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Reserve Requirements on Bank Deposits as Implicit Taxes:
A Case Study of Italy

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Abstract

This paper analyzes the quasi-fiscal effects of Italy's relatively high bank reserve requirements, against the background of growing pressure to align them with those of other EC countries. The paper develops an integrated accounting framework for the measurement of implicit and explicit taxes on the banking system and applies that framework to the Italian experience during the 1980s. Pointing to a lack of transparency in the yield and incidence of the reserve requirement tax, the results reinforce the case for lowering the attendant burden on the Italian banking system. It is estimated that that burden could be halved at a cost to the budget of no more than 0.2 percent of GDP.

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Summary

Italy's system of relatively high reserve requirements on bank deposits is a legacy of a long period of weak public finances. In light of the Government's automatic access to a current account facility with the central bank, the monetary authorities have in the past had to rely on coercive means of monetary control. During the 1980s, they made substantial progress in moving toward a more market-oriented system of monetary control, but the pressures from the monetary financing of the budget deficit did not abate, and the domestic banking system remained burdened by a rising average reserve requirement. The need to alleviate that burden has recently been heightened by the liberalization of international capital flows and by the move toward a single European market.

This paper analyzes the quasi-fiscal effects of reserve requirements, with a view to assessing their importance in the process of Italy's fiscal consolidation. Compulsory reserves constitute an implicit tax on the banking system insofar as they provide the public sector with an indirect source of financing at below-market rates. To assess the relative contribution of the reserve requirement tax to the overall revenue effort, the paper develops an integrated accounting framework to measure implicit and explicit taxes on the banking system.

The evolution of the associated receipts during the 1980s highlights the shortcomings of implicit taxes. The yield and incidence of the reserve requirement tax are influenced by difficult-to-predict nonpolicy factors, and a lack of transparency hampers coordination with explicit tax policy. These considerations reinforce the case for lowering Italy's taxation through reserve requirements toward the EC average, provided that this effort is coordinated with a reform of the Treasury's current account facility. In light of the already small budgetary contribution of the reserve requirement tax, and with existing explicit taxes remaining in place, a halving of reserve requirements would cost the budget no more than 2/10 of 1 percentage point of GDP.

I. Introduction

The process of EC financial integration has far-reaching implications for bank regulation within each member country. The second directive on the coordination of banking activity has set rules governing banks' freedom of establishment and of providing services throughout the Community, with effect from January 1, 1993. A number of accompanying directives have also specified minimum prudential standards on, among other items, the definition of own funds, solvency ratios and large exposures, setting the stage for the harmonization and mutual recognition of national legislation in those areas. 1/ Reserve requirements on bank deposits are considered an instrument of monetary rather than prudential control and, as such, they are exempted from the harmonization requirements of the second directive. Nevertheless, following the elimination of barriers to international capital flows--which was completed in April 1990 in the case of Italy--domestic and cross-border financial instruments are set to become ever-closer substitutes, exerting mounting pressures toward a de facto harmonization of reserve requirements. Such pressures could be more intense in countries with higher reserve requirements.

Reserve requirements in Italy are substantially higher than in other major industrial countries. This is the legacy of a long period of weak public finances dating back to the 1970s. During the early part of that period, the monetary authorities had limited autonomy in determining the quantity or terms of government borrowing from the central bank. Recourse to the Treasury's current account facility with the Bank of Italy (BI), in particular, increased steadily as the overdraft limit was linked to the total amount of public expenditure. In these circumstances, monetary control was secured through a rising reserve ratio together with a host of administrative controls on international capital flows and on domestic banks' credit policies. Resident investors in effect became captive holders of government debt, accepting lower returns on their financial assets than they might have required in a free market, thereby helping limit the Government's interest bill. The associated implicit transfer to the budget was tantamount to a tax on the financial system. 2/ Following the so-called divorce between BI and the Treasury in 1981, the central bank was able to move toward a more indirect system of base money management, allowing most of the administrative controls on bank credit and on capital flows to be gradually eased. In the absence of reform in the current

1/ For a discussion of these directives, their state of implementation, and their implications for Italy, see Banca Commerciale Italiana, The Italian Economy: Monetary Trends, Economic Research and Planning Department, January 1990 and Istituto Mobiliare Italiano, Normativa Italiana in Campo Creditizio e Finanziario: Recenti Evoluzioni, November 1991.

2/ The tax-like function of reserve requirements has been appreciated for some time, especially in connection with the effects of inflation. See, for example, Phelps (1973), Fama (1980), McKinnon and Mathieson (1981) and, for the case of Italy, Porta (1983).

account facility, however, average reserve requirements remained on an upward trend.

The Italian authorities recognize the need, and have already signaled their intent, to reform both the Treasury's current account and the system of compulsory reserves.^{1/} Such reform is called for not only by the advent of the single market but also by the EC-wide guidelines on monetary financing of the Government that would be imposed during the second phase of EMU. Early adherence to these guidelines would make it possible to lower Italy's reserve requirements on deposit flows toward the EC average before January 1, 1993. In the presence of an efficient and smoothly functioning money market, this would not undermine monetary control, which could remain effective through greater reliance on open market operations. A more gradual reduction could be applied to outstanding stocks, so as not to exert undue pressure on money market conditions in the short run. To the extent that reserve requirements are still an important source of implicit tax revenue, however, their prospective lowering could interfere with the process of fiscal consolidation.

This paper analyzes and quantifies the quasi-fiscal effects of Italy's reserve requirements, with a view to assessing the potential budgetary implications of their reduction toward EC levels. Section II describes Italy's system of bank reserve requirements and compares it with those of other industrial countries. Section III applies a simple method toward the measurement of the fiscal gains from reserve requirements in Italy. After developing a more formal accounting framework, Section IV quantifies some of the tax-like effects of reserve requirements from the point of view of Italian banks and depositors. Concluding remarks are presented in Section V.

II. Bank Reserve Requirements in Italy

The average reserve ratio on Italian banks has been on an upward trend since 1975. This reflects several successive increases in the marginal reserve ratio, together with the fact that those increases have been applied only to the flow of deposits, thereby slowing convergence towards a steady-state reserve ratio. Prior to 1975, there was a system of differentiated reserve requirements, both by type of deposit and by type of financial institution. As a result, the incidence of the burden of reserve requirements was highly uneven between commercial banks and savings banks and the money multiplier was dependent on difficult-to-predict changes in deposit composition. To improve the effectiveness of monetary policy through base money management and also place all types of banks on a more equal footing, this system was reformed in January 1975, by introducing a uniform marginal reserve ratio of 15 percent. The marginal reserve ratio was subsequently raised to 15.75 percent as of 1976, 20 percent as of 1981,

^{1/} See Banca d' Italia, Abridged Report for the Year 1990, pp. 160-161.

and 25 percent as of 1983. To increase the pace of convergence towards the long-run equilibrium reserve ratio, the 25 percent ratio has been applied only to deposit increases. Deposit decreases were instead subject to a reserve ratio of 20 percent and, since May 1983, they have been subject to a ratio of 22.5 percent. This latter rate is also the target steady-state reserve ratio. The marginal reserve ratios are to remain unchanged until the average reserve ratio reaches 22.5 percent, at which point a uniform 22.5 percent ratio is to apply for all deposits. 1/

