistically significant in most specifications, suggesting that BTTs are more productive in countries with deeper financial markets. Inflation is positively correlated with

4. For descriptive evidence on financial disintermediation attributable to BTTs, see Coelho, Ebrill and Summers (2001) and Kirilenko and Perry (2004).

productivity, but the coefficient on the stock market index is not robust across model specifications. The interest-rate spread, which measures the risk of lending money outside the banking system, is positively correlated with productivity at classical levels of significance. The ratio of claims on government to private-sector credit, another proxy for financial deepening, is negatively correlated with productivity.

The results are robust to the use of the ratio of currency outside banks to banks' liquid assets to proxy for financial deepening instead of the ratio of money to quasi-money (Model 1). In order to assess further the possibility that the joint endogeneity of the explanatory variables may be biasing parameter estimates, we re-estimate the full model excluding the explanatory variables that are most strongly correlated with the effective rate (*i.e.* the ratio of money to quasi-money, the interest spread and the ratio of claim on government to private-sector credit). We find that the estimated coefficients of the remaining explanatory variables are generally robust to this alternative model specification, but the coefficient of the effective rate is greater in absolute value relative to the full model (Model 2). We also re-estimate the full model excluding the effective rate, while keeping its lagged values in the set of instruments (Model 3), and keeping all other explanatory variables. The estimated coefficients of the remaining explanatory variables are robust to this alternative model specification, although SHARE loses significance slightly.

To deal with the possibility that BTT productivity might be affected by the length of time the tax remains in place, we include a variable (TREND) measuring the number of quarters from the date of introduction of the BTT (Model 4). Motivation comes from Figure 2, which depicts Laffer-type curves for the relationship between the BTT rate and productivity (or tax base) over time: BTT productivity seems to decline over time, especially for higher rates.⁵ The curves were constructed by fitting quadratic polynomials to the semester averages of productivity and BTT rates for each country.⁶ The introduction date of the BTT in each country was used as the starting semester for constructing the Laffer-type curves.⁷

TREND is positively signed and statistically significant. A possible interpretation is that it takes time for taxpayers to learn how to avoid paying the BTT or that a tax administration effect could outweigh the effect of tax avoidance, at least for some time after the tax is introduced. Intuitively, it takes time for taxpayers to devise mechanisms for avoiding BTT without much disruption in their payments and financial management technologies. However, the longer the tax remains in place, the greater the expertise gained in the area of tax administration, which would suggest an improvement, or relative stability, in productivity over time, but also the greater the gain in expertise in tax avoidance, which would suggest a fall in productivity over time.⁸ To assess this possibility, we include a nonlinear term (TREND squared) and find that productivity does increase with time, but the tax avoidance effect tends to dominate after about 2 quarters following the introduction of the tax (Model 5).⁹

5. This empirical regularity also holds at both quarterly and annual frequencies. We chose the semi-annual frequency as the most suitable for illustration purposes.

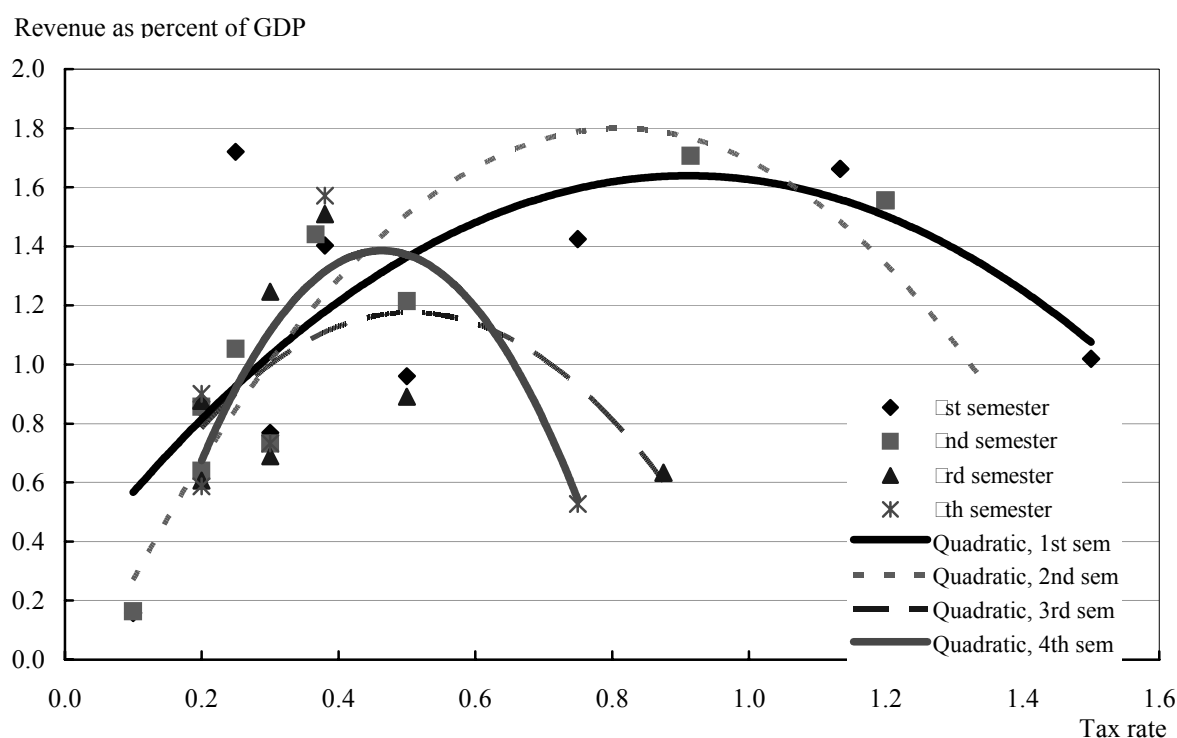
6. Data for Argentina prior to 1993 and Ecuador were excluded.

