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INTERNATIONAL CAPITAL MARKETS

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EXTERNAL CURRENCY MARKET EQUILIBRIUM AND ITS IMPLICATIONS FOR REGULATION OF THE EUROCURRENCY MARKET††

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"A Eurodollar has some things in common with an atom. You can't see one. The concept boggles the mind. And experts are deeply concerned over how best to harness its power."

The Wall Street Journal (August 3, 1979)

POLICY MAKERS, the financial press, and some economists periodically express alarm over the "unregulated" growth of offshore banking markets, particularly the Eurocurrency markets. Offshore banks operating without benefit of strong government guidance, they contend, may act in ways that are publicly irresponsible, hence may ultimately bring about the collapse of the world's financial system through the uncontrolled credit creation.¹ But the size of the offshore banking market is already regulated by the value maximizing supply behavior of banking firms and the attendant demand adjustments by depositors. External efforts to impose restrictions on behavior may not be effective in producing intended results, such as a reduction in the rate of expansion. Consequently, policy makers may be confronted with a very difficult, if not entirely elusive, task. The task, moreover, may not be one even worth trying so long as investors, both external depositors and equityholders, are not misled regarding the nature of the risks and costs that they bear.

This paper analyzes the external currency market behavior of banking firms in the context of the modern theory of finance. Equilibrium is obtained in which external banking activities are completely neutral to the value of the firm while the size of the external currency market is determinate at the aggregate level.

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¹ See Swoboda (1982) for a listing of concerns regarding international banking.

This aggregate level expands or contracts through time despite the inconsequential effect of external banking activity on the value of the individual banking firm. The external currency banking neutrality results when rents are "priced out" through costless supply adjustments by competing firms.

Non-uniform costly supply adjustments, on the other hand, may impact the value of an individual bank, resulting in interior or corner solutions for the degree of external currency banking involvement, but again the equilibrium size of the market expands or contracts through time. Thus, there is no necessary linkage between the (non)neutrality of external banking activity and the expansion (contraction) of the external currency market. External government regulation is unnecessary, because the aggregate size is internally determined and self-regulated in the external currency market equilibrium.

The paper is then extended into a tax environment. The supply-side benefits and the demand-side costs of offshore banking activities interact with corporate and personal taxation so as to generate gains from leverage in a more complex fashion. This implies that the Miller (1977) analysis of debt and taxes can be materially affected by offshore imperfections. Also, the breakeven supply interest rate is affected by corporate and personal taxation, resulting in the shift of supply of external currency deposits. Thus, our equilibrium formally demonstrates the effect of government tax policies on the growth of the external currency market. This tax effect on the size of the market occurs despite the neutrality of offshore banking activity on the value of individual firms.

I. THE NATURE OF THE OFFSHORE BANKING FIRM AND EQUILIBRIUM IN THE EXTERNAL CURRENCY MARKET

The driving force behind the development of offshore banking seems to be no more difficult to understand than the driving force behind, say, money-market funds. Offshore banks developed as a low-cost means of satisfying the return streams desired by investors.² That is to say, the types of deposits offered by these institutions were, at their inception and continue to be, somewhat unique and to many investors superior to those offered domestically.³

From inception offshore banks offered higher interest rates to depositors than were available domestically. Indeed, offshore dollar rates seem to adjust more rapidly to changing world economic conditions than do domestic dollar rates.⁴ This is not surprising since domestic deposits are covered, to a limit, by insurance and at least partially protected by the presence of a lender of last resort—the central bank—from adverse changes in general economic conditions. On the

² This point is not carefully addressed by those who provide reasons for offshore banking developments, such as Aliber (1980), Gray and Gray (1981) and references cited there, and Grubel (1977). The argument here is something like the completion of the market argument found in Ross (1976).

³ Marston (1974), for example, shows that domestic bank regulation, especially regulation Q, played a great role in encouraging the development of the Eurodollar market. His analysis stops short of contending, however, that growth in the market was given its initial impetus by investors seeking instruments, rather than banks taking the initiative in selling investors something they did not previously know they wanted.

⁴ See Kaen and Hackey (1983).

other hand, offshore deposits are not subject to the same political risks as domestic deposits. For instance, dollar deposits by foreigners in banks outside the U.S. are less susceptible to blockage or expropriation than are dollar deposits in domestic U.S. banks.