A comparison of reserve ratios in major industrial countries shows that Italian banks are indeed subject to the highest reserve ratio. As is illustrated in Table 1, reserve ratios range from near-zero for banks in Japan and the United Kingdom to highs of 12 percent and 12.1 percent on portions of demand deposit balances with banks in the United States and Germany, respectively. The only qualification as regards the relative burden of reserve requirements is that bank reserves are remunerated in Italy, unlike in the other countries. The rate of remuneration is 8.5 percent on reserves held against certificates of deposit (CDs), 5.5 percent on all other required reserves and 0.5 percent on excess reserves. The higher rate of remuneration on reserves against CDs--initially set at 9.5 percent in 1982 and lowered to 8.5 percent in 1986--has reflected the authorities' desire to induce more competitive pricing and greater interest rate differentiation of bank deposits with longer maturities. Partly as a result, CDs have become the most dynamic source of bank funds, raising their share since their introduction in 1982 to 17.4 percent of bank deposits in 1990. 2/

Recent changes in the regime of reserve requirements can be seen as a first, albeit modest, step in lowering their overall burden. Following the shift from end-of-period to monthly-average reserve accounting and the so-called mobilization of required reserves, introduced in October 1990 and extended in October 1991, banks can now economize on their free reserves by using up to 5 percent of their required reserves for purposes of daily cash management. Any such use, however, would have to be offset by excess reserve holdings in the rest of the reserve maintenance period, so as to meet the reserve requirement on average. Indeed, the mobilization scheme has been intended not so much to alleviate the burden of required reserves as to help diminish the day-to-day volatility and increase the information

1/ For a more detailed description of the evolution of Italy's system of reserve requirements, see Banca d'Italia, Relazione Annuale 1983, pp. 183-184.

2/ See Banca d'Italia, Relazione Annuale 1983, p. 196 and Relazione Annuale 1990, pp. 195-6. Certificates of deposit have also received a more favorable tax treatment than other deposits. Since 1988, the withholding tax rate on interest income has been 12.5 percent for CDs with maturities of at least 18 months, 25 percent for CDs with shorter maturities and 30 percent for all other deposits. Beginning in October 1991, however, as a part of the fiscal adjustment effort, the withholding tax rate on shorter-term CDs was to be raised to 30 percent.

Table 1. Reserve Ratios in Major Industrial Countries as of 1990

(In percent)

	Minimum Reserve Ratio	Maximum Reserve Ratio	Rate of Remuneration of Required Reserves
Italy	22.50 <u>1/</u>	25.00 <u>2/</u>	5.5-8.5
Germany	4.15	12.10	--
France	3.00 <u>3/</u>	5.50	--
United Kingdom	0.45	0.45	--
United States	3.00	12.00	--
Japan	0.125	2.50	--
Canada	1.00	10.00	--

Source: Deutsche Bundesbank, Monthly Report, March 1990.

1/ Target average reserve ratio.

2/ Marginal reserve ratio on increases of deposits until the target average reserve ratio of 22.5 percent is reached, at which point there will be a uniform reserve ratio of 22.5 percent.

3/ Since October 16, 1991, the reserve ratio has been reduced from 3.0 percent to 0.5 percent for all components of money supply that constitute M3-M2, and from 3 percent to 2 percent for components that constitute M2-M1. Moreover, cash holdings of financial institutions can now be counted toward reserve requirements.

content of interbank rates. 1/ In May 1991, the aggregate subject to reserve requirements was modified, by excluding from reservable deposits banks' net borrowing from abroad or through repurchase agreements and including residents' foreign currency deposits with Italian banks. Once again, this move was motivated by several considerations other than the cost of reserve requirements, including the need to shift towards EC's common definition of the reservable deposit base. The end result was the freeing of some Lit 5 trillion of bank reserves in June 1991, which was only about 4 1/2 percent of the total stock of reserves. Even so, altogether, the above reforms can be viewed as an important signal to the banking system of the direction of changes yet to come in Italy's system of reserve requirements.

III. Measuring Government Revenue from the Reserve Requirement Tax

The implications of reserve requirements for the public finances are not readily apparent in conventional fiscal accounts. This is because, from a purely accounting point of view, bank reserves are a central bank liability to depository institutions, which is excluded from the definition of public debt. To develop a notion of the quasi-fiscal gains from reserve requirements, it is useful to think in terms of the consolidated accounts of the government and the central bank. Assuming that bank reserves are fully backed by central bank credit to the government, one can view the system of reserve requirements as a means to compel banks to invest indirectly in government securities. The quasi-fiscal element in reserve requirements can then be defined as the resulting interest savings on the public debt. If reserve requirements and open market operations are the only instruments of monetary policy, for any given target level of the monetary base, the lower the level of required reserves the larger the amount of government securities that must be placed with the public. 2/ Assuming that the rate of return (rb) required by the public to hold the extra amount of government securities is larger than the rate of return (rr) on required reserves, the quasi-fiscal receipts (T) from reserve requirements can be expressed as

$$(1) \quad T = (rb-rr) \cdot k \cdot (D-E)$$

where k is the statutory reserve ratio, D is the stock of reservable deposits, E is bank equity--which in Italy is deductible from reservable deposits--and $(rb-rr) \cdot k$ can be viewed as the implicit tax rate on bank deposits.

1/ See Banca d' Italia, "La mobilitazione della riserva obbligatoria: motivazioni e implicazioni," October 1988 and Bollettino Economico, 15, 1990.

2/ For a more detailed discussion of the related issue of defining the fiscal gains from seignorage, see Molho (1989).

