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Taxation of Financial Intermediaries

Ramon Caminal



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1. Introduction

Most economists would agree that tax policy, on the one hand, and financial intermediation, on the other, are very important research areas. However, their intersection, the taxation of financial intermediaries, may appear at first sight to be a narrow topic only attracting the attention of specialists. I wish to start this *Opuscle* by arguing that this impression is misguided. First, the financial system, and banks in particular, play a crucial role in the allocation of resources and the growth process, and cannot be treated as just another industry. Second, the fiscal treatment of the financial sector is very complex in most countries, with a combination of regular and special taxes, implicit subsidies and exemptions. As a result, the policy issues involved are substantive and of interest to broad audiences.

Over the last two decades a large body of research has supported the proposition that improving the efficiency of the financial system is likely to increase long-term growth. Moreover, increasing awareness of the devastating effects of financial crises has stimulated academic and political debate on financial policies. Most of the

attention has been devoted to the effects of liberalization of the financial industry, privatization of financial institutions, and optimal design of the regulatory environment. Surprisingly, taxation of the financial system has received relatively little attention, in spite of the fact that the financial sector has typically been a significant source of tax revenue, and that many countries have recently undertaken substantial reforms.

Although the financial sector is usually subject to general taxation (personal and corporate income tax), in most countries financial intermediaries receive special tax treatment. On the one hand, they may enjoy implicit or explicit subsidies: exempting financial services from VAT in the European Union, below-cost deposit insurance, and bailouts in cases of financial collapse. On the other hand, they may bear special taxes (unremunerated reserve requirements, taxes on financial transactions) and/or serve as tax collecting subsidiaries (withholding taxes on the capital income of their clients).

Taxes and subsidies may remedy certain market failures or, on the contrary, interfere with the efficient working of the industry. Hence, it is important to understand how various fiscal instruments affect the performance of financial intermediaries. In particular, this *Opuscle* discusses the effects of taxes on the various specific roles of financial intermediaries, the interaction between taxes and financial regulation, and the desirability of taxing financial intermediaries. The analysis will focus on three specific forms of bank taxation: reserve requirements, a value added tax on financial services, and the interaction between capital requirements and corporate income taxation. Most

of the discussion reflects my own research. Some of the papers I will be referring to were written in collaboration with my former colleagues Philippe Bacchetta and Carmen Matutes. It has been a pleasure to work with such wonderful coauthors.¹

The next section contains a brief introduction to the modern banking literature, which emphasizes the role of banks in security transformation, reduction of informational asymmetries, and the provision of transaction services. Section 3 discusses the conditions under which the deposit and loan markets are fully segmented, which has immediate implications for tax incidence. Section 4 is devoted to a widespread form of implicit taxation: unremunerated reserve requirements. Section 5 reviews the impact of exempting financial services from the VAT base, the interaction between corporate income tax and capital requirements, and the effects of taxing deposits and loans. Finally, Section 6 examines the normative issues: should capital income and financial intermediaries be taxed? Some concluding remarks close the paper.

2. The role of banks

Modern banking theory emphasizes three main contributions of banks to economic efficiency:²

- a) Reduction of asymmetric information
- b) Security transformation (diversifying risk and enhancing liquidity)
- c) Provision of transaction services

Credit transactions are critically restricted by the presence of asymmetric information. Typically, borrowers have superior information about their project characteristics and market conditions. Also, the success of the project may depend on the entrepreneurs' effort, which is not easily assessed by outsiders. Banks tend to specialize in the reduction of asymmetric information using various screening devices, monitoring borrowers' effort and, more generally, by establishing long-term relations with borrowers.

Banks invest in risky and relatively illiquid projects. For instance, they lend to entrepreneurs with insufficient collateral and, as mentioned above, loan decisions are based to some extent on the bank's private information. As a result, those loans cannot be traded on secondary markets. Hence, a typical business loan is both risky and illiquid. However, banks are large institutions that lend to many different and independent entrepreneurs. As a result, the aggregate risk of their portfolios is relatively low. In other words, banks can diversify idiosyncratic risks to a large extent and arrange the maturity structure of their assets in such a way that their liabilities become very liquid and relatively safe.

Finally, banks play a crucial role in the payment system. Deposits can be easily converted into cash, or directly used in transactions through checks, debit and credit cards. Depositors can also set up automatic payments. In fact, the proportion of cash transactions is shrinking fast in most parts of the world, except for illegal activities and tax evasion purposes.

Banks are not the only financial institutions performing some of these functions. The main role of investment and pension funds is also security transformation. In addition, some US

money market funds have started providing transaction services. If this trend continues in the future then bank deposits and participations in investment funds might eventually become very close substitutes.

Because of the nature of banking activity the failure of a single bank has important external effects. Firstly, the stock of information about the characteristics of its customers may disappear to a large extent. Secondly, crises can be contagious and the problems of an individual firm may spread out to the rest of the industry. Thirdly, an interruption of banking activity may lead to collapse of the payment system with dramatic consequences for the economy as a whole.

This explains why banks are heavily regulated. A widespread regulatory device is deposit insurance. One of the goals is to protect small depositors from bankruptcy risk (which is not negligible, since banks are highly leveraged firms). Presumably, such protection avoids bank runs and facilitates the smooth functioning of the payment system. However, deposit insurance systems typically include flat premia (independent of bank risk), which induces banks to take too much risk. As a result other complementary devices are required to avoid excessive bankruptcy risk, including capital requirements, restrictions on asset composition, direct supervision, and protection of bank profits.