It is our purpose here to develop an understanding of the external currency market in the context of the theory of finance. We analyze the valuation of the offshore bank and the nature of equilibrium in the external currency market. We are concerned here with the valuation consequences of a shift by a banking firm into offshore banking. In turn, this provides insight into the reasons for offshore banking market growth and into the ways in which the market may act as an effective brake on irresponsible credit creation on the part of the system.

In our construct, the offshore banking firm (OBF) sells (supplies) external currency deposits to investors seeking a different expected return/risk combination than is offered in the domestic markets of the currency of their choice. The OBF buys (demands) currency loans. We view the OBFs more broadly than the typical Eurobank. The network of the OBF is presumed to include normal domestic operations as well as OBF activity.

Specifically, our analysis will explain: (1) the valuation of the OBF relative to its domestic counterpart; (b) interest rate differentials in favor of external currency deposits; (c) the coexistence of domestic and external currency intermediaries in the face of deposit rate differentials; (d) the size and growth of the external currency market; (e) the effect of domestic inflation on the external currency market; and (f) the effects of tax policies. We also show that it is possible for the external currency market to expand rapidly even if, in equilibrium, there exists no value differential between the domestic bank and the OBF. Conversely, we demonstrate the possibility of a shrinking external currency market even if offshore banking activity has a positive impact on the value of any given banking firm. Further, implications for regulation are drawn from the theoretical analysis.

The analysis proceeds by first formulating the basic valuation model of the OBF in a world of no taxes. Conditions for equilibrium in the external currency market are derived and explored.⁵ The model is also extended to include taxes. Essentially, the same qualitative results are obtained in this environment as in the taxless one. Finally, the analysis concludes with an elaboration of the implications of our analysis for regulation of offshore banking.

⁵ The supply-demand view of Euro-credit expansion is not new (See, for instance, Hewson and Sakakibara (1974), Makin (1973), and a later elaboration by Dufey and Giddy (1978)), although this literature addresses the issue of supply and demand elasticities by merely assuming that a rise in relative interest rates induces a flow of funds to the market. The analysis at this stage of our paper may be viewed as formalizing the notion in the context of value maximizing behavior of banking firms which are disciplined by the force of competition in the market. In this framework we examine issues, such as valuation effects of external banking and the associated implications for the determinancy of the market size and growth, which are not considered adequately in the literature. Indeed, once we formalize the analysis in the context of the theory of finance, we find that there is no necessary linkage between (non)neutrality of external banking activities to firm valuation and the growth of the market.

II. THE TAXLESS ENVIRONMENT

A. Assumptions

1. There are no explicit personal or corporate taxes. This is later relaxed.
2. All agents are price-takers. The markets are competitive.
3. There are no economies of scale or scope. Nominal payoffs from bank asset management before interest payments on deposits are independent of the firm's degree of involvement. The degree of involvement is defined as:

$$W = \frac{L - L_0}{L} = \frac{L_F}{L}$$

where

L = Total deposits generated in a numeraire currency, say dollars.

and

L_0 = Domestic numeraire currency deposits.

L_F = External numeraire currency deposits.

Our first assumption is a simplifying abstraction. However, analysis under this assumption is informative and offers an interesting contrast to the analysis with taxes which comes later. Our second, crucial assumption approximates reality and is maintained throughout this paper.

The third assumption is an artifact. Its intent is equalizing effective domestic currency loan and external currency loan interest rates adjusted for risk, although there is an apparent observed differential between the London Interbank Offered Rate (LIBOR) and the domestic prime rate. However, this is misleading, since the LIBOR and the prime rate are not readily comparable. While we do not know whether effective loan costs differ, we hasten to add that quantitatively, possible differences in lending rates between domestic and OBF banks could be accounted for by an adjustment to the cost function on the supply side as described below. There may be, from the bank's perspective, differential costs associated with these types of loans; similarly, from the borrower's vantage point there may be a cost differential associated with the negotiation of loans in different arenas.