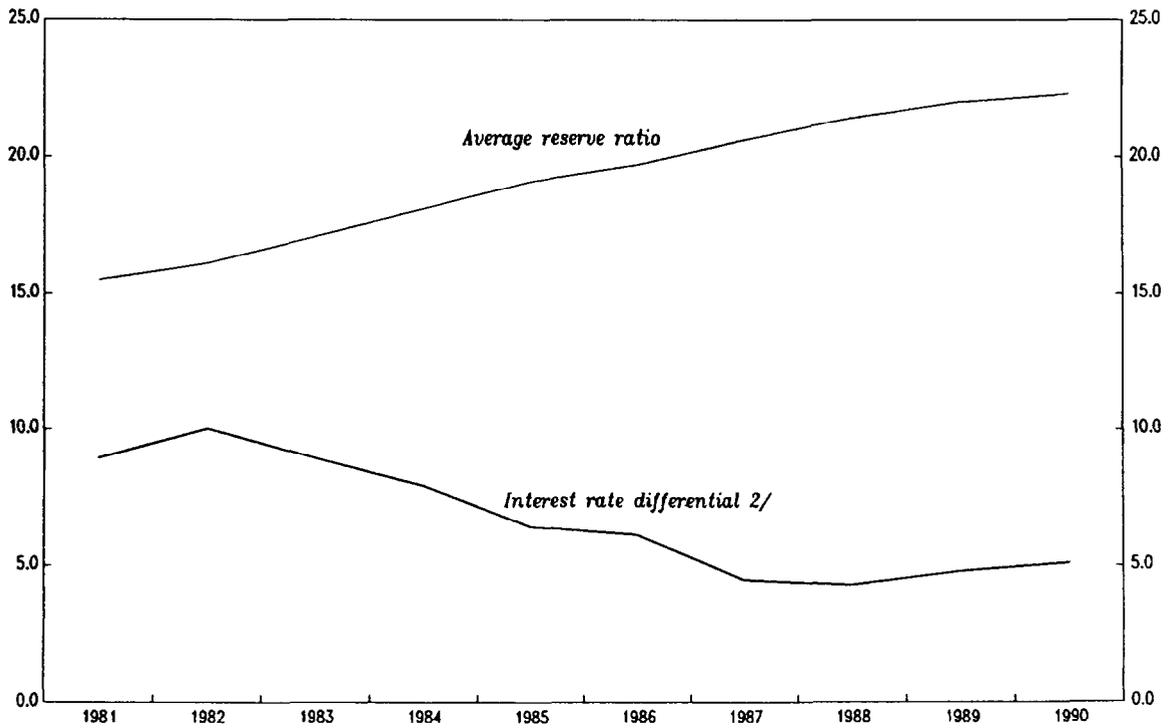
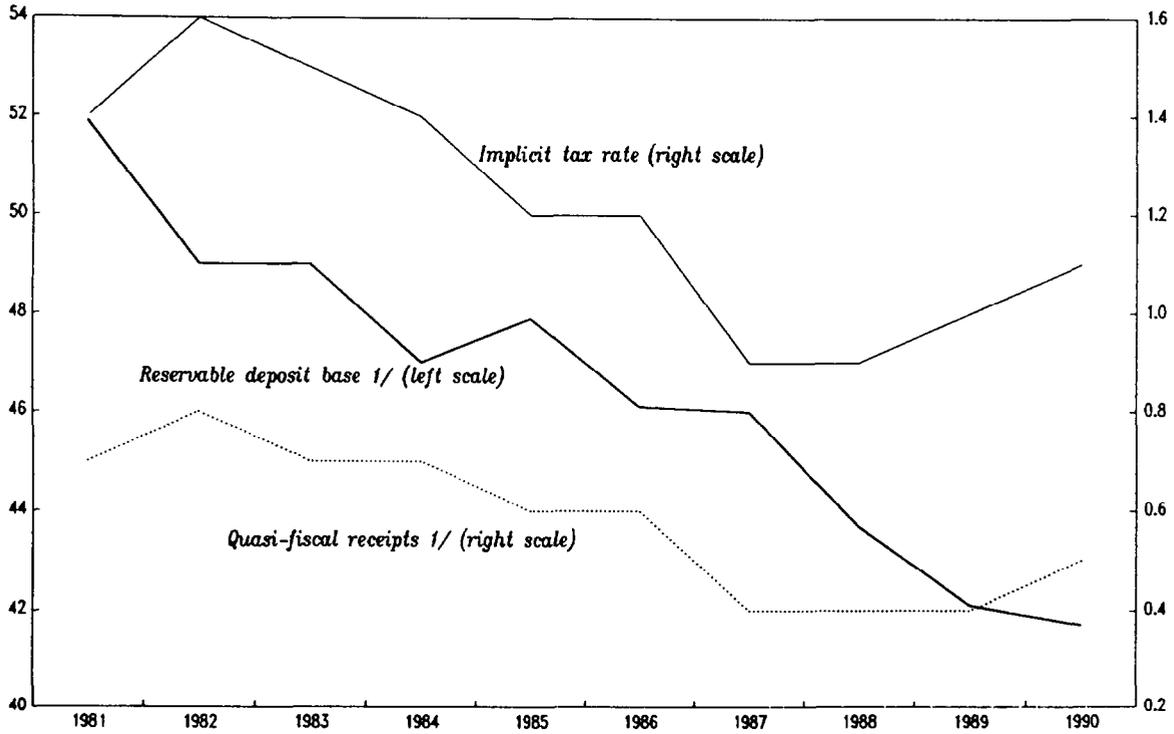
Equation (1) can be used to measure the quasi-fiscal receipts from reserve requirements in Italy. Data on k , $D-E$, and rr can be readily derived from the balance sheet of the banking system and from the central bank's profit and loss account, but the derivation of rb is somewhat more complicated. Because of the automatic pass-through of part of central bank profits to the Treasury, the interest rate on the public debt implicit in the official fiscal accounts understates the actual cost of borrowing from the public. This basically reflects the Government's subsidized borrowing-- at an interest rate of 1 percent--through BI's treasury account and the reimbursement to the Treasury of some of the interest earned on BI's government security portfolio. For a more accurate measure of the cost of placing securities with the public in lieu of required reserves, one could use the implicit interest rate on public debt held outside the central bank. This can be done by adding to the Government's officially reported net interest bill the reimbursements of interest from BI, subtracting BI's interest earnings on government debt, and dividing by the stock of public debt held outside BI.

The results of this exercise for Italy over the 1981-90 period, presented in Chart 1 and Table 2, help place the contribution of reserve requirements to the overall fiscal effort in perspective. The quasi-fiscal receipts from reserve requirements declined from a peak of 0.8 percent of GDP in 1982 to 0.4 percent in 1987-89, before edging up to 0.5 percent of GDP in 1990. By comparison, revenues from the withholding tax on bank deposits amounted to 1.1 percent of GDP in 1990, while receipts from the direct taxation of banks amounted to an additional 0.4 percent of GDP. Adding together the above implicit and explicit tax receipts, we find that implicit revenues from reserve requirements amounted to only one fourth of the overall taxation of the banking system in 1990.

The declining receipts from the reserve requirement tax during the 1980s reflect both a substantial erosion in the relevant tax base (i.e., reservable deposits) in relation to GDP and a decline in the associated implicit tax rate. The erosion of the reservable deposit base--by some 10 percentage points of GDP between 1981 and 1990--was attributable at least in part to tax considerations, as households continued substituting government securities for lower-yielding and more heavily taxed bank deposits. Perhaps more striking is the concurrent decline in the implicit tax rate on bank deposits, which fell from a high of 1.6 percent in 1982 to 0.9 percent in 1987-88, before partially recovering to 1.1 percent in 1990. The sharp decline in the implicit tax rate was due to a virtual halving of the differential between the average interest rates on government securities and required reserves--from 10 percentage points in 1982 to about 5 percentage points in 1989-90. This, in turn, reflected the marked decline in government bond yields and, to a much lesser extent, the shift in the composition of deposits toward CDs benefiting from a higher rate of remuneration on the associated required reserves.

The variability of the rate of effective taxation through reserve requirements highlights a major shortcoming of implicit taxes. Their lack

CHART 1
ITALY
QUASI-FISCAL RECEIPTS FROM
BANK RESERVE REQUIREMENTS, 1981-90
(In percent)



Sources: Bank of Italy, Annual Report, various issues; and Fund staff estimates.

1/ In percent of GDP.

2/ Differential between average interest rate on government securities held outside the Central Bank and average yield on banks' required reserves.