Banks tend to enjoy some market power, at least in their business with households and small and medium enterprises. The origin of this market power is complex. First, banks have privileged information about their clients. Second, size is a competitive advantage, not so much because of returns to scale (they seem to be exhausted at relatively small sizes) but because

of diversification economies. Third, competition in the banking industry is often restricted by government policies (entry restrictions, softer competition policies, interest rate ceilings, etc.).

The welfare implications of monopoly power may be quite different in the banking industry in comparison with the rest of the economy. As emphasized above, banks tend to establish long-run relations with their customers. The initial investment in information acquisition can be used in successive transactions (information reusability). Banks usually find it difficult to capture the return on those investments using contractual arrangements (in particular, because banks' monitoring effort is not verifiable). Hence, incentives to invest in activities that reduce information asymmetries depend on the bank's ability to appropriate some of the return from this investment through loan rates above 'competitive' levels. In other words, banks will tend to invest more in long-run relationships in environments with softer interbank competition. Carmen Matutes and I (Caminal and Matutes, 1997) have formalized these ideas and demonstrated that monopoly power in the loan market has ambiguous effects on welfare. A higher monopoly power implies, on the one hand, higher loan rates and smaller loan sizes (the classic effect), which is detrimental to economic efficiency, and, on the other hand, less asymmetric information, which facilitates lending and promotes efficiency.

Entry restrictions in the banking industry are very common. In addition, some governments are significantly less strict when they apply competition policy to the banking industry. In fact, it is not rare to observe central banks and financial regulators encouraging mergers between banks. The above argument to some extent provides some justification for such practice.³

In a more recent paper (Caminal and Matutes, 2002) Carmen and I have extended the previous analysis to consider aggregate portfolio shocks. The goal of this paper is to reexamine the relation between market power and bankruptcy risk. If banks do not reduce informational asymmetries then they are forced to use other disciplining devices, such as rationing loan sizes. As a result, in very competitive environments banks may not have incentives to invest in information acquisition and instead they may systematically constrain loan sizes. This implies that rationed firms only invest in high return projects, which reduces the exposure of bank portfolios to aggregate shocks. In other words, it might well be the case that, contrary to common belief, liberalization and deregulation of the financial system may decrease (rather than increase) the exposure of banks' portfolio to macroeconomic shocks, which reduces the probability of banking failures.

The analysis of the incidence of taxation on banking activity, which I discuss in the remainder of this *Opuscle*, will focus on the three main functions of banks mentioned above, the interaction between regulation and taxes, and the role of banks' market power. Some attention will also be devoted to substitutability between bank services, investment funds and securities markets, which has important implications for tax incidence.

3. Deposits and loans: separability of the bank's decision problem

The main 'outputs' produced by banks are deposits and loans. Deposits are more liquid and safer than most other financial assets and, on the top of that, they provide transaction services. The main difference between loans and bonds is that

the former typically involve some kind of information gathering activity (screening or monitoring).

Banks do not only intermediate between depositors and loan applicants. They also trade on the securities market. Some of the funds collected from depositors can be invested in government bonds or other securities, or lent to other banks. Similarly, loans may also be financed by issuing tradable securities or by loans from other banks.

It turns out that the characteristics of the securities market play a crucial role in tax incidence. In order to clarify ideas let us consider two extreme environments.

First, let us consider a monopolistic bank that faces an exogenous demand for loans and a supply of deposits. Suppose that the securities market does not exist and all loans must be financed with deposits. Figure 1 depicts such a situation. Variables with a subscript “0” denote the equilibrium without taxes. The monopoly solution is a level of deposits, D_0 , equal to the level of loans, L_0 , such that the marginal revenue from loans (MR) is equal to the marginal cost of deposits (MC). The loan rate, r_0^ℓ , and deposit rate, r_0^d , must be read from the loan demand function (L^d) and deposit supply function (D^s), respectively. In this case taxing deposits or loans, at the rate τ has the same effect. As illustrated in Figure 2, the relevant MC curve shifts upwards horizontally in proportion to the tax rate (MC'), or, equivalently,

Figure 1

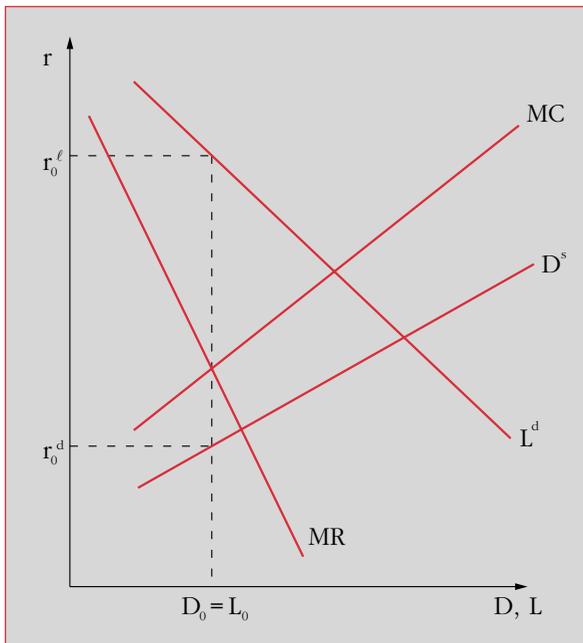
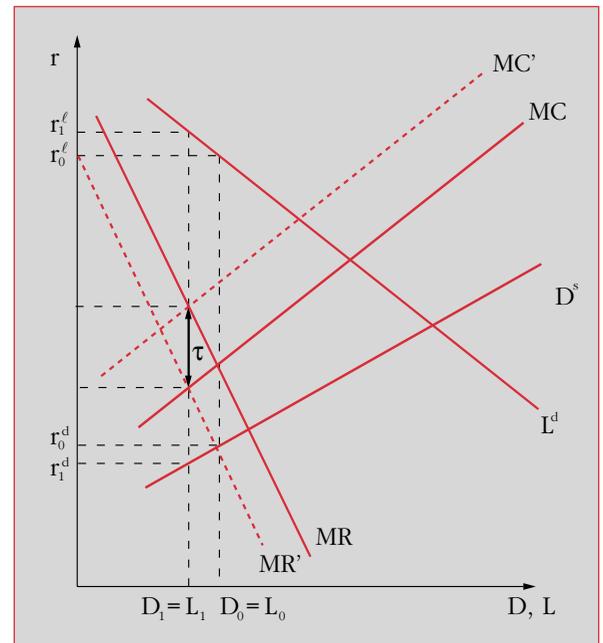


