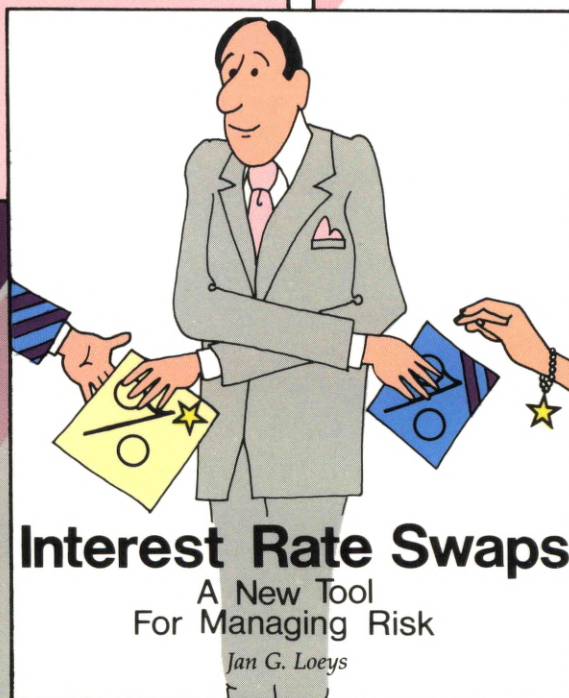
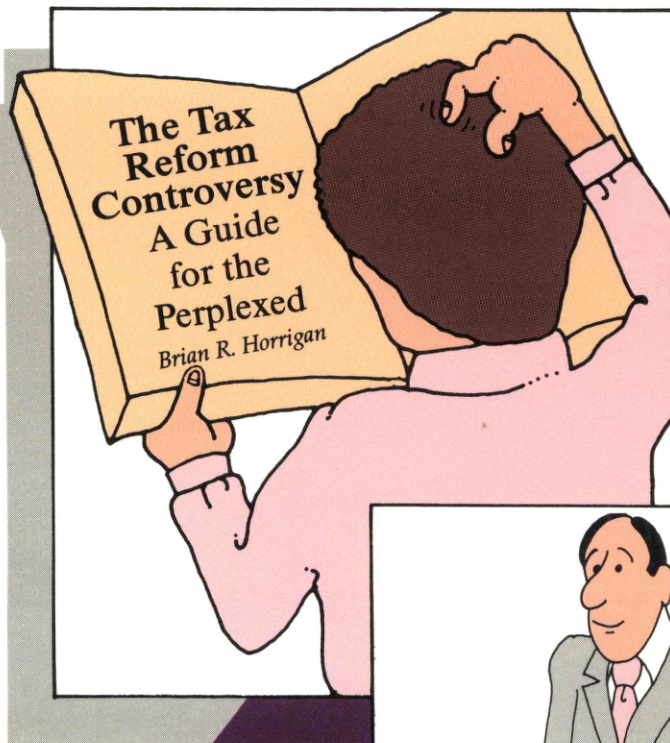


# BUSINESS REVIEW

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## Interest Rate Swaps

A New Tool  
For Managing Risk

Jan G. Loey

# BUSINESS REVIEW

Federal Reserve Bank of Philadelphia  
Ten Independence Mall  
Philadelphia, Pennsylvania 19106

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## THE TAX REFORM CONTROVERSY: A GUIDE FOR THE PERPLEXED .....3

*Brian R. Horrigan*

The time seems ripe for an overhaul of the tax system. Both the Congress and the Administration propose reforms that lower tax rates, flatten tax brackets, and simplify the tax code. These measures are expected to improve efficiency, making the economy more productive, so that lower tax rates will not reduce tax revenues. Indeed economic studies support the view that significant efficiency gains would be achieved. But tax reform remains controversial, because these measures may also seriously alter key aspects of income and wealth distribution. As the debate heats up, many issues will be raised, but the crux will remain the trade-off between efficiency and the distribution of income and wealth.

## INTEREST RATE SWAPS: A NEW TOOL FOR MANAGING RISK. . . . 17

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Interest rate swaps, first used in the Eurobond market in 1981, have become a very popular technique for hedging against interest rate risk. In particular, they have enlarged the menu of firms' borrowing strategies. In comparison to more traditional hedging techniques, such as futures, swaps are more flexible, especially in terms of duration. And swaps are also useful as a way for firms to enter financial markets indirectly, when the costs of entering otherwise would be too high.