Table 2. Italy: Quasi-Fiscal Revenues from Bank Reserve Requirement, 1981-90

(In billions of lire)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Public debt (end-year)	283,490	362,007	456,031	561,489	683,044	793,583	910,542	1,035,263	1,168,485	1,318,709
Borrowing from BI-UIC	66,555	78,670	79,630	92,863	120,286	130,954	137,968	140,522	147,474	147,752
O/w: Overdrafts on BI	25,312	31,910	23,288	41,842	48,182	52,707	61,981	66,312	68,154	71,063
Securities	37,746	40,977	43,063	43,008	66,741	75,737	72,526	71,377	76,494	73,960
Other	3,497	5,783	13,279	8,013	5,363	2,510	3,461	2,834	2,826	2,729
Borrowing from public	216,935	283,337	376,401	468,626	562,758	662,629	772,574	894,741	1,021,011	1,170,957
Net interest bill	28,777	39,308	48,029	59,340	66,352	77,401	79,146	89,929	107,869	127,415
Reimbursements from BI	1,912	2,180	2,681	2,188	2,293	2,634	1,502	1,013	1,210	1,568
Gross interest bill	30,689	41,488	50,710	61,528	68,645	80,035	80,648	90,942	109,079	128,983
O/w: Overdrafts on BI	242	318	347	347	507	557	621	720	694	701
Securities	2,206	2,535	2,763	4,041	6,120	7,601	6,862	6,471	6,641	7,243
Public	28,241	38,635	47,601	57,140	62,019	71,878	73,165	83,751	101,744	121,039
Interest on required reserves	2,049	2,349	2,918	3,446	4,167	4,627	5,299	5,815	6,476	7,255
Average required reserves	37,326	42,936	53,000	61,762	74,105	81,841	93,033	102,000	110,541	121,443
(In percent of GDP)	8.0	7.9	8.4	8.5	9.1	9.1	9.5	9.3	9.3	9.3
Average reservable deposits	241,052	267,188	310,403	340,848	388,200	414,500	452,163	476,636	502,460	544,586
(In percent of GDP)	51.9	49.0	49.0	47.0	47.9	46.1	46.0	43.7	42.1	41.7
Implicit interest rates (in percent)										
Government debt held by public	14.4	15.4	14.4	13.5	12.0	11.7	10.2	10.0	10.6	11.0
Required reserves	5.5	5.5	5.5	5.6	5.6	5.7	5.7	5.7	5.9	6.0
Interest differential	8.9	10.0	8.9	7.9	6.4	6.1	4.5	4.3	4.8	5.1
Implicit tax rate on deposits	1.4	1.6	1.5	1.4	1.2	1.2	0.9	0.9	1.0	1.1
Quasi-fiscal revenue from required reserves	3,326	4,283	4,730	4,907	4,745	4,974	4,186	4,432	5,266	6,157
(In percent of GDP)	0.7	0.8	0.7	0.7	0.6	0.6	0.4	0.4	0.4	0.5
<u>Memorandum items</u>										
Revenue from withholding tax on deposit interest	--	9,507	9,673	14,429	12,414	13,580	11,677	11,540	13,006	14,786
(In percent of GDP)	--	1.7	1.5	2.0	1.5	1.5	1.2	1.1	1.1	1.1
Revenue from tax on bank profits	1,208	2,009	2,535	2,925	3,703	4,974	3,540	4,536	5,129	5,385
(In percent of GDP)	0.3	0.4	0.4	0.4	0.5	0.6	0.4	0.4	0.4	0.4
Total revenue from explicit taxes on banking system	1,208	11,516	12,208	17,354	16,117	18,554	15,217	16,076	18,135	20,171
(In percent of GDP)	0.3	2.1	1.9	2.4	2.0	2.1	1.5	1.5	1.5	1.5
Gross domestic product	464,030	545,124	633,436	725,760	810,580	899,903	983,803	1,091,837	1,192,725	1,306,833
Average reserve ratio (in percent)	15.5	16.1	17.1	18.1	19.1	19.7	20.6	21.4	22.0	22.3

Sources: Bank of Italy, Annual Report, various issues; and Fund staff estimates.

of transparency often implies that tax rates are set not by deliberate policy actions but as a side effect of a number of incidental factors. In the case of the implicit tax rate on deposits, the rise in the average reserve ratio during the 1980s is the only element of policy that was unequivocally deliberate. The concurrent changes in government security rates and in the composition of deposits were determined by a combination of policy actions and market mechanisms that are unlikely to have been fully anticipated. Yet the latter turned out to be more important determinants of the effective rate of taxation of deposits, by more than offsetting the effects of the policy-induced increase in the reserve ratio.

Lack of transparency also gives rise to a degree of arbitrariness in the incidence of the reserve requirement tax. It is not obvious how the tax may be shifted among borrowers, depositors and banks, neither is it clear how its effects may interact with those of other implicit or explicit taxes. To the extent that they impinge on bank profits, in particular, reserve requirements indiscriminately tax loss-making and profitable banks, unlike the explicit tax on corporate profits. A more systematic attempt to cast light on some of these issues is made in the following section.

IV. Incidence of Reserve Requirements and Interaction with Explicit Taxes

As was already suggested, although reserve requirements are directed at banks, their burden could ultimately be shifted to bank customers. This can occur to the extent that banks are able to lower their deposit rates and/or increase their loan rates from the levels that would have prevailed in the absence of reserve requirements. Market structure is one obvious determinant of the room for such pass-through. In a perfectly competitive system, with banks acting as price-takers in both the deposit and loan markets, the pass-through would be complete so long as reserve requirements are universally applied. To break even, banks would have to widen their intermediation margins as necessary to offset the cost of reserve requirements. However, if some banks were exempt from reserve requirements, perfect competition would imply no pass-through at all, as deposits and loans would be diverted from banks that sought to increase their intermediation margins. Banks subject to reserve requirements would then bear the full burden of the tax and would ultimately be driven out of business.

The situation is more complicated if banks possess some market power in the deposit and loan markets. The reserve requirement tax will then affect bank rates and profits in a way that depends on the properties of the public's deposit and loan demand functions. The first subsection below addresses the issue of pass-through more formally in the context of an optimization framework. Subject to certain qualifications, the second subsection derives some practical implications for the incidence of the reserve requirement tax in Italy.

1. A simple model of the banking firm ^{1/}

Consider a bank that seeks to maximize its end-period net worth (NW) given an exogenous amount of equity capital (\bar{E}) in the beginning of the period. The bank's only other source of funds is deposits (D) carrying an interest rate of r_d , while its interest-bearing assets consist of government bonds (B) and loans to the private sector (L) yielding rates of return of r_b and r_l , respectively. The bank faces a deposit supply function that is positively related to its deposit rate, a loan demand function that is negatively related to its loan rate, and an infinite supply of government bonds at the exogenously given rate r_b . The bank's optimization problem is thus reduced to the setting of its deposit and loan rates in the beginning of the period so as to maximize its end-period net worth.

a. The case of no reserve requirements

The bank's optimization problem is to select r_d and r_l so as to maximize the objective function (2) subject to the balance sheet constraint (3):

$$(2) \quad \max NW = (1+r_l) \cdot L + (1+r_b) \cdot B - (1+r_d) \cdot D$$

subject to

$$(3) \quad L + B = D + \bar{E}.$$

Substituting equation (3) for B in equation (2) yields

$$(4) \quad \max NW = D \cdot (r_b - r_d) + L \cdot (r_l - r_b) + \bar{E} \cdot (1+r_b).$$

Differentiating with respect to r_d and r_l yields the two first-order conditions for a maximum:

$$(5) \quad \partial NW / \partial r_d = (\partial D / \partial r_d) \cdot (r_b - r_d) - D = 0,$$

$$(6) \quad \partial NW / \partial r_l = (\partial L / \partial r_l) \cdot (r_l - r_b) + L = 0.$$

Solving for the profit maximizing values of the deposit and loan rates (r_d^* and r_l^*) provides the well-known neoclassical equalization between the marginal cost of deposits and the marginal revenue of loans, with the deposit and loan rates set independently of one another as functions of the exogenous government bond rate: ^{2/}

^{1/} The model described below is a version of the so-called Klein-Monti model. For a fuller discussion of its properties, see Dermine, J., "Deposit Rates, Credit Rates and Bank Capital: The Klein-Monti Model Revisited," Journal of Banking and Finance 10 (1986), pp. 99-114 and references therein.