B. The Effects of OBF Activity on a Bank's Value

Consider two banks which originate in the same country and carry identical assets.⁶ They differ in their deposit liability generation, but their gross asset returns are identical and perfectly correlated (or differ only by a scale factor) before the deduction of payments to securityholders. The OBF generates external currency deposits through a foreign branch. The credit worthiness of the entire firm backs the deposit. (If OB activity is generated by a subsidiary rather than a branch, there is no explicit obligation of the parent for its subsidiary's liabilities.) Central banks, as lenders of last resort, have no obligation to lend to domestic banks whose foreign activities have brought them to the brink of default.

⁶ These results can also be obtained purely by invoking the value additivity principle.

Conceivably, banks in external markets act as if they believe their domestic central banks will step in if the probability of default becomes great. Therefore, it seems safe to assume that *de facto* differences in default risk between domestic and external banks may be small.

There are obvious cost advantages to offshore banking. First, there are no reserve requirements. Second, there are no lower limits placed by regulatory authorities on bank capital to deposit ratios. Third, there are no strictly enforced limits by regulatory authorities on "average loan and investment quality," as there are, say, in the U.S. where government-run depository insurance institutions insist upon a certain average quality in the portfolio because, among other things, mandatory deposit insurance premia do not take bank portfolio risk into account. Thus, the offshore banking firm has more degrees of freedom in its investment behavior. These lead to the net cost saving to the OBF as a function of θ , the proportional cost of offshore deposits accepted. The aggregate payoffs, Π_0 , to the securityholders of the OBF can be expressed as:

$$\begin{aligned}\Pi_0 &= \Pi - r(1 - \theta)WL + rWL \\ &= \Pi + \theta rWL\end{aligned}\quad (1)$$

[Note that $r(1 - W)L$, payments to domestic depositors, are offset by adding back to reflect the interest income earned by them]
where Π = the payoff available to the purely domestic banking firm.

By the value additivity principle we can convert the expected payoffs into current valuation by assuming perpetuity for convenience.

$$V_0 = V_D + \theta WL$$

where

V_0 = the value of the OBF

V_D = the value of the purely domestic (but otherwise equivalent bank) (2)

Indeed, the last term in (2) reflects the relative advantage of offshore banking activity. The value of the OBF is maximized when $W = 1 |_{\theta}$. In this framework, there exists an incentive for all banking firms to become pure OB firms, *i.e.*, have $W = 1.0$. Domestic intermediation by domestic banks disappears under this corner solution; domestic banking would be done only by foreign-based banks which may be unregulated by domestic law. The currency of choice could even be the foreign currency if this kept the banking system free of regulation. However, this is a partial analysis; it ignores the existence of countervailing forces on the demand side.

Offshore deposits differ from domestic deposits at least by a geographic jurisdiction. Depositors may be concerned about the possibility of government controls on the flow of funds out of the country. Historically, this problem has not occurred in the external currency system (indeed, the external currency system's development was at least partially motivated by this), but so long as external currencies remain under external government jurisdiction, deposits may continue to anticipate the "unthinkable." Such anticipations manifest themselves

in a premium demanded by depositors in an external market versus purely domestic depositors in a domestic market. This premium is not just a risk premium but could be in the same vein as default premium so long as there are exchange controls or positive probability of future control on the movement of funds. Thus, even risk neutrals would demand higher promised yields depending upon their expectations. Indeed, our analysis allows for heterogeneity of expectations among investors in generating the demand function. Against this, note that once a depositor decides upon the foreign currency which is to be held, only two real choices exist: internal versus external markets. The risk of impoundment or expropriation in the internal market almost certainly exceeds the risk in an external market. So the political risk premium demands of a foreign investor in an external market could be lower than those in a domestic market. At this point, further note must be made of the fact that depositors from different countries face different probabilities of impoundment or expropriation, in as much as the likelihood of poor political relations developing between two countries is not the same for every pair.

Offshore deposits, in addition, are riskier in terms of default likelihood. This leads to an additional default premium in the system, even though bank failure in the system has historically been minimal. Of course, one could also add a distinct possibility of the transaction cost disadvantage of acquiring external deposits relative to domestic deposits. However, there is currently no hard evidence to support this view.