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# The Tax Reform Controversy: A Guide for the Perplexed

*Brian R. Horrigan\**

## INTRODUCTION

Widespread dissatisfaction with the personal income tax has produced an assortment of tax reform proposals from several quarters, including Congress, the Treasury, and some tax experts. All of these proposals would simplify the tax code by removing various deductions, exemptions, and exclusions, and would flatten the income tax brackets—that is, reduce the gap between the highest and lowest tax bracket. Some even go so far as to advocate one tax rate for all income above a personal exemption—a

flat-tax system (see CURRENT TAX PROPOSALS p. 14). The aim of all these proposals is to make the economy more efficient than it is under the present graduated tax bracket structure while producing the same amount of tax revenue. In broad strokes, the argument is that the existence of any tax brackets discourages work and saving by generating inefficiencies. And graduated tax brackets create disproportionately larger inefficiencies in the high brackets. By lowering the high end, while adjusting the rest of the tax system so as to keep tax revenues constant, people will be induced to work and save more, thereby generating more output. This expansion will broaden the tax base so that most of the tax brackets can be lowered, while still producing

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the same amount of revenue for government. Important efficiency gains can be had by simplifying the tax code, because elimination of deductions, credits, and exclusions also broadens the tax base, making possible lower tax brackets.

But the passage from proposal to law is proving to be a very rocky one, because these reforms also involve potentially major changes in the distribution of income. Many doubt that the trade-offs between the efficiency gains and the income distribution changes are worth making. After all, flattening the tax brackets means not just lowering the high end, but it may involve also raising the low end. And income distribution issues also touch those who have structured their investments according to the tax incentives in place now, such as mortgage interest deductions and the investment tax credit.

The central question, of course, is how much is to be gained and how much lost from enacting such reforms. As yet economists don't have a comprehensive answer to this question. At this stage there is only fragmentary evidence on the effects of simpler, flatter taxes. Nonetheless, economists have identified key elements of the economic consequences of tax reform, and this has helped focus the ongoing debate.

### INCOME TAX RATES AND INEFFICIENCIES<sup>1</sup>

Not only are death and taxes inevitable—economic inefficiencies produced by income taxes are also inevitable. Economic inefficiencies arise because taxes drive a “wedge” between the wages and interest businesses pay and the wages and interest people receive. An example of this wedge is the difference between workers' gross salary (the worker's value to the firm), and workers' take-home pay (the worker's value of his own labor). These differences may result in an inefficient allocation of labor and capital, which would depress national income. And the higher

the tax bracket, the larger the inefficiencies.

The tax reform proposals seek to reduce the overall inefficiencies by lowering and flattening the tax brackets to various degrees. But exactly how do these inefficiencies arise, and how can lowering and flattening the tax schedule help increase national income? Answers to these questions can be inferred, in part, by observing how people's work and saving behavior responds to changes in wages and interest rates, since changes in income tax rates change after-tax wages and interest receipts.

**Labor Supply.** People value both income and leisure, and they are willing to trade off the income they receive from additional work for less leisure if wages are high enough. For example, suppose a firm offers a worker the opportunity to work 10 hours a week (a second job) at \$10.00 per hour. From the firm's point of view, this worker will add at least \$100.00 worth of value to its output per week. But suppose also that the worker is in the 40 percent tax bracket; from his point of view, he has to decide whether to give up 10 hours of his leisure activities each week for compensation of \$60.00.<sup>2</sup> Income taxes drive a \$40.00 wedge between what the firm sees as the value of 10 hours of work and what the worker sees as the value of 10 hours of leisure. A worker who would prefer to work 10 more hours for \$100.00 may well be unwilling to work for \$60.00, and as a result, he may refuse the extra work. The inefficiency arises because both the worker and the firm would have been better off if the tax brackets were lower—or zero—because the worker would have accepted the job. Since the existence of tax brackets affects all workers' decisions in similar ways, the inefficiencies tax brackets create may add up to substantial amounts, and they may make for considerably lower national income.<sup>3</sup>

<sup>1</sup>For a discussion of these and other issues on the inefficiencies of taxation, see Ira P. Kaminow, “The Merits of Efficient Taxation” in this *Business Review* (November/December, 1981) pp. 15-22.

<sup>2</sup>Tax brackets here refer to the marginal tax rates people pay—that is, the rate on an additional dollar of income.

<sup>3</sup>Economists call society's loss of welfare from such inefficient resource allocation “deadweight losses.” Since it is not possible to measure welfare losses directly, economists con-



Many people, of course, do not have much flexibility in deciding how many hours to work at a particular job. But there are instances where people can decide to work more or less time. For example, people can retire early, or make arrangements to work