^{2/} See Dermine (1986) ; op. cit., p. 101.

$$(7) \quad rd^* = rb/(1+l/ed),$$

$$(8) \quad rl^* = rb/(1+l/el),$$

where ed and el are the elasticities of deposit supply and loan demand with respect to the deposit rate and loan rate, respectively.

b. The case with reserve requirements

The bank is now obliged to place a fraction k of its reservable deposit base (i.e., deposits minus equity capital) in bank reserves yielding a rate of return rr and its optimization problem is as follows:

$$(9) \quad \max NW = (1+rl) \cdot L + (1+rb) \cdot B + (1+rr) \cdot k \cdot (D - \bar{E}) - (1+rd) \cdot D$$

subject to

$$(10) \quad L + B + k \cdot (D - \bar{E}) = D + \bar{E}.$$

Once again, substituting equation (10) for B in equation (9) yields

$$(11) \quad \max NW = L \cdot (rl - rb) + D \cdot [rb - rd - k \cdot (rb - rr)] + [(1+rb) + k \cdot (rb - rr)] \cdot \bar{E},$$

and the first-order conditions for a maximum are

$$(12) \quad \partial NW / \partial rd = (\partial D / \partial rd) \cdot [rb - rd - k \cdot (rb - rr)] - D = 0,$$

$$(13) \quad \partial NW / \partial rl = (\partial L / \partial rl) \cdot (rl - rb) + L = 0.$$

Solving for the profit-maximizing levels of the deposit and loan rates in a regime of reserve requirements, we find the same loan rate function as above but a different deposit rate function:

$$(14) \quad rd = [rb - k \cdot (rb - rr)] / (1 + l/ed),$$

$$(15) \quad rl = rb / (1 + l/el).$$

Thus, for any given levels of ed and el , the bank offers a lower deposit rate than it would have offered in the absence of reserve requirements, while charging the same loan rate as in the case with no reserve requirements.

c. The tax-like effects of reserve requirements

The above framework could help account for the size and incidence of the reserve requirement tax. To facilitate a comparison of the cases with and without reserve requirements, it is assumed that the public's deposit supply and loan demand functions have constant interest rate elasticities for all values of rd and rl , and that there is no corner solution, so that the bank chooses to hold a diversified portfolio of loans

and bonds in both cases (i.e., with and without reserve requirements). The two assumptions together basically ensure that the bank can accommodate whatever reduction in the supply of deposits results from the imposition of the reserve requirement tax by lowering its holdings of bonds and without affecting its supply of loans. This, in turn, implies that borrowers will be unaffected by the reserve requirement tax.

With both the quantity of loans and the loan rate equal in the two cases, it is easy to derive the burden of the reserve requirement tax on depositors (BD) and on the bank (BB). Assuming that the tax induces depositors to increase their cash holdings at the expense of deposits, their tax burden (BD) can be defined as the interest forgone on deposits. 1/ Denoting the holdings of deposits by D^* and D and the bank's net worth by NW^* and NW , respectively, in the cases with and without reserve requirements, we have:

$$(16) \quad BD = D^* \cdot rd^* - D \cdot rd,$$

$$(17) \quad BB = NW^* - NW.$$

After adding and subtracting $D \cdot rd^*$ in equation (16) and factoring out D and rd^* , we substitute equations (7) and (14) for rd^* and rd . Likewise, we substitute equations (4), (11), (7) and (14) in equation (17) and obtain:

$$(18) \quad BD = k \cdot (rb - rr) \cdot D / (1 + 1/ed) + rb \cdot (D^* - D) / (1 + 1/ed),$$

$$(19) \quad BB = k \cdot (rb - rr) \cdot D / (1 + ed) + rb \cdot (D^* - D) / (1 + ed) - k \cdot (rb - rr) \cdot \bar{E}.$$

Adding equations (18) and (19) yields the total burden (B) of the reserve requirement tax:

$$(20) \quad B = k \cdot (rb - rr) \cdot (D - \bar{E}) + rb \cdot (D^* - D).$$

Finally, substituting equation (1) in (20) yields a rough measure of the excess burden (EB) of the reserve requirement tax, defined as the difference between the total burden (B) and the associated quasi-fiscal revenue (T):

$$(21) \quad EB = B - T = rb \cdot (D^* - D).$$

Equations (18)-(21) together with equation (1) provide a unified account of the tax-like effects of reserve requirements. The implicit tax

1/ It is also possible that some deposits are replaced by higher-yielding government bonds which, at the margin, would lead to an increase in depositors' total interest earnings. The burden of the tax would then include the cost of forgoing the liquidity, convenience and other desirable attributes of deposits, net of the extra interest earned. Provided that the government bond rate is equal to the opportunity cost of those attributes, the above definition of BD would carry over to this more general case.

receipts by the government are measured by equation (1). The associated tax burdens on depositors and the bank are captured in equations (18) and (19), which illustrate how the incidence of the tax depends on the interest elasticity of the supply of deposits. The higher that elasticity, the larger the share of the tax burden borne by depositors and the smaller the share borne by the bank. In the benchmark case of unitary elasticity, the burden of the tax is shared equally by depositors and the bank. Equation (21), finally, provides a measure of the excess burden, i.e., the net welfare loss associated with the reserve requirement tax. That loss is proportional to the reduction in the stock of deposits stemming from the imposition of the tax.

d. Interaction with explicit taxes:
towards an integrated framework

We can now integrate the analysis of explicit and implicit taxes, by establishing equivalent measures for the two types of taxation. Letting t denote the tax rate applied to deposit interest ($0 < t < 1$), rd^* the deposit rate before taxes, and rd the after-tax deposit rate, we have by definition:

$$(22) \quad rd = (1-t) \cdot rd^* \Rightarrow$$

$$(23) \quad t = (rd^* - rd) / rd^*$$

Substituting the deposit rate without reserve requirements from equation (7) for the pre-tax deposit rate rd^* and the deposit rate with reserve requirements from equation (14) for the after-tax deposit rate rd , we have

$$(24) \quad t = k \cdot (rb - rr) / rb = k - k \cdot rr / rb.$$

In the simplest case of noninterest bearing required reserves ($rr=0$), equation (24) implies that, from the point of view of depositors, reserve requirements are equivalent to a withholding tax rate on interest income that is equal to the reserve ratio.