Figure 2



the MR curve shifts downwards, in such a way that the optimal monopoly solution implies a reduction in loans and deposits (L_1 and D_1).

Next, let us consider a different (and more realistic) benchmark. Suppose the monopolistic bank can trade without restrictions on the securities market at an interest rate of r^B .⁴ Figure 3 represents the case that r^B is higher than the intersection of the MR and MC curves, but the opposite case delivers a similar lesson. In the absence of taxes, the optimal level of loans, L_0 , is determined by the intersection between MR and r^B . Analogously, the optimal level of deposits, D_0 , is given by the intersection between MC and r^B . In this case, the bank invests a fraction of its deposits, $D_0 - L_0$, in the securities market. Note that, since r^B is exogenous, the bank's decision

problem is separable, in the sense that the optimal deposit rate is independent of the characteristics of the loan market, and the optimal loan rate is independent of the characteristics of the deposit market. Hence, tax incidence will differ from the previous case. Figure 4 illustrates the impact of a tax on deposits, τ . It does not have any effect on the loan market, $L_0 = L_1$, and all the impact is on the deposit market. In particular, the relevant MC function shifts vertically by τ , and the new equilibrium consists of a much lower level of deposits, D_1 , and also a much lower deposit interest rate, r_1^d .⁵

Besides a competitive securities market, strict separability of the bank's decision problem requires additional assumptions: the marginal

Figure 3

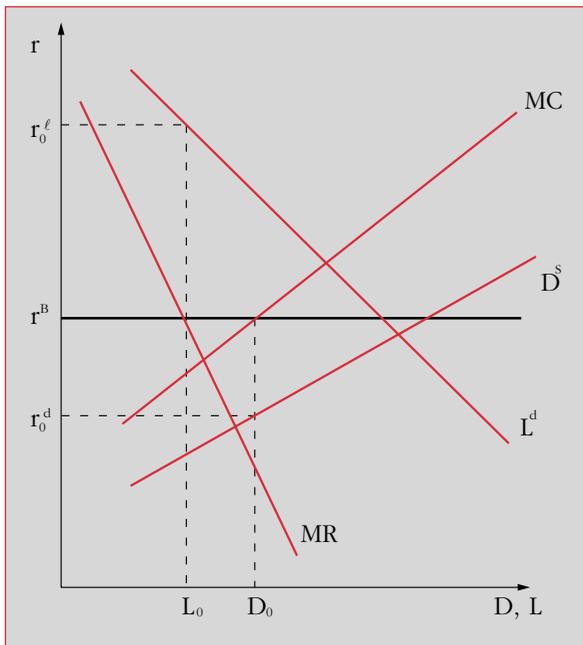
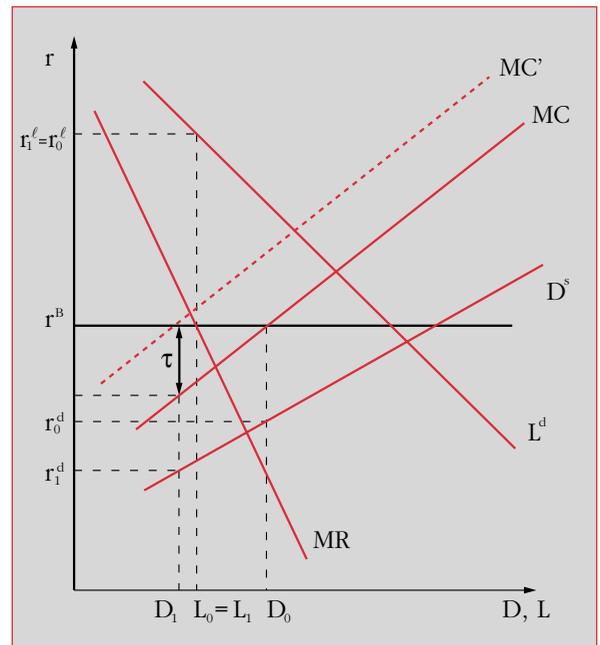


Figure 4



cost of granting loans must be independent of the level of deposits (and vice versa), the supply of deposits and the demand for loans must also be independent, and the probability of banking failures be zero.

In my contribution to a recent collective volume (Caminal, 2003), I acknowledge that it is unlikely that all these separability conditions will be met in any real world situation. However, I argue in that chapter that simultaneous deviations from this set of conditions may offset each other to some extent. For instance, in the presence of bankruptcy risk, a tax on deposits will tend to reduce the loan interest rate. The reason is that the tax increases the probability of bankruptcy, which reduces the expected cost of funds and hence the loan rate. Furthermore, if monitoring costs are reduced with the level of deposits (because of the information generated by deposits) then a tax on deposits will tend to raise the loan interest rate. In other words, it is unlikely that a tax on deposits leaves the loan interest rate unaffected, but the size of the effect may be small and may have an ambiguous sign. Summarizing, it is reasonable to conduct tax analysis under the hypothesis that banks' decisions on deposits and loans are separable. I will maintain such a hypothesis in the remainder.