The benefits that accrue to OBF's and the demand-side disadvantages that depositors face in the system have been recognized in the past (e.g., McKenzie, 1976). However, our purpose is not illuminating specific effects, but analyzing them in a value-theoretic framework and in an interactive way. When these factors interact, the aggregate payoffs to the securityholders of an OBF are modified as:

$$\begin{aligned}\Pi_0 &= \Pi - r(1 - \theta)WL + rWL(1 - \lambda) \\ &= \Pi + rWL[(1 - \lambda) - (1 - \theta)]\end{aligned}\quad (3)$$

where

λ = the cost/premium adjustment demanded by the debtholders (depositors).

This is assumed tentatively to be *uniform* across depositors. (This uniformity is crucial to the analysis, but the perceived appropriate premium for different depositors will be allowed to vary when we analyze market equilibrium.)

Accordingly, we can express the value of the OB firm as:

$$V_0 = V_D + WL \left[1 - \frac{1 - \theta}{1 - \lambda} \right] \quad (4)$$

We can no longer claim that V_0 exceeds V_D due to offshore banking effects, as might be expected. The effects of offshore activity on the value of the banking firm depend on the interaction between θ and λ . Indeed, when the two are equal, the value of the OBF converges to that of the purely domestic firm. However, so long as $\lambda < \theta$, there is gain to the individual from offshore banking activity.

C. The OBF and Equilibrium in the External Currency Market

The marginal gain to offshore activity evaporates altogether in equilibrium, once we realistically differentiate depositors according to their perceptions about anticipated government controls or repatriation of funds and default premia; that is, as we allow λ to vary across depositors, with each depositor setting the demand cost/premium required according to differential perception. However, the evaporation of this gain does not imply the evaporation of foreign activity. To the contrary, the gain disappears because there exists an incentive for a large number of firms to enter the external currency market competitively. Consequently, OBF effects get "priced out" in the external currency market equilibrium by "grossing-up" the external currency deposit interest rates to reflect the personal premium at the margin. The aggregate size of the external currency market is, therefore, *determinate*, but the degree of offshore banking activity (W) of any particular bank is *indeterminate*.

In this context, the marginal OBF may earn zero rent on all its OB activities, just as the marginal firm in classical competitive market theory. In this case, the effect of OB activity on value is nil. There are, as well, infra marginal OBF's which may earn economic rents on some of their activities. Such firms may continue to expand OB activities until they, too, earn zero rent on their marginal activity. However, the net effect of their OB activity may be a positive rent, hence a positive valuation consequence for their total OB operations. Where banks stand in this arrangement depends on their relative costs and the premia depositors associate with their deposits in particular OBF's.

Consider a spectrum of depositors who face differential personal premia due to differential risk attitudes or differential expectations about government behavior. Unless there are some potential depositors who regard external deposits as perfect substitutes for domestic deposits, OBF's must pay higher interest rates on external currency deposits than on domestic deposits. Therefore, the demand curve for deposits by depositors must be upward sloping to entice investors with progressively higher personal requirements for compensation to make deposits. See Figure I. On the supply of deposits side, banks are indifferent between offshore and domestic deposits when the interest payments to offshore depositors fully use up the benefits that would accrue to banks in the form of θ , that is, when cost advantages are bid away. However, they may not exit offshore operations. If some leave the field, others enter so as to close the gap that the equilibrium demands. In equilibrium, the aggregate K^* must be supplied and demanded. With insufficient supply, certain banks see that there are gains to be achieved as envisioned by the model in (4), and they enter the market until the proper quantity K^* is supplied. An expansion of OBF activity beyond K^* is uneconomic, because banking firms must pay higher interest rates to entice additional deposits. This means that λ must exceed θ , from equation (4). Offshore activity has a negative impact on V_0 , in this case. Thus, in this equilibrium there is a determinate volume of external deposits, although offshore banking activity is of no consequence to the value of an individual banking firm.