In combining the effects of implicit and explicit taxes one important distinction relates to the tax base. To the extent that an implicit tax has already been withheld from the base for an explicit tax, the two tax rates are applied to different bases and, therefore, they are not additive. In the case of deposit interest, the base of the withholding tax is already net of the reserve requirement tax. The base for the latter cannot be observed and is derived with respect to a notional rate of interest that would have been earned in the absence of reserve requirements. Similarly, the explicit tax on bank income is applied to profits net of the cost of reserve requirements absorbed by banks.

The interaction between implicit and explicit taxes can now be formalized. Letting t_{imp} denote the implicit tax rate applied on a tax base TB and t_{exp} the explicit tax rate applied to that same base net of implicit tax

payments, total tax revenues T and the corresponding compound tax rate t_{total} are as follows:

$$(25) \quad T = t_{imp} \cdot TB + t_{exp} \cdot (1 - t_{imp}) \cdot TB,$$

$$(26) \quad t_{total} = T/TB = t_{imp} + t_{exp} \cdot (1 - t_{imp}).$$

Differentiating equation (26) with respect to t_{imp} we obtain

$$(27) \quad \partial t_{total} / \partial t_{imp} = 1 - t_{exp}.$$

Equation (27) shows that a cut in the implicit tax rate does not imply a *pari passu* decline in the overall rate of taxation. Less implicit taxation allows a larger after-tax base to be subject to the explicit tax, thereby moderating the size of the cut in the compound tax rate.

2. An application to the case of Italy

With certain qualifications, the above model could be adapted to provide a concrete illustration of the evolution and relative size of the reserve requirement tax in Italy. One of the features of the model that might seem objectionable is the assumption that banks exercise market power in both the deposit and loan markets. There is indeed evidence that the Italian loan market has become significantly more competitive in recent years. ^{1/} But the structure of our model is such that the bank sets deposit and loan rates independently of one another, thereby sheltering borrowers from the burden of reserve requirements. This implies that the assumption of imperfect competition in the loan market could be relaxed, without affecting the model's principal results. The use of monopoly power by banks would probably be a more apt characterization of the deposit side of the market, except in the case of certificates of deposit (CDs), where there is also evidence of increasing competition in recent years. The model could be made more realistic by allowing for more than one type of deposit, with differing elasticities with respect to the own rate of interest. The bank could then be modeled to act as a discriminating monopolist, setting different interest rates in each market, and the government could tax each type of deposit differently, consistent with the Italian experience. The previous results would carry over to this more general case, provided that the cross-rate elasticities of deposit supply functions are equal to zero.

In drawing the model's implications, the analysis has been based on a uniform marginal reserve ratio (25 percent), assuming that it reached its steady-state level of 22.5 percent in 1990. The implicit tax rates on deposit interest were computed on the basis of equation (24), while the explicit tax rates were set equal to the withholding tax rates that have actually been in force. In the case of bank profits, the explicit tax rate

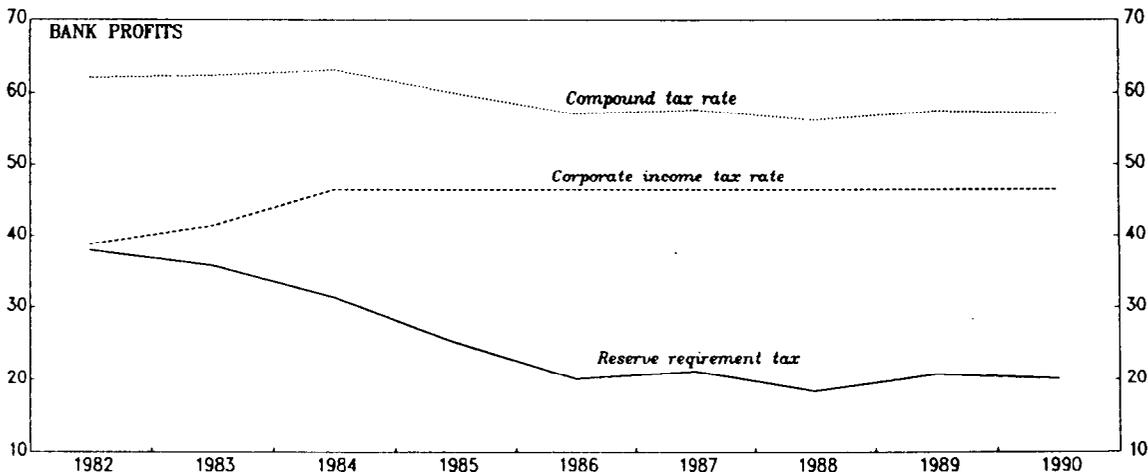
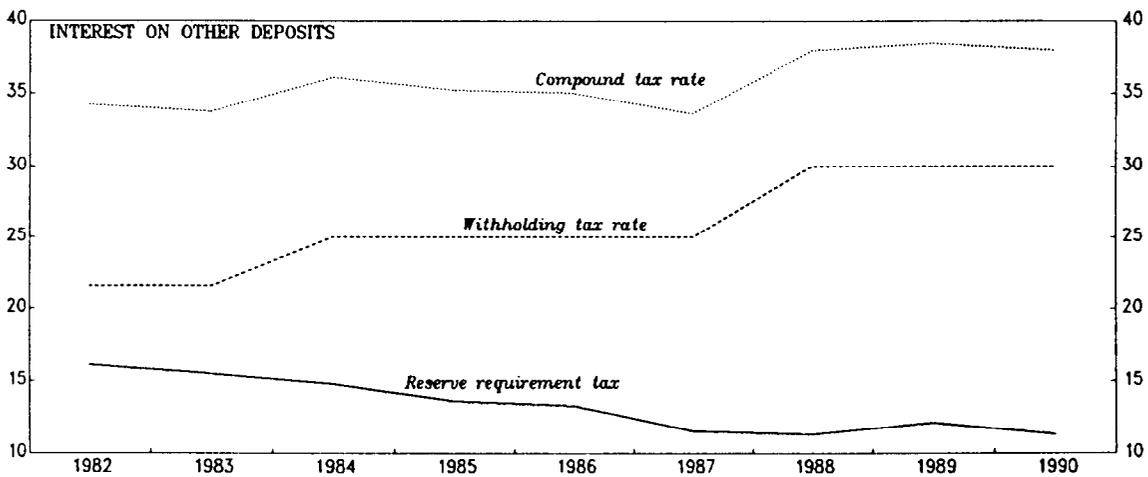
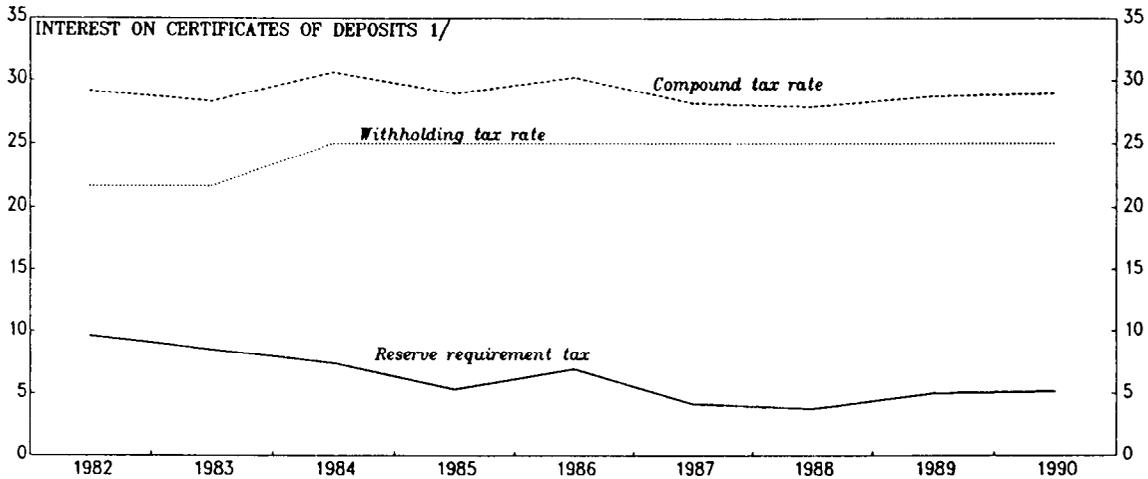
^{1/} See, for example, Banca d' Italia, Relazione Annuale 1990, pp. 186-187 and Ferri (1991).