4. Reserve requirements

4.1. Some facts

Banks are often required to hold a certain fraction of their deposits in the form of liquid reserves (cash, or deposits at the central bank). Such requirements have a long history (dating at least from the early part of the 19th century) and their importance has fluctuated considerably across countries and over time.

Initially, reserve requirements represented a convenient mechanism to facilitate daily clearing and reduce the need for borrowing from the central bank. However, unremunerated reserve requirements artificially expand the demand for monetary base and hence boost the net income of the central bank (i.e., they raise *seigniorage* revenue).⁶ Soon it became difficult to distinguish the revenue-raising motive from other considerations.

Seigniorage revenue can be expressed as the product of the rate of growth of monetary base and the demand for monetary base. Over the long-run inflation rate and the rate of monetary growth move together and hence, for a given level of monetary base, a higher inflation rate implies higher *seigniorage*. On the other hand, a higher reserve requirement expands the demand for monetary base. Hence, for a given inflation rate, a higher reserve requirement implies higher *seigniorage*. In other words, the same *seigniorage* revenue can be obtained with multiple combinations of inflation and reserve requirement, with a higher inflation rate allowing for a lower reserve requirement.

Throughout the 1960's and 1970's high inflation rates coexisted with high reserve ratios (the ratio of bank reserves to aggregate deposits).⁷ In fact, according to Brock (1989), in the 1960-84 period reserve ratios and inflation rates were positively correlated across countries, and even over time, at least for Latin America and Africa. In other words, the two components of *seigniorage* revenue appear to be complementary. In the 1980's and early 1990's most countries drastically cut their inflation rates and many of them also reduced their reserve ratios, as illustrated in Table 1. Although we do not have precise information on the fraction of remunerated

reserves and the evolution of the demand for voluntary reserves, it is clear that the drastic reduction of reserve ratios experienced in some countries does reflect a significant change in unremunerated reserve requirements.⁸

Table 1
Reserve ratios

Country	Average 1960-84	Average 1998-2002
Argentina	50	9
Brazil	35	19
Chile	33	5
Mexico	35	10
Egypt	27	21
Morocco	6	9
Nigeria	17	25
South Africa	7	4
India	9	8
Indonesia	33 (1)	11
Korea	20	3
Malaysia	10 (2)	16
Australia	10	2
France	4	3
Germany	11	3
Italy	12	2
Japan	3	3
Spain	8	3
U.S.	8	2
Israel	n.a.	16
Russia	n.a.	22

Source: Brock (1989) and IMF-International Financial Statistics

Notes: (1) 1962-84
(2) 1961-84

The first column of Table 1 (reproduced from Brock, 1989) shows that in the 1960-84 period reserve ratios were extremely high in many countries. For instance, they reached an average of 50% in Argentina, 35% in Mexico, and 33% in Indonesia. In more developed countries, reserve ratios were also relatively high: 10% in Australia, 11% in Germany, and 8% in the USA.

The second column of the table shows that reserve ratios are currently significantly lower than in the 1960's and 1970's. However, in some less developed countries they are still significantly high (25% in Nigeria, and 18% in Brazil). Thus, this form of taxation is not only a feature of the past but is still a significant phenomenon in the present.

4.2. Characterizing reserve ratios as a tax

It has long been recognized that unremunerated reserve requirements are a form of taxation (see, for instance, Fama, 1980). Banks are forced to invest part of their resources in an asset with return below the market level, and the consolidated government can finance its budget deficit at more favourable rates. A precise characterization of the effects of reserve requirements must take into account that they affect not only banks' profitability (flow effect) but also the private demand for monetary base (stock effect). Romer (1985) showed that, under certain conditions, banks would be indifferent between a reserve ratio and a proportional tax on deposits plus an open market sale of bonds equivalent to the resources kept inactive by the requirement.

Romer did not consider whether the government was also indifferent to such an experiment. In fact, it was claimed (Freeman,

1987) that a reserve ratio was dominated by a pure inflation tax on non-bank cash holdings. Freeman's analysis, however, compared the welfare of the representative consumer across steady states. In a paper jointly written with Philippe Bacchetta (Bacchetta and Caminal, 1994), we argued that steady state comparisons are inappropriate when the government can issue money and debt. This point is quite obvious and can be easily illustrated. Suppose that the government must raise a certain amount of revenue in each period using distortionary taxes and borrowing and lending in international capital markets. If the goal of the government is to maximize long-run consumers' welfare then the optimal debt policy consists of taking the stock of debt to a sufficiently low (negative) level, in such a way that in steady state all public expenditure can be financed by the interests on public savings, and thus avoiding the use of distortionary taxation.

Let us now consider Romer's experiment without accounting for transition costs. That is, following Freeman, we simply compare steady states. If a tax on deposits replaces a reserve requirement, then the demand for monetary base falls. The supply of monetary base must also fall in order to keep inflation unchanged, but this reduces government revenue (i.e., reduces *seigniorage*). However, in the future all deposits can be invested in productive assets, the base of the new tax broadens and government revenue will be larger than in the previous steady state. In other words, if starting at a steady state a tax on deposits replaces a reserve requirement (at the same rate), then in the next steady state the private sector is indifferent but government revenue is higher. In fact, the government can set a lower tax rate, collect the same revenue as in the previous steady state, and improve the

welfare of the private sector (a proposition analogous to Freeman's).