7. In the case of Brazil and Venezuela – where BTTs were introduced and abolished repeatedly – the starting semester was reset each time the tax was re-introduced.

8. The experience of Brazil is illustrative of the use of a BTT as a collection enforcement instrument. The CPMF, the Brazilian bank debit tax, has been used as an instrument to fight tax evasion, primarily by allowing for the cross-checking of information on income tax returns and financial transactions, and by bringing part of the informal sector to the tax net.

9. We also experimented with modified trend variables to identify periods following a rise or a fall in the statutory rate. Neither effect was statistically significant at classical levels, nor did the inclusion of these variables alter our results.

Figure 2. BTTs in Latin America: Laffer curves



Source: National sources and authors' calculations.

Another interesting observation prompted by Figure 2 is that the Laffer curves shift towards the origin as the BTT remains in effect. This means that the revenue-maximising rate decreases over time. Moreover, increasing the BTT rate accelerates the speed at which the tax base is depleted. In other words, the fall in BTT revenue over time is higher for higher tax rates. For example, according to our estimation, for a tax rate of 0.2%, second-year revenue is 9% lower than during the first year the tax is in effect. For a tax rate of 0.3%, BTT revenue is nearly 30% lower in the second year relative to the first year. Thus, an estimate of the revenue-maximising BTT rate that does not take into account the shrinking of the tax base would be biased upward. For example, in our quadratic model, a simple calculation of a revenue-maximising rate yields an estimate of about 1.5%: a very high rate for a BTT.¹⁰ In contrast, as can be seen in Figure 2, the revenue-maximising rate based on the data for the fourth and later quarters is about 0.4%.

Finally, we carried out a number of additional robustness checks, which are not reported to economise on space. Robustness is maintained when SHARE is included among the controls in first differences, rather than levels.¹¹ The inclusion of a proxy for macroeconomic conditions, such as the real rate of GDP growth, does not affect the results qualitatively, although SHARE loses significance. Moreover, the empirical findings are robust to the re-estimation of the baseline model excluding Argentina, due to the country's experience with a currency board during the 1990s, although the results are somewhat

10. Several previous studies, for example, Albuquerque (2003) and Koyama and Nakane (2001), failed to take into account the shrinking of the tax base over time when calculating the inflection point of a Laffer-type curve.

11. Ideally, dividend receipts should also be included but data are not readily available for most countries in the sample.

sensitive to the choice of controls. This can be attributed to the loss of statistical power coming from a reduced size of explanatory variables used to estimate more coefficients.

Conclusion

Based on a panel of recent data from six Latin American countries – Argentina, Brazil, Colombia, Ecuador, Peru and Venezuela – we find that bank transaction taxes are not a reliable source of revenue, especially over the medium term. Our results are robust: they hold for different functional specifications of the underlying relationship, alternative estimation techniques and the inclusion of various controls. Moreover, raising the tax rate causes the tax base to shrink by more than it raises revenue. We therefore conclude that these taxes should be used only as a temporary means to mobilise revenue in situations of fiscal duress.