was also set equal to the applicable corporate income tax rate--IRPEG plus ILOR--but a less direct method was used to determine the relevant implicit tax rate. Assuming a unitary interest elasticity of deposit supply, the implicit tax on bank profits was estimated to be equal to one half of the government's overall receipts from reserve requirements as measured in Table 2. The effective rate of implicit taxation was then derived by using those estimates in conjunction with figures from the consolidated profit-and-loss accounts of the commercial banking system. In each case, compound tax rates were also computed, in line with equation (26).

The results, presented in Chart 2 and Table 3, provide an integrated picture of the evolution of implicit and explicit taxes on bank deposits and bank profits in Italy over the 1981-90 period. One noteworthy finding is the apparent tendency of explicit and implicit tax rates to move at times in opposite directions, with mutually offsetting effects. The reserve requirement tax on interest from CDs declined sharply from 9.6 percent in 1982 to 3.8 percent in 1988, before edging up to 5.2 percent by 1990. After jumping from 12.4 percent in 1981 to 16.1 percent in 1982 on account of a 5 percentage point increase in the reserve ratio, the reserve requirement tax on other deposits also declined, leveling off at 11.5 to 12 percent in 1987-90 or slightly below its 1981 level. The corresponding explicit tax rates, by contrast, increased markedly between 1981-82 and 1990. The end effect has been that, between 1982 and 1990, the compound rate of taxation barely declined for CDs, while increasing by some 3 1/2 percentage points for other deposits.

A similar pattern of offsetting movements seems to characterize the taxation of bank profits. The reserve requirement tax is estimated to have fallen from 40 percent in 1981 to 20 percent by 1986, staying around that lower level thereafter. But the corporate income tax was raised from 36.25 percent in 1981 to 46.368 percent in 1984 and thereafter. The net effect was a broadly stable compound rate of taxation of 62 to 63 percent

CHART 2
ITALY
INTEGRATION OF RESERVE REQUIREMENT
TAX WITH EXPLICIT TAXES, 1982-90
(In percent of tax base)



Sources: Bank of Italy, Annual Report, various issues, and Temi di discussione, 144, February 1989; and Fund staff estimates.

1/ With maturities of less than 18 months.

Table 3. Italy: Implicit and Explicit Tax Rates on Bank Deposits and Profits, 1981-90

(In percent, unless otherwise noted)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Taxes on deposit interest										
Reserve requirement tax										
Certificates of deposit	...	9.6	8.5	7.4	5.3	6.9	4.2	3.8	5.0	5.2
Other deposits	12.4	16.1	15.5	14.8	13.6	13.3	11.5	11.3	12.1	11.3
Withholding tax rate										
Certificates of deposit (>18 months)	...	10.8	10.8	12.5	12.5	12.5	12.5	12.5	12.5	12.5
Certificates of deposit (<18 months)	...	21.6	21.6	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Other deposits	20.0	21.6	21.6	25.0	25.0	25.0	25.0	30.0	30.0	30.0
Compounded tax rate										
Certificates of deposit (>18 months) ^{1/}	...	...	...	...	...	...	...	15.9	16.9	17.0
Certificates of deposit (<18 months)	...	29.1	28.3	30.6	28.9	30.2	28.1	27.9	28.7	28.9
Other deposits	29.9	34.2	33.7	36.1	35.2	35.0	33.6	37.9	38.4	37.9
Taxes on bank profits										
Reserve requirement tax	40.4	37.9	35.8	31.3	25.2	20.1	21.2	18.4	20.7	20.1
Corporate income tax (IRPEG and ILOR)	36.3	38.8	41.3	46.4	46.4	46.4	46.4	46.4	46.4	46.4
Compounded tax rate	62.0	62.0	62.3	63.1	59.9	57.2	57.7	56.3	57.5	57.2
Memorandum items										
Marginal reserve ratio	20.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	22.5
Government bond yield	14.4	15.4	14.4	13.5	12.0	11.7	10.2	10.0	10.6	11.0
Interest rate on CD reserves	5.5	9.5	9.5	9.5	9.5	8.5	8.5	8.5	8.5	8.5
Interest rate on other reserves	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Banks' net profits (Lit billion)	1,243	1,505	1,706	2,467	3,332	4,889	4,234	5,274	4,979	6,836
Banks' explicit tax payments (Lit billion)	1,208	2,009	2,535	2,925	3,703	4,974	3,540	4,536	5,129	5,385
Banks' share of reserve tax (Lit billion)	1,663	2,141	2,365	2,453	2,373	2,487	2,093	2,216	2,633	3,079

Sources: Bank of Italy, Annual Report, various issues and Temi di discussione, 144, February 1989; and Fund staff estimates.

^{1/} Prior to 1988, commercial banks were not allowed to issue deposits with maturities longer than 18 months. Such deposits were issued only by specialized credit institutions, subject to a 12.5 percent withholding tax but with no reserve requirement.

during the 1981-84 period, followed by a decline to a rate of 57 to 57.5 percent from 1986 onwards. 1/

These results lend support to the case against heavy reliance on implicit taxes in general and on the reserve requirement tax in particular. Lack of transparency implies that changes in the reserve requirement tax may at times be at cross purposes with explicit tax policy, making it difficult to keep track of changes in the incidence and overall burden of taxation. To allow a more informed and more purposeful development of tax policy, it would seem advisable to substitute explicit for implicit taxation to the extent possible.