To avoid the temporary reduction in revenue the government must issue an amount of debt equivalent to the reduction in supply of monetary base. In future periods, the interest paid on this extra debt exactly offsets the extra revenue collected through the new tax. As a result, a reserve requirement is equivalent to a proportional tax on deposits plus an open market operation of the magnitude of banks' reserves, even when we take into account government revenue (Bacchetta and Caminal, 1994). In other words, under similar conditions Romer's equivalence result holds not only from the point of view of the private sector but also from that of the government.

4.3. Tax competition and reserve requirements

In a financially liberalized world, individual countries acting in isolation will tend to set low taxes on bank deposits, as well as on other financial assets (the classic 'tax competition' effect). In the limit, under perfect capital mobility, the only non-cooperative equilibrium policy outcome is a zero tax on capital. This is actually what occurred to reserve requirements in the European Union after financial liberalization in 1992. In the early 1980's reserve requirements were very high in southern European countries (Greece, Italy, Portugal, and Spain). Average reserve ratios for these countries in the 1979-84 period lay between 12% (Portugal) and 23% (Greece).⁹ Policy makers soon realized that this situation could not be maintained in the long run given the prospect of financial liberalization in the early 1990's. In fact, reserve ratios are currently very low in all these countries. The

governments' reaction to anticipation of liberalization was less easy to predict. In fact, reserve requirements increased in Italy, Greece and Spain right before liberalization and then fell again.

Philippe and I (Bacchetta and Caminal, 1992) presented a model that rationalized this experience. Suppose that *seigniorage* is part of the optimal tax system, perhaps because of a limited ability to raise revenue through conventional taxes. Then it is optimal to set a combination of high inflation rates and high reserve requirements in order to spread the distortions over different margins. If policy makers anticipate that positive reserve requirements will not be feasible after some future date, then it is optimal to raise reserve requirements temporarily, reduce the stock of public debt and thus reduce future revenue requirements. Given that inflation and reserve requirements are imperfect substitutes, it was optimal to increase inflation after liberalization. This could explain these countries' reluctance to reduce inflation in the early 1990's. However, monetary union eventually acted as the driving force to bring inflation down.

5. The characterization of various forms of taxation

The previous section was devoted to an implicit form of bank taxation. It was shown that unremunerated reserve requirements were equivalent to a tax on deposits plus a once-and-for-all adjustment in the composition of government liabilities. In this section I examine the incidence of some explicit taxes. First, I argue that, under certain conditions, value added tax (VAT) and corporate taxes are equivalent to a tax

on deposits and loans, respectively. Second, I briefly discuss the incidence of a pure tax on deposits (which stands for either reserve requirements or lifting the exemption of financial services in the VAT base) and a pure tax on loans (which stands for corporate income taxation).

5.1. VAT exemption for financial services

Most financial services are exempt from VAT in virtually all countries employing this tax, including the European Union (although not all financial services are exempt). This means that financial institutions do not charge tax on exempt services but they are not given rebates for the VAT they pay on most of their purchased inputs. Obviously, such an exemption is non-neutral. The usual justification for it is that there are administrative difficulties with measuring value-added in the financial sector; in particular, evaluating default risk.¹⁰ What kind of distortions does this exemption cause? Alternatively, if the administrative obstacles could be overcome, what would be the effect of lifting the exemption? I took up this question in Caminal (2003).

The value-added created by a financial intermediary will tend to reflect the resources employed in producing various functions. For instance, in the conceptual framework discussed above, banks' value-added is related to the (non-taxed) resources employed in the provision of transaction services, reduction of asymmetric information and security transformation. A first implication is that VAT is expected to have relatively little impact on security transformation, since this is to a large extent obtained because of the size of the intermediary (by exploiting the law of large numbers). In contrast, the other two functions (provision of transaction services and investment in information) will be more clearly

affected. Hence, VAT may in principle have an influence on both deposits and loans. In particular, loan interest rates will tend to be higher and deposit rates lower because of the tax.

However, the incidence of VAT will depend very much on various institutional features; in particular, on whether bank customers can deduct their VAT payments and on the specific method of application. As a first approximation, we could describe borrowers as VAT-registered businesses but depositors as not being engaged in commercial activities (households). In this case, if banks' decisions on deposits and loans are separable, then VAT affects the deposit market but not the loan market, since borrowers can fully deduct their VAT payments on financial services, but depositors cannot. As a result, lifting the exemption on banking services in the general VAT base is equivalent to setting a tax on deposits, with no impact on the loan market.

5.2. Corporate income taxation

As is well known, a corporate income tax distorts the capital structure and raises the average cost of capital. In the case of banking the effects of corporate taxes may be different since banks are subject to regulation that restricts their liability structure.

Suppose that bank equity holders require a net rate of return equal to r^e . Also, let us denote the marginal cost of non-equity funds, including deposits, as r^d . Note that r^e is typically higher than r^d (although this is not essential for the argument). Suppose that there exists a minimum capital requirement, ρ . That is, 1 euro in loans must be financed with ρ euros of equity and $(1-\rho)$ euros of deposits.

Let τ be the constant tax rate on corporate income. Then, the gross rate of return on capital is $r^e/(1-\tau)$, and hence the cost of lending is given by:

$$\rho \frac{r^e}{1-\tau} + (1-\rho)r^d$$

If banks' decisions on loans and deposits are separable, then corporate income tax will not affect return on deposits. Thus, a tax on banks' corporate income is equivalent to a tax on bank loans (Caminal, 2003).