We acknowledge that a particularly challenging problem in estimating the usual reduced-form productivity equations in the case of BTTs is the strong correlation between the effective rate and conventional measures of financial deepening, as well as among these variables. In addition to the problem of joint correlation of the explanatory variables, reduced-form productivity equations do not allow for the estimation of the full impact of taxation on financial intermediation. To gauge this impact fully, further empirical evidence is needed on how the taxation of bank transactions affects capital markets and interest rates, in conjunction with other levies on financial institutions, transactions and income.

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Appendix

Bank Transaction Taxes in Latin America

A. Argentina

Argentina was the first country in Latin America to introduce a temporary BTT at a time of fiscal distress. The tax was first introduced in 1976 at the rate of 0.2%, but was repealed after only three months. It was introduced again in October 1983 at a rate of 0.1%. In August 1985, the rate was increased to 0.2% as part of the Austral stabilisation plan and remained in place until December 1986. In March 1988, after the failure of the Austral Plan, and with the inflation rate rising, it was reintroduced with a new name: *Impuesto sobre los debitos en cuenta corriente* with a standard rate of 0.7% levied on debits from current and savings accounts (Appendix Table 1). In January 1990, the rate was reduced to 0.3% until February 1991, when it was raised to 1.2% as part of the convertibility-based stabilisation programme. This high rate remained in place until February 1992 when, once again, it was reduced to 0.3% until its elimination in June 1992. The tax was reintroduced in April 2001 and is currently in place.

The current tax, *Impuesto sobre los debitos y creditos en cuentas bancarias*, initially to be in effect through the end of 2002 and subsequently extended through the end of 2004, has played the role of advance payment for the income tax and VAT. The cross-credit mechanism with other taxes was eliminated in 2002. Currently, the tax is levied at the statutory rate of 0.6%. However, because both debits and credits are taxed, the effective rate is 1.2%. A reduced rate of 0.25% (effective rate of 0.5) is applied to taxpayers exempt from VAT and income tax. Grain and cattle brokering, credit card operations, and electronic transfers via the Internet are taxed at 0.075% (0.15% effective). There is an extensive list of exemptions including interbank transactions, financial flows of the administration of pension plans, credits originating in exports, and the acquisition and redemption of shares of mutual funds.

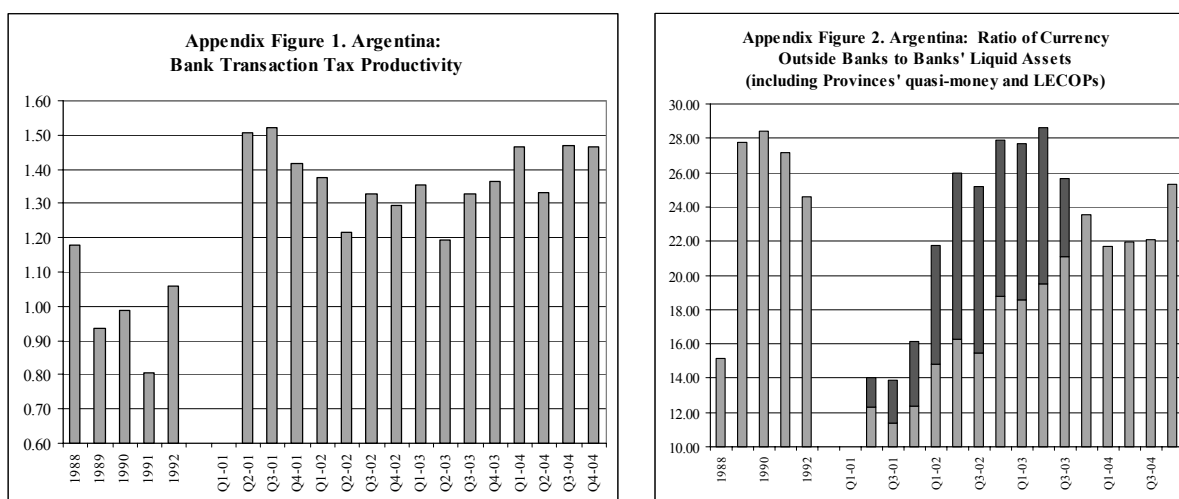
Appendix Table 1. **Argentina: Statutory BTT rates, 1988-2004**

Statutory rate	Period
0.70 per cent	1 March 1988 to 31 December 1989
0.30 per cent	1 January 1990 to 20 February 1991
1.20 per cent	21 February 1991 to 20 February 1992
0.25 per cent (debits and credits)	1 April 2001 to 30 April 2001
0.40 per cent (debits and credits)	1 May 2001 to 31 July 2001
0.60 per cent (debits and credits)	1 August 2001 to date

Source: Country authorities (AFIP).