D. Further Implications of the Equilibrium

1. The external currency market expands or shrinks as the elasticities of

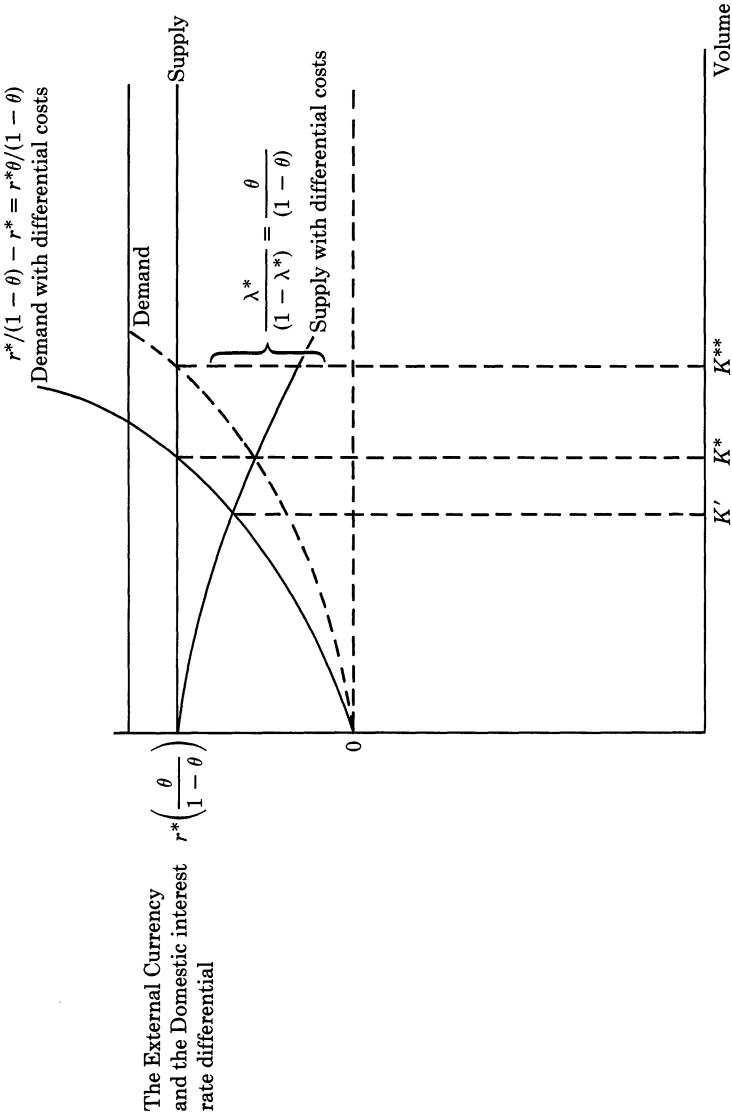


FIGURE I THE VOLUME OF THE EXTERNAL CURRENCY DEPOSITS OUTSTANDING

demand and supply change over time. Once the deposits are injected into the system, the multiplier effect is operative, but the empirical evidence suggests that the multiplier is quite likely to be in the range of 1 to 1.5 because of immense leakages from the system.⁷

2. Risk and cost perceptions about the external market may have declined in recent years because experience has shown that:

- a. bank failure and government intervention are minimal, and
- b. depositors possess more intimate acquaintance with the market and the financial strengths of the relevant institutions.

This shifts demand to the right, and explains an expansionary movement in the market.

3. The supply curve makes a parallel shift depending upon θ . Note that an increase in the general level of interest rates domestically increases the opportunity cost of reserve requirements, and hence the commensurate benefits from the offshore activity. This tends to increase θ so that the supply curve shifts upwards, and accordingly the market expands. It means that domestic monetary policy which is inflationary enhances the growth of the external currency market.⁸

4. The absence of reserve requirements in the external currency market does *not* lead to unlimited external market expansion. Any expansion beyond K^* or K^{**} (depending upon the nature of the supply curve) is uneconomic for the OBF as our equilibrium analysis demonstrates. Those who claim otherwise must be taking a view in which causality runs from banks to the deposit market, rather than the other way. Our analysis clearly demonstrates that non-necessity of the alarms associated with lack of regulation in the market. (Indeed, if the market for offshore bank deposits were to become regulated, there would very likely emerge offshore money market funds to fill the gap in the investment opportunity set created by the subjugation of this market.)