5.3. Incidence of a tax on deposits

Sometimes taxes affect only banks but not other financial intermediaries (including investment and pension funds). This is the case, for instance, with reserve requirements. This puts banks at a disadvantage in those functions in which banks and non-banks are close substitutes; that is, in security transformation.

In those countries where the investment fund industry is underdeveloped, deposits may dominate direct investment and a small tax on deposits may have little effect. But in general, a tax on deposits will tend to decrease deposit rates and reduce the level of deposits. Households and firms will tend to use cash more intensively in their transactions and invest directly in securities.

Nevertheless, it is not entirely obvious how a tax on deposits will affect efficiency. This is because some of the alternatives to bank deposits may already be taxed. In particular, inflation is a tax on cash holdings, and hence in the absence of a deposit tax the ratio of deposits to cash may be inefficiently high. In other words, a tax on deposits may restore the neutrality of the tax system, at least as far as the cash-deposit margin is concerned.

5.4. Incidence of a tax on loans

The alternative to bank financing is either the securities market or the informal credit market. As the securities market becomes more efficient then the comparative advantage of bank financing is eroded and the price elasticity of demand for loans increases.

A tax on loans will tend to decrease the demand for loans and to encourage alternative forms of credit. The magnitude of the inefficiency induced by taxation will depend on the level of development of the securities market and the informal credit market.

5.5. Summary

Different taxes will affect deposits and loans differently. Reserve requirements and VAT will mainly affect deposits, but corporate income taxation, if banks' capital requirements are binding, will tend to affect loans exclusively. A tax on bank deposits need not reduce economic efficiency; in particular if non-bank cash holdings are already subject to the inflation tax. Finally, the distortion created by a tax on loans will be largely dependent on the level of development of the securities market.

6. The normative issues

So far I have examined the consequences of various types of taxation on the activity of financial intermediaries. It is time to shift from positive questions to normative ones. In particular, the questions I wish to address in this section are: a) should capital income, broadly defined, be taxed? And b) should financial intermediaries be taxed? Clearly, the two issues

are closely related. If we decide that capital income should be tax-free, then obviously we should not tax financial intermediaries either. However, if taxing capital income is justified, then we still need to figure out the optimal structure of capital income taxes, and whether this includes taxing financial intermediaries.

6.1. Should capital income be taxed?

From a macroeconomic point of view the key normative issue is to determine the optimal tax rates on labour income, capital income, and consumption. The literature has identified conditions under which the optimal tax rate on capital income is zero, at least in the long run.¹¹

Some of the basic intuitions can be obtained from studying a very simple partial equilibrium model. Consider a two-period economy where the representative consumer derives utility from consumption and leisure in each period, and both real wages and real interest rate are exogenously given. Suppose that the government can set proportional taxes on labour income and capital income. A capital income tax distorts the relative price of future consumption in terms of current consumption, while a labour income tax distorts the price of leisure in terms of contemporaneous consumption. In this context there are at least two sets of circumstances under which the optimal tax on capital income is zero:

- 1) The utility function is additively separable over time, real wages are constant and the interest rate is equal to the consumers' discount rate.
- 2) The per period utility function is additively separable with a constant intertemporal elasticity of consumption.

In the first case, it is optimal to set a constant tax rate on labor income and induce a constant path of consumption and leisure. Thus, it is second best efficient to distort equally the contemporaneous consumption-leisure margin in each period, but nothing would be gained by distorting the intertemporal margin. The second case requires more restrictions on the consumer's utility function but poses no constraint on relative prices.

The above results help us to understand the prescriptions offered by standard dynamic general equilibrium models. Let us consider the neoclassical growth model with an infinitely-lived representative household. In steady state, real wages are constant and interest rate is equal to the consumers' discount rate. If we take into account the assumptions considered in (1) of the above two-period example, then it is not surprising that as the economy converges to the steady state the optimal rate on capital income approaches zero (Chamley, 1986). If preferences satisfy the assumptions considered in (2) then the optimal tax plan includes a zero tax rate on capital income from the second period onwards.¹²

The analogy with the two-period partial equilibrium model is not the entire story. In fact, the general equilibrium set up provides an additional channel that reinforces the optimality of exempting capital income from taxation. The point is that capital and labour income taxes have very different effects on capital accumulation and relative prices. A tax on labour income reduces real after-tax wages and has no direct effect on capital accumulation and labour productivity, while a tax on capital income discourages capital accumulation and reduces labour productivity and wages.

One may argue that the set of conditions supporting a zero tax rate on capital income are very restrictive. If we deviate from these conditions then the optimal plan includes a non-zero tax rate on capital income, but such a tax rate can be either positive or negative, probably small in absolute value, and in any case far below the high and positive rates that we observe in the real world. So, is the current tax policy highly detrimental to economic efficiency? Lucas (1990) simulated the quantitative effect of eliminating capital income taxation (and increasing labour taxation in order to maintain total tax revenue unchanged) in a calibrated version of the neoclassical growth model. In the case of the USA such a tax reform would have a significant (but not overly large) effect on total welfare, equivalent to a one per cent increase in permanent consumption.

The prescriptions of the overlapping generations model regarding the optimality of taxing capital income are somewhat different (Erosa and Gervais, 2002). The reason is that, because of the labour productivity pattern over the life cycle, the efficient levels of consumption and labour supply of the representative individual are generally not constant even in steady state. As a result, the set of conditions supporting a zero tax rate on capital income is smaller than in the neoclassical growth model. More specifically, result (2) is obtained, but result (1) is not.