BTT productivity has declined over time due to rising tax avoidance (Appendix Figure 1). Two different periods can be singled out. The first period, from 1988 to 1992, is characterised by high inflation and a shallow financial system. During this period, the introduction of the BTT contributed to disintermediation, which resulted in declining productivity. The second period, from 2001 to the present, is characterised by low inflation and a deeper financial system. As expected, tax productivity is higher in the latter period. However, the high effective tax rate is eroding its tax base and productivity has been declining steadily over time.

Appendix Figure 2 presents evidence that the BTT strongly affects the demand for cash in Argentina. This effect is compounded by the use of “quasi-money” printed by provinces and exempted from the BTT. According to Central Bank data, the ratio of cash outside banks (including quasi-money) as a per cent of banks’ total liquid assets has more than doubled since the BTT was introduced. The increase in the demand for cash has taken place despite the rise in inflation. Moreover, the fact that in the first five months of 2003, the number of cheques cleared by the Central Bank was 43% lower than in the same period in 2002 could be interpreted as evidence of financial disintermediation.



B. Brazil

Brazil first introduced a BTT in July 1993. Originally the tax was earmarked to finance health care programmes. However, as early as September 1993, the tax was abolished by the Supreme Court on the grounds that the Constitution ruled out the earmarking of revenue from such taxes (Appendix Table 2). The tax was formally known as *Imposto provisório sobre a movimentação ou transmissão de valores e de créditos e direitos de natureza financeira* – IPMF. A subsequent Supreme Court ruling allowed the collection of IPMF with a statutory rate of 0.25% to take place between January 1994 and December 1994.

In January 1997, the tax was reintroduced with a different name – CPMF (*Contribuição provisória sobre movimentação ou transmissão de valores e de créditos e direitos de natureza financeira*). Since its reintroduction, the CPMF base has remained broadly stable over time, but its rate has changed substantially: between 0.2% and 0.38%. The current statutory rate is 0.30% plus a 0.08% surcharge.

Appendix Table 2. **Brazil: Statutory BTT rates, 1993-2004**

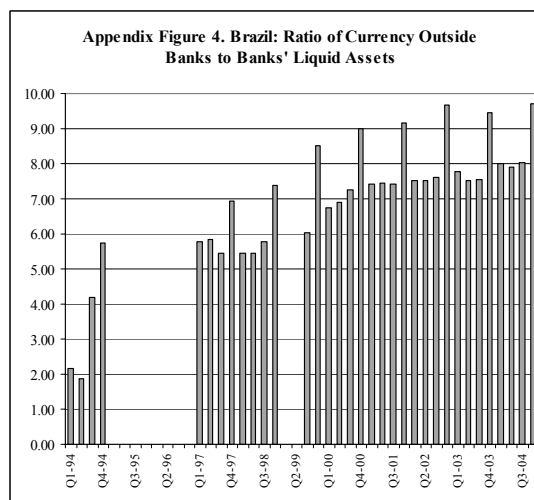
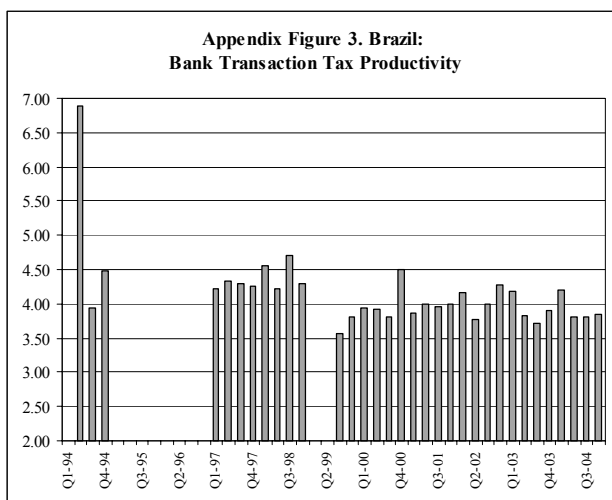
Statutory rate	Period
0.25 per cent	26 August 1993 to 15 September 1993
0.25 per cent	1 January 1994 to 31 December 1994
0.20 per cent	23 January 1997 to 22 January 1999
0.38 per cent	17 June 1999 to 16 June 2000
0.30 per cent	17 June 2000 to 17 March 2001
0.30 per cent + 0.08 per cent surcharge	18 March 2001 to date

Source: Country authorities (SRF).