5. The expansion (contraction) of the market is not necessarily linked with the (non) neutrality of OB activity on the valuation of the firm. In Figure I, the supply curve may bend down to reflect nonuniform costly supply adjustments or relative cost efficiencies of banking firms in supplying offshore deposits. If the marginal benefit declines with the degree of offshore banking activity, an optimal allocation exists which maximizes the value of the individual firm. However, the equilibrium size of the market is now K' which is below K^* as previously determined by uniform supply adjustments. Of course, the market can grow beyond K' depending upon shifts in the supply and demand schedules. Thus, the growth of the market is not necessarily linked to valuation gains from offshore banking activities.

6. The domestic and the external currency markets *coexist* for reasons implicit in the preceding analysis. This coexistence is consistent with rational market behavior. Those suggesting corner solutions presume either irrationality or persistent arbitrage opportunities in the external currency market.

⁷ See Dufey and Giddy (1978, p. 53) for a discussion of the multiplier issue and a listing of empirical results on the question. Most empirical analyses suggest it is quite small.

⁸ This notion is consistent with Marston's (1974) findings in which the Eurocurrency market expands as government increases the cost of domestic banking activity.

III. THE MODEL IN A TAX ENVIRONMENT

The tax environment varies with the tax laws of the sovereign nations in which OBF's operate. To make a meaningful analysis while drawing in the implications of taxes, one has to invoke a specific tax regime. In this regard, we employ a stylized version of the U.S. tax code.

We assume tax arbitrage opportunities are readily available against income from equity holdings. Arbitrage is costless. Put another way, we assume that equity income is tax exempt.⁹ Debt income is taxed at T_{PB} . Corporations face the uniform marginal tax rate, T_C , but they do not engage in tax arbitrage so as to reduce the marginal tax rate.

The aggregate payoffs to the owners of the OBF (with $W = 1$ for convenience) are modified in a tax environment as follows:

$$\Pi_0 = \Pi + rL[(1 - \lambda)(1 - T_{PB}) - (1 - \theta)(1 - T_C)] \quad (5)$$

Implicit in (5) is the assumption that the cost savings from OB activity are taxed. This is shown in an unconventional form. Instead of reflecting the benefit in Π we subsume it in the cost reduction, and the tax subsidy associated with interest deduction is reduced accordingly. In other words, we show the taxability of the cost-saving as a reduction in the tax subsidy. This is implicit in the first term in brackets. By the same token, we state the costs to the depositors on an after-tax basis as implied in the last term in brackets. Again by the expedient of value additivity, we write the value of OBF as:

$$V_0 = V_U + L \left[\frac{(T_C - T_{PB}) + \theta(1 - T_C) - \lambda(1 - T_{PB})}{(1 - \lambda)(1 - T_{PB})} \right] \quad (6)$$

where V_U = the theoretical value of the unlevered (but with identical holdings) banking firm.

While it is hard to imagine an unlevered banking firm, what we mean here is that the value of the OBF can be decomposed into its relevant theoretical components: the first theoretical component obtains irrespective of the underlying financial structure, and the second obtains due to the effect of deposit generation or leverage.

The valuation in (6) has interesting possibilities. In the absence of OB activity (or for a purely domestic banking firm), the value collapses to the traditional value of the levered firm with corporate and personal tax effects:

$$V_D = V_U + L \frac{(T_C - T_{PB})}{(1 - T_{PB})} \quad (7)$$

The gain from leverage disappears when $T_C = T_{PB}$. If T_{PB} is progressive in nature, market equilibrium dictates that the supply interest rate grosses up the

⁹ Implied in this tax environment is that there exists discriminatory taxes on equity income and debt income. While we state that equity income is tax exempt, all that is actually needed for the analysis is that it is taxed at a lower rate than the debt income. It is not unreasonable to assume that equity is taxed at a lower rate, because equity income is composed of capital gains which are tax-preferred and tax-deferred until realized.

corporate tax subsidy and the demand interest rate grosses up the personal tax disadvantage of the marginal investor for whom $T_{PB}^* = T_C$. Thus, the tax implications for the purely domestic banking firm are identical to those which obtain for a nonfinancial firm as specified by Miller (1977).

The equality between T_C and T_{PB} can no longer ensure the evaporation of gain from leverage to the OBF, unlike the tradition which concentrates on a domestic nonfinancial firm. The supply-side benefits and the demand-side costs of offshore banking activity interact with corporate and personal taxation so as to generate gains from leverage in a more complex fashion. As an aside, the Miller analysis must be modified substantially in the presence of offshore imperfections. These imperfections affect at least the aggregate volume of debt in the corporate sector.