Thus, the desirability of taxing capital income depends on various modeling issues. So far the discussion has focused on the structure of consumer preferences and on the existence of an operative bequest motive. By restricting ourselves to the representative consumer hypothesis we have avoided any redistribution concerns. However, any tax reform is likely to generate

winners and losers. Hence, it is not sufficient to assess the impact of a particular policy change on aggregate efficiency, but it is important to evaluate its effects on the distribution of welfare across households.

Garcia-Milà et al. (2001)¹⁵ have approached this issue by studying the consequences of eliminating capital income taxation in a calibrated version of the neoclassical growth model with heterogeneous consumers. They consider five types of consumer, which differ in their labour productivity and initial wealth, and representing the patterns of the observed distribution of the US economy. It is found that the elimination of capital income taxation increases aggregate welfare (as in Lucas, 1990), but would seriously hurt a large fraction of households (those with a high ratio of wage income to initial capital holdings). For some plausible parameter values up to 60% of the population lose out. Therefore, Lucas' tax reform would increase aggregate welfare, but it might be blocked by a majority of voters, unless authorities found a way of compensating the losers.

6.2. The optimality of taxing financial intermediaries

Suppose that, either for reasons of efficiency or equity, capital income must be taxed. How should we treat banks and other financial intermediaries? In informal discussions on the desirability of taxing banks, the standard negative argument is the disintermediation effect (taxes induce savers to avoid banks and use direct finance), while the positive argument relies on the low tax collection cost: auditing large financial intermediaries is relatively easier than auditing households and small and medium enterprises. In fact, banks are relatively

transparent institutions, since they work under the supervision of financial regulators.

A crucial feature of the problem is that banking services are intermediate goods. According to the standard optimal taxation theory, under perfect competition intermediate goods should not be taxed; only final output should be taxed. The question is whether the same result holds in the case of banking, which is an industry with peculiar characteristics. In particular, taxing final investment projects may be very difficult because of the existence of informational asymmetries.

I analyzed these issues in detail in Caminal (1997). The model is very abstract but still captures the main ingredients of the problem. Tax collection costs are introduced by assuming that authorities have access to the same information gathering technologies as private agents (no administrative costs are considered). Savers have two options: either to finance entrepreneurs directly through the securities market (bonds) or to deposit their money in a bank (deposits and bonds are perfect substitutes). Lending is subject to a moral hazard problem and entrepreneurs are heterogeneous with respect to their exposure to this problem. In other words, lending through the securities market involves an agency cost, which varies across entrepreneurs. Banks are special because they can eliminate the information asymmetry by spending resources on monitoring. The most efficient method of finance depends on the type of entrepreneur. Low-agency cost entrepreneurs prefer to issue securities and thus avoid intermediation costs, but high-agency cost entrepreneurs must pay high interest rates in the securities market and hence prefer to borrow from banks.

The market structure of the banking industry is crucial to determine the optimal tax system. In a perfectly competitive industry, a tax on bank deposits is partially reflected in lower deposit rates, which discourage savings, and partially in higher loan rates,¹⁴ which induces firms to switch to the securities market (disintermediation effect). As a result, aggregate agency costs increase and overall efficiency is reduced. Alternatively, the same revenue is more efficiently raised by a tax on savings, since in this case the tax only distorts the level of savings, which are efficiently channeled into investment.¹⁵

In contrast, if we consider the other extreme case and assume that banks are local monopolists that are able to price discriminate across borrowers,¹⁶ then a small tax on deposits falls almost entirely on banks' economic profits. The reason is the following. Banks are able to appropriate the entire efficiency gains generated by monitoring. As a result the tax cannot be shifted to loan applicants (loan interest rates are constrained by bond market rates) and hence banks must pay the entire tax. The only distortion is the disintermediation effect. Under the tax, banks prefer not to lend to those borrowers to whom, in the absence of the tax, they are only able to charge a low mark-up. However, because of price discrimination the *laissez-faire* equilibrium is efficient, and hence the disintermediation effect only involves a second order welfare loss. Consequently, a tax on deposits is part of the optimal tax system.

Clearly, the real world lies somewhere in between these two extreme market structures. In most models of imperfect competition the tax is predicted to fall partially on banks, and partially on depositors and loan applicants. Provided banks' monopoly power is sufficiently high, the

optimal tax system is likely to include a tax on deposits. Thus, the analysis provides some support for the drastic reduction in reserve requirements that took place in the late 1980's in some southern European countries in the context of financial liberalization (which presumably reduced banks' monopoly power). However, it does not automatically justify the high reserve ratios existing in some developing countries (see Table 1), although it does support moderate ratios in those countries with banking sectors characterized by significant degrees of market power.

The above model did not consider banks' risk taking behaviour and the possibility of banking failures and financial collapse. It is generally agreed that the environment faced by banks (limited liability reinforced by flat deposit insurance) might be conducive to excessive risk taking. Since banking failures may hurt the rest of the industry and even the real sector, authorities tend to intervene in order to reduce or eliminate excessive risk taking behavior. Direct supervision and setting a minimum capital requirement are classic remedies, which are both imperfect and costly. It has been suggested that a useful complementary device is to protect banks' profits either by relaxing competition policy in banking (Perotti and Suarez, 2003) or by setting deposit interest rate ceilings (Hellman et al., 2000). Thus, if banks have incentives to take excessive risk, taxes may exacerbate those incentives by reducing economic profits (Caminal, 2003).

Another consideration has to do with the information 'externalities' of bank transactions. If bank taxation induces depositors to switch to cash holdings then, given that bank transactions are more easily monitored than cash transactions, the aggregate tax revenue may fall because other tax bases are eroded.