All debits by non-bank depositors from current, investment, time deposit and savings accounts are subject to CPMF taxation, including overdraft facilities in current accounts and transactions in spot and futures markets. In order to avoid the use of the same cheque for several payments with the purpose of avoiding CPMF taxation, cheques can be endorsed only once. Government accounts (all levels of governments, including government agencies) are exempt, as well as withdrawals from individual social security accounts (FGTS and PIS/PASEP), and unemployment insurance. Non-profit organisations and capital market transactions are also exempt from CPMF taxation. There is no exemption threshold.

The CPMF revenue performance has been strong. CPMF revenues rose from approximately 0.8% of GDP in 1997-99 to 1.3% of GDP in 2000 and, at current levels, productivity does not seem to have been affected adversely by the successive increases in the CPMF rate over time (Appendix Figure 3). This likely reflects the facts that the current CPMF rate is not excessively high, the Brazilian banking system is relatively sophisticated and widely used for payments, and that the CPMF is levied on bank debits only, rather than on both debits and credits, as in other countries where revenue productivity has deteriorated over time.

The CPMF has nevertheless promoted some financial disintermediation in Brazil (measured as the ratio of cash out of banks to banks' liquid assets) as the statutory CPMF rate has been increased (Appendix Figure 4). Furthermore, Koyama and Nakane (2001) show that the Brazilian bank debit tax (CPMF) is associated with a fall in the number of cheques issued, a small increase in M1, a reduction in long-term deposits (M4) in favour of hedge fund applications, which are exempted, and an increase in interest spreads.



C. Colombia

In November 1998, Colombia introduced a 0.2% tax on financial transactions – *Contribucion sobre transacciones financieras* – as a temporary measure and earmarked its revenue to finance the bailout of mortgage institutions. The tax, which was intended to expire in December 1999, was extended until the end of 2000, but the revenue earmarking was eliminated. In 2001, its rate was increased to 0.3% and the tax became permanent under the name *Gravamen a los movimientos financieros*. At present this tax is levied on all withdrawals from savings and current accounts, credit card transactions, and loan disbursements. In fiscal year 2002, this tax accounted for 5.4% of total tax revenue, approximately 0.7% of GDP.

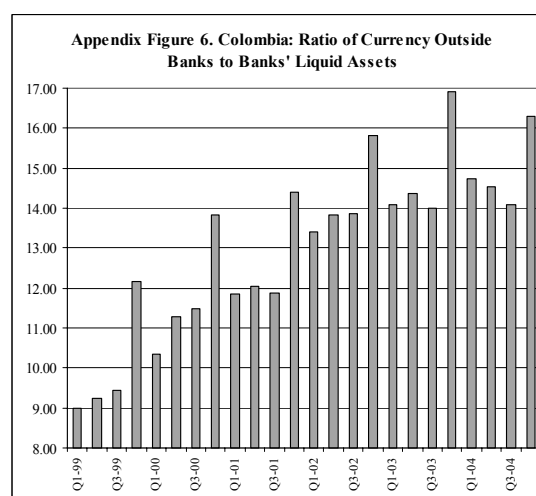
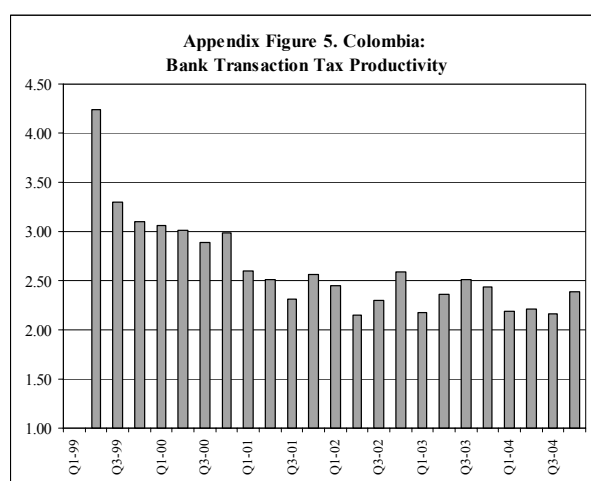
Appendix Table 3. Colombia: Statutory BTT rates, 1998-2004

Statutory rate	Period
0.20 per cent	16 November 1998 to 31 December 2000
0.30 per cent	1 January 2001 to 31 December 2003
0.40 per cent	1 January 2004 to date

Source: Country authorities (DIAN).