The previous section's analysis could also be used to make an illustrative comparison of implicit, explicit, and compound rates of taxation of depositors in the major industrial countries. 2/ The results, presented in Table 4, confirm that Italy's reserve requirement tax on depositors is among the most onerous, especially when compared with the near-zero rates of Japan and the United Kingdom. Italy's explicit and compound tax rates, by contrast, are both within the respective ranges that

1/ The results on the taxation of bank profits must be interpreted with caution, as they constitute a very preliminary attempt to integrate the treatment of the relevant explicit and implicit taxes. The statutory corporate tax rate that is used in the above computation is in fact significantly lower than the effective tax rate that is implicit in the commercial banking system's profit-and-loss accounts, raising questions about the accuracy of our computations. Among the factors that may account for this disparity may be the inclusion of payments for indirect taxes in the banks' profit-and-loss accounts (e.g., transaction taxes, value-added taxes, and capital gains taxes (INVIM)); differences between the definition of bank profits for accounting purposes and for application of IRPEG and ILOR; and lags in the settlement of corporate taxes stemming from the system of estimated tax payments. The settlement lags, moreover, together with the withholding tax on interest on interbank loans, may give rise to an additional form of implicit taxation on those banks that are subject to over-withholding. For a discussion of this latter issue, which is beyond the scope of this paper, see Ceriani and Ferri (1991).

2/ Once again, the results are purely illustrative and must be viewed with caution. A comprehensive comparison would have to take into account international differences not only in statutory tax rates and reserve requirements but also in market structure, accounting practices, and tax enforcement. In the case of personal income taxes, because several countries tax interest income at a progressive schedule of rates, the measured explicit tax rates tend to have a wide dispersion. Bank secrecy laws, moreover, may make it difficult to ascertain the extent to which nominal tax rates are representative of effective rates of taxation. In the case of banks, the already-mentioned difficulties in gauging the effective rate of taxation in Italy argue against the application of our approach to an international comparison of total tax burdens.

Table 4. Italy: Illustrative Comparison of Taxation of Bank Deposits in Selected Industrial Countries as of 1990 ^{1/}

(In percent)

	Average Yield on Government Securities	Yield on Required Reserves		Implicit Tax Rate on Deposit Interest ^{2/}		Explicit Tax Rate on Deposit Interest		Total Explicit and Implicit Tax Rate ^{3/}	
		Max.	Min.	Min.	Max.	Min.	Max.	Min.	Max.
Italy	11.0	8.5	5.5	5.2	11.3	12.5	30.0	17.0	37.9
Germany	8.9	--	--	4.2	12.1	--	53.0	4.2	58.7
France	10.0	--	--	3.0	5.5	--	46.0	3.0	49.0
United Kingdom	11.1	--	--	0.5	0.5	25.0	40.0	25.3	40.3
United States	8.6	--	--	3.0	12.0	--	33.0	3.0	41.0
Japan	7.4	--	--	0.1	2.5	--	20.0	0.1	22.0

Sources: International Monetary Fund, IFS; Bank of Italy, Annual Report, various issues and Temi di discussione, 144, February 1989; Deutsche Bundesbank, Monthly Report, March 1990; and Fund staff estimates.

^{1/} The comparisons in this table are tentative and are presented only for illustrative purposes, as they constitute a preliminary and partial effort to integrate the treatment of explicit and implicit taxes. A more comprehensive approach would also examine the comparative tax burdens on banks, using a more general optimization framework, which could allow for different market structures (see also notes in p. 16.).

^{2/} Based on equation (24).

^{3/} Based on equation (26).

are theoretically applicable in the other countries. This suggests that it is primarily the implicit component of taxation of deposits that may be excessive in Italy relative to other countries. Thus, even if tax harmonization, together with coordinated enforcement, were to preclude the avoidance of explicit taxes in the single market, there could still be competitive pressures to lower the implicit component of taxation.

The rapid expansion of cross-border financial flows over the last few years has already served to highlight the emergence of such pressures. In February 1989, to arrest the tide of capital inflows set in motion by the liberalization measures of October 1988, the Italian authorities reinstated the 25 percent marginal reserve requirement on resident banks' net foreign-currency deposits, which had been suspended since August 1987. Partly as a result, there was a marked diversion of funds from inflows through the domestic banking system toward loans from Italian banks' foreign subsidiaries. ^{1/} The stock outstanding of such loans virtually quintupled from Lit 9.4 trillion in February 1989 to Lit 46.9 trillion in April 1991. Following the abolition of reserve requirements on resident banks' net foreign positions in May 1991, there was an immediate rechanneling of capital inflows through domestic banks and loans by foreign subsidiaries declined rapidly--to Lit 35 trillion by August 1991. Beginning in 1993, the coming into effect of EC's second banking directive is apt to lead to an increasing presence of foreign banks in Italy. This is likely to expand the scope for avoidance of the reserve requirement tax, thereby intensifying pressures toward its reduction.

As was already noted, in a regime of perfect competition, there is no room for differential reserve requirement taxes across countries. The analysis has so far assumed that Italian banks have in the past enjoyed some degree of market power, at least in the deposit market. Financial integration is bound to increase competition in the period ahead, but banks may still retain some market power in sectors less prone to foreign penetration (e.g, demand deposits or retail banking). In principle, this could allow the Italian authorities to adopt a selective approach, by lowering reserve requirements only for those operations that are at risk of being diverted abroad. In practice, however, the lines of demarcation between contestable and noncontestable activities may be unclear and subject to continuous revision. A broad-based reduction of the burden of reserve requirements toward those of partner countries may then be a sensible course of action.

Assuming that lower reserve requirements are desirable both to limit incentives to circumvent them and to improve the transparency of tax policy, what would be the effect on Italy's fiscal accounts? A halving of the reserve ratio--which would bring the associated tax rate on depositors roughly in line with that of France--would decrease quasi-fiscal revenues by

^{1/} See Banca d' Italia, Bollettino Economico, 15, October 1990, pp. 48-49.

1/4 of a percentage point of GDP, based on the estimates of Table 2. This overstates the net loss to the Treasury, however, to the extent that there is a partially offsetting increase in explicit tax revenues. Assuming that the reserve requirement tax is distributed evenly between depositors and banks, we can estimate the net revenue loss based on equation (25). As of 1990, 6.25 percent of the total stock of bank deposits consisted of CDs with maturities longer than 18 months, 11.15 percent were shorter-term CDs and the remainder were other forms of deposits, implying an average withholding tax rate of 27.57 percent. With the explicit tax rate on bank profits amounting to 46.4 percent, the halving of reserve requirements would cost to the budget the equivalent of 0.16 percent of GDP. 1/

V. Concluding Remarks

The Italian experience during the 1980s highlights several shortcomings of the reserve requirement tax. The amount of quasi-fiscal revenue raised by the tax is influenced by difficult-to-predict nonpolicy factors, and lack of transparency hampers coordination with explicit tax policy. Increasing financial integration, moreover, may limit the viability of Italy's relatively high implicit taxes on the banking system, at least in those types of operations that can be readily diverted through foreign financial centers. These considerations would seem to call for a lowering of Italian reserve requirements, which could be implemented in short order on deposit flows and more gradually on deposit stocks, so as not to disrupt money market conditions. In light of their already small contribution to the overall fiscal effort, and with existing explicit taxes remaining in place, a halving of reserve requirements would cost to the budget no more than 2/10 of a percentage point of GDP.

1/ This computation disregards the fact that about two thirds of the Italian banking system is owned by public entities. Assuming that changes in the taxation of publicly owned banks are of no consequence for the fiscal accounts, the net budgetary losses stemming from a halving of the reserve ratio turns out to be equal to 0.11 percent of GDP.

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