In this section I have taken a normative point of view. The final comment lies in the sphere of what we might call 'political economics'. Bank taxation may be perceived as fair and/or neutral, and as a result might receive wide popular support. First, tax authorities obtain some revenue from places where money is abundant. Second, many voters might find it difficult to understand that minimum reserve requirements are a tax. Third, most bank customers may not be able to anticipate banks' ability to pass the tax onto deposit and loan rates.

7. Summary and conclusions

The content of this paper may be summarized as follows:

1. The effect of taxes depends on the level of development of the financial system (efficiency of the securities market, development of the informal market, existence of investment and pension funds, etc.).
2. As a first approximation we can treat the taxation of deposits and loans as separate.
3. Reserve requirements are equivalent to a tax on deposits plus an open market sale of bonds. Reserve requirements have recently fallen in most countries but are still very high in some regions.
4. Lifting the exemption of financial services from VAT is likely to affect deposits relatively more than loans.
5. Corporate income taxation when banks' capital requirements are binding is equivalent to a tax on loans.
6. Taxation of financial intermediaries may be justified only in some special circumstances (limited revenue-raising ability of conventional taxes, high market power of banks, no solvency risk). In general, it is preferable to tax savings.

How does the future of bank taxation look like? It is difficult to anticipate whether future governments will resist the temptation of using reserve requirements as a non-negligible source of revenue, especially in countries with a limited ability to raise revenue through conventional taxes. Similarly, taxes on financial transactions will probably be used in some countries under extreme budgetary conditions. Nevertheless, the significance of those special taxes will depend to a large extent on whether countries choose to expose their financial systems to foreign competition.

Existing exemptions will also probably survive. In particular, it is likely that the current exemption of financial services in the general VAT base will continue for quite some time. Recent proposals to lift such an exemption have received some attention but have not defeated the initial scepticism.

Notes

(1) Philippe is currently at Studienzentrum Gerzensee (Switzerland). Carmen lives in Edinburgh (Scotland) and is fully devoted to writing fiction.

(2) See Freixas and Rochet (1997) for a rigorous but accessible introduction to banking theory.

(3) A separate argument to justify the desirability of a certain degree of market power in banking is related to banks' incentives to take excessive risk. This issue will be discussed in some detail below.

(4) The monopolist is assumed to be price taker in the securities market. A standard justification is that a bank may enjoy monopoly power in local deposit and loan markets but is relatively small in large and integrated markets for securities.

(5) Analogously, a tax on loans reduces the level of loans but has no impact on deposits.

(6) The demand for monetary base is the sum of three terms: the demand from the non-bank private sector, the reserve requirement, and the demand for voluntary reserves.

(7) International databases do not typically contain information on unremunerated reserve requirements. Instead, we only have access to reserve ratios, which are good proxies but do not provide exactly the same information. On the one hand, some reserves may be held voluntarily, and thus they are to some extent independent of the reserve requirements. On the other hand, reserves may be partially remunerated, which reduces seigniorage.

(8) As mentioned above, a minimum reserve ratio could be justified in terms of improving monetary control and guaranteeing the liquidity of bank deposits. Nowadays, it is difficult to believe that those goals are not achieved with a 2 or 3% reserve ratio. Any reserve requirement above this level (especially if unremunerated) is necessarily motivated by revenue-raising considerations.

(9) In the case of Spain the implicit revenue raised by the reserve requirement was higher than that of corporate income tax (Impuesto de Sociedades).

(10) See Poddar (2003) for a detailed discussion of such difficulties and the main alternative approaches to making the system more neutral. A more optimistic view on the feasibility of taxing financial services can be found in Huiizinga (2002).

(11) See Boadway and Keen (2003) for a good summary of the literature.

(12) In the first period it is optimal to set a 100% tax on initial capital holdings (past savings), since it is equivalent to a lump-sum tax.

(13) See Marcat (1998) for an accessible discussion of these results.

(14) In this model banks' decisions on deposits and loans are not separable. If banks can trade in a perfectly competitive securities market then authorities cannot collect any revenue by taxing deposits, since deposits and bonds are perfect substitutes. However, a tax on loans would have similar qualitative consequences on disintermediation and loan rates as those discussed in the main text.

(15) Taxing final investment projects is not efficient because of the high costs of acquiring information. In fact, these costs imply that the optimal financial contract is a standard debt contract, which induces borrowers to take excessive risk (the agency cost associated with market lending).

(16) Loan contracts typically require the use of banks' private information and hence interest rate setting is customer-specific.

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Ramon Caminal

Ramon Caminal earned his Ph.D. in Economics at Harvard University in 1987.

At present he is Scientific Researcher of the Institut d'Anàlisi Econòmica (CSIC) and Research Fellow of the Centre for Economic Policy Research (CEPR). He has been professor at the Universitat Autònoma de Barcelona and Visiting Scholar at Harvard. Besides, he has taught at the Université de Toulouse and at the Universitat Pompeu Fabra.

His main research areas are industrial economics, public finance and macroeconomics. His articles have been published in several international scientific journals such as *Rand Journal of Economics*, *Journal of Public Economics*, *European Economic Review*, *Journal of Industrial Economics*, *International Journal of Industrial Organization*, *International Journal of Money and Finance*, *Economica*, *Journal of Economics and Management Strategy*, *International Tax and Public Finance*, and *Regional Science and Urban Economics*.

At present he is a member of the Editorial Board of *the Journal of the European Economic Association* and of the *Journal of Industrial Economics*.

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