BTT productivity has declined over time due to the increase in the tax rate and growing tax avoidance (Appendix Figure 5). The introduction of the BTT contributed to disintermediation, which resulted in declining productivity. The increase of the tax rate to 0.30% in January 2001 contributed to a further decrease in productivity. This trend has continued with the increase of the tax rate to 0.40% in January 2004.

The tax has had a significant effect on the demand for cash in Colombia. The ratio of cash outside banks to the banks' liquid assets has increased from 9% in 1999 to more than 14% in 2003 (Appendix Figure 6). Arbeláez, Burman, and Zuluaga (2002) found evidence that the ratio of cash to monetary base has been increasing since the BTT was introduced in 1998. As in other countries, the number and value of cleared cheques has also fallen over time. According to Arbeláez, Burman, and Zuluaga, the number of cheques cleared by the Central Bank plummeted from a monthly average of 15 million in 1997-1998 to an average of 8 million for the period 1999-2002.



D. Venezuela

Venezuela first introduced a BTT between May and December 1994 under the name of *Impuesto al debito bancario* (IDB). The statutory tax rate for the IDB was set at 0.75%. The tax was levied on all bank debit transactions. In May 1999, the BTT was reintroduced with a tax rate of 0.50% and remained in place until May 2000. On both occasions the BTT was introduced as a temporary measure to alleviate the fiscal stress caused by a fall in oil revenues. In March 2002, the IDB was introduced once again to compensate for falling oil revenues associated with the political crisis during the failed attempt to oust President Chavez. This time, the IDB was reintroduced with a rate of 0.80% on all bank debits. However, due to the extension of the political crisis and near paralysis of the oil industry, its rate was increased to one per cent in September 2002.

In 1994 and 1999 the number of exemptions was large and created administrative problems. Among the institutions exempted from taxation were government bank accounts, saving and loan entities, mortgage banks, the stock exchange, diplomatic representations and international organisations, universities, non-profit organisations, and public pensions. At present the IDB is applied to all withdrawals from savings and current accounts, credit card transactions and loan disbursements, and the number of exemptions has been reduced.

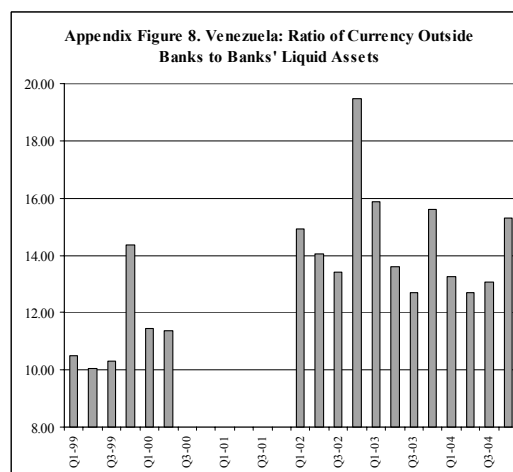
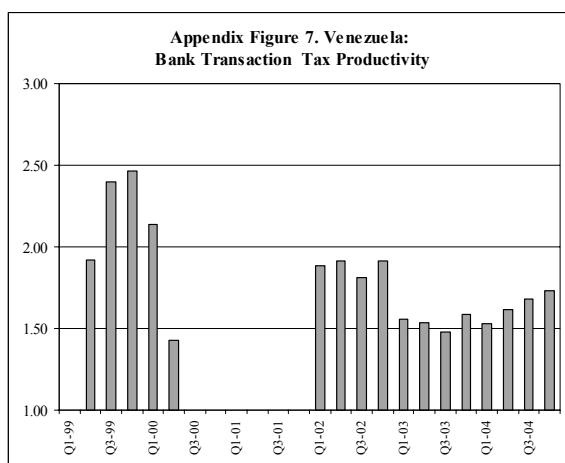
Appendix Table 4. **Venezuela: Statutory BTT rates, 1994-2004**

Statutory rate	Period
0.75 per cent	9 May 1994 to 31 December 1994
0.50 per cent	14 May 1999 to 13 May 2000
0.80 per cent	15 March 2002 to 31 August 2002
1.00 per cent	1 September 2002 to 31 June 2003
0.80 per cent	1 July 2003 to 31 December 2003
0.50 per cent	1 January 2004 to date

Source: Country authorities (Seniat).