Gains from leverage alone do not necessarily accord systematic benefits to offshore banking. To see this, notice that the value of the OBF does not exceed V_D in the absence of θ and λ , though the OBF value differs systematically from the non-OBF when there are differences in international taxation. (See Senbet (1979) for an analysis in the context of nonfinancial firms.)

It is possible to modify Figure I in accordance with (6) and the attendant tax implications. However, the qualitative implications are clear enough and remain the same in the taxable environment. If we look at (6) closely, we see that the breakeven supply interest rate is affected materially by corporate and personal taxation. This has the consequence of shifting the supply and demand schedules, and it means that governments can influence the growth of the external currency market through their *tax* policies. Again, this tax impact on the aggregate size of the market can arise even if offshore banking activities are neutral to the relative valuation of individual banking firms.

IV. IMPLICATIONS FOR REGULATION

In a perceptive analysis, Fama (1980) shows that a central bank does not need to regulate banks in order to obtain a stable equilibrium for prices and real activity. Our paper produces a similar policy prescription in the context of an equilibrium analysis in a value theoretic framework. Nonetheless, many proposals have been put forward to regulate the offshore banking industry in some fashion out of fear that it is disruptive to equilibrium in prices and credit (see, for instance, Wallich (1979)). Aliber (1977), for example, suggests the Eurodollar system be subject to the same regulations imposed on the U.S. domestic banking system simply as a matter of fairness. One need not get very specific, however, about the form of the optimal regulation envisioned by proponents to use the model developed in this paper for analysis.

The likely effect of any set of regulations is equality of costs associated with domestic and external currency banking. To the extent that a change in costs for offshore activities leads to a change in the demand-side disadvantages of deposits, there would still be offshore activities and they may grow more or less rapidly under the prevailing regulatory mosaic.

In the context of our model, attention is directed towards the *interaction* of the variables θ and λ . So long as offshore banking activities did not ultimately yield identical costs and depository risks as domestic activities, OBF's would

persist and perhaps continue to expand. Even if costs and default risks were, through regulation, made identical for offshore activities and domestic banking, there would still be those depositors who would prefer to hold funds abroad because of the greater expropriation risk associated with holding domestic deposits. Moreover, there is nothing which excludes from the range of possibility the more rapid expansion of OBF's than is currently the case if new regulatory burdens are imposed. So long as shifts in θ and λ are not perfectly offsetting, there is no way of telling what effect regulations which increase costs and reduce default risk, will have on the size of offshore banking markets.

There is another more subtle point regarding the growth of offshore banking and risk that ought not go unmentioned. Swoboda (1982, p. 346) points out that in the external currency markets "there is a general perception that banks (or major borrowers) will not be allowed to fail." His concern is not with growth, *per se*, but with the misallocation of capital resources arising from the misperception. He goes on to say:

"This perception acts as a subsidy to banks in several respects. The implicit guarantee on their liabilities enables them to obtain funds at lower cost than they otherwise could. It allows them to invest in assets that are riskier than those their stockholders would choose to hold directly . . ."

In the context of our analysis, the implicit deposit guarantee shows up in lower λ ; riskier assets are to some extent reflected in higher θ , as with the case of suboptimal reserves. Whether Swoboda's perception is true is an empirical question. But again, if regulatory authorities acted to move these values to their "correct" levels, it is not obvious whether the size of the market would shrink or grow more rapidly because of joint effects on λ and θ .

A problem confronts policy makers in attempting to assess the effectiveness of policy. What indicator variables might they use, given that they are deprived of using size? Alas, we cannot do more on this question than raise it.¹⁰ Our analysis shows only that external currency market size is determinate and internally regulated in the market place as a consequence of competitive behavior of value maximizing firms and the attendant demand adjustments. Policy intended to change one element in the supply/demand relationship may unintentionally change another, thus making the success of policy difficult to assess.

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¹⁰ Policy makers, of course, could attempt to hamper external market growth by reducing domestic regulation, but this may simply exacerbate their concerns about affecting the equilibrium in prices and real activity. So this is a "nonstarter." For policy makers, more always seems preferable than less.

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