BTT productivity has declined over time due to the high statutory rates (Appendix Figure 7). Between May 1999 and May 2000, inflation was high and the introduction of the BTT contributed to disintermediation, which resulted in declining productivity. Subsequently, from March 2002 to June 2003, productivity continued declining. Since July 2003 up to date, productivity has been increasing as a result of the reduction of the tax rates.

As in other countries in Latin America the IDB has had a significant effect on the demand for cash in Venezuela. The ratio of cash outside banks to the banks' liquid assets has increased from 10% in 2001 to more than 14% in 2003 (Appendix Figure 8). Faust, Vera, Vivancos and Echeverria (2001) find evidence that the number and value of cheques cleared by the Central Bank decreased for the period when the IDB was in place (1994 and 1999-2000).



E. Ecuador

In January 1999, in the midst of an economic and financial crisis, Ecuador introduced a 1.0% tax on financial transactions under the name *Impuestos a la circulacion de capitales* (ICC). The new tax, initially introduced to replace the income tax, was creditable against the income tax. In January 2000, its rate was lowered to 0.8% until its elimination in January 2001.

The tax was levied on all debits and credits to current, saving, term, loan, and other accounts in financial institutions, including interbank transfers, remittances abroad, payments abroad by exporters, loan rollovers and cheque clearing. Tax exemptions were granted to public sector agencies, local governments, public universities, the Central Bank, foreign governments and international institutions, social security contributions, funds received by financial institutions for intermediation, withdrawals from savings accounts and ATMs.

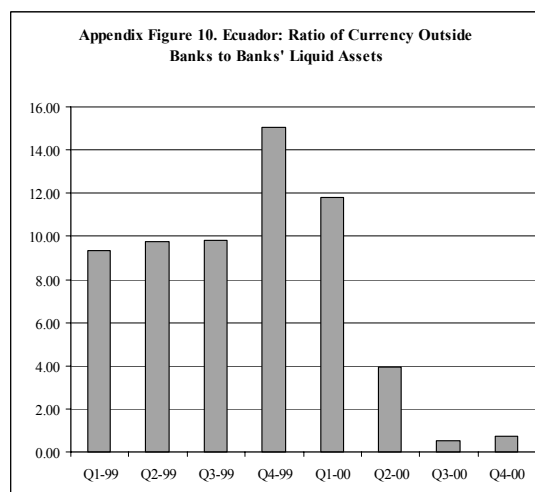
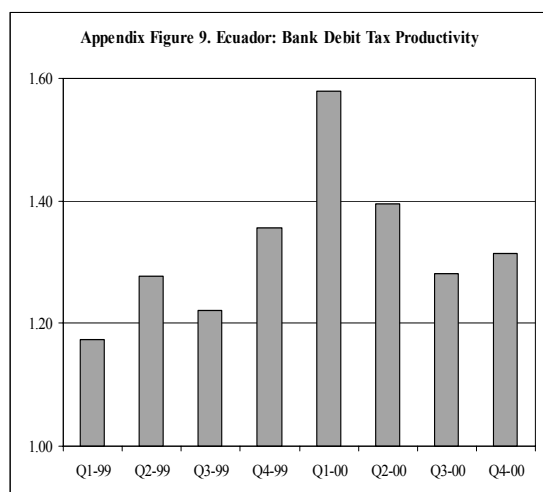
Appendix Table 5. Ecuador: Statutory BTT Rates, 1993-2001

Statutory rate	Period
1.00 per cent (debits and credits)	1 January 1999 to 31 December 1999
0.80 per cent (debits and credits)	1 January 2000 to 1 December 2000

Source: Country authorities (BCE).

The ICC revenue performance was initially strong when it was meant to replace the income tax. However, once this provision was eliminated, the productivity of the tax plummeted (Appendix Figure 9). Revenue performance was also influenced by the fact that the ICC had a broader base than in other countries, being levied on both debits and credits, and because the ICC was creditable against the income tax.

The ICC has resulted in financial disintermediation, compounded by the already weak banking system and the economic crisis. In fact, in March 1999 – 3 months after the introduction of the ICC – the collapse of the banking system forced the freezing of banking deposits for 4 months. Tax revenue collapsed in real terms during the entire period in which the tax was in place. In 2000, the dollarisation of the economy contributed to the collapse of transactions in domestic currency (Appendix Figure 10).



F. Peru

In August 1989, Peru introduced a 1.0% tax on financial transactions (*Impuesto a los debitos bancarios y financieros*) as an emergency measure during hyperinflation (Appendix Table 6). Continued fiscal duress forced the government to increase the tax rate to 2.0% in April 1990. Growing financial disintermediation subsequently led the government to lower the BTT rate first to 1.0% in September 1990, then to 0.75% in April 1991, and finally to 0.40% in January 1992. With the approval of a comprehensive tax reform in March 1992, the BTT was eliminated. In March 2004 the BTT was reintroduced at a

statutory rate of 0.05% but because both credits and debits are taxed, the effective rate is 0.1%. In January 2005, the statutory rate was reduced to 0.04% and the law contemplates eliminating this tax at the end of 2006.

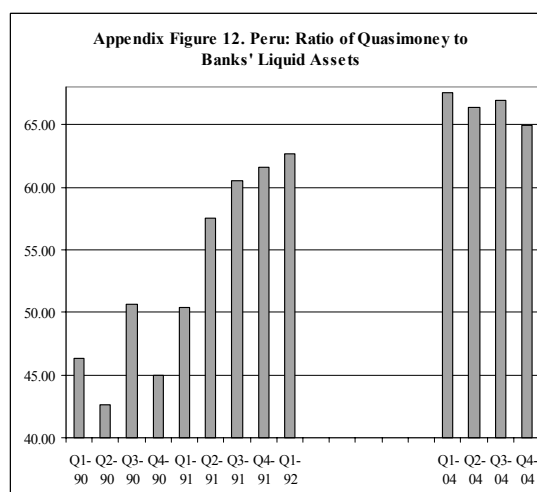
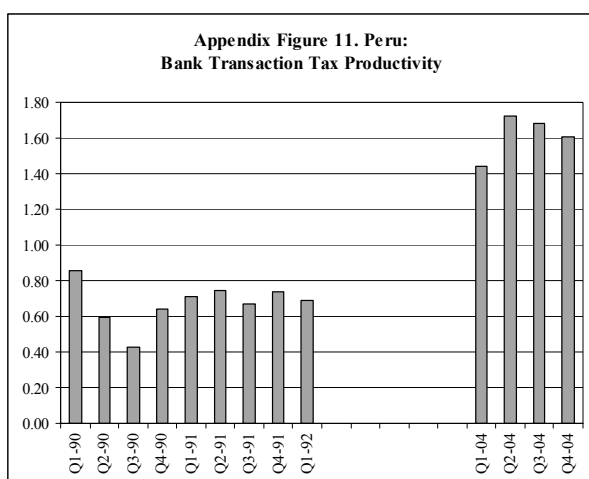
Appendix Table 6. **Peru: Statutory BTT rates, 1989-2004**

Statutory rate	Period
1.00 per cent	11 August 1989 to 12 April 1990
2.00 per cent	13 April 1990 to 28 September 1990
1.00 per cent	29 September 1990 to 25 April 1991
0.75 per cent	26 April 1991 to 31 December 1991
0.40 per cent	1 January 1992 to 17 March 1992
0.05 per cent	1 March 2004 to 31 December 2004
0.04 per cent	1 January 2005 to date

Source: Country authorities (SUNAT).

The BTT was levied on all debits from bank accounts, but the list of exemptions was extensive, including saving accounts, accounts of housing financing funds, government accounts, accounts of official customs agents and universities and other schools, transfers between same-name accounts, mining and industrial enterprises that signed agreements of tax payment stability, severance payments, and the debit of the tax itself.

. BTT productivity declined throughout the period in which the BTT was in place (Appendix Figure 11). In 2004, after an initial increase in productivity, the tax has exhibited a declining trend despite the low tax rate. The high BTT rate induced financial disintermediation. The number of cheques cleared by the Central Bank and their average value fell substantially. The ratio of cash outside banks to banks' liquid assets increased from 45% in early 1990 to 64% in 1992 (Appendix Figure 12). The transfer of funds from current to saving accounts, which were exempted from taxation, was encouraged. The clearance of payments was carried out directly among enterprises to avoid bank debits. Multiple endorsements of cheques became frequent and dollarisation deepened. Financial disintermediation, coupled with the widespread use of informal settlement of payments, led to a fall in tax revenues and current account deposits in real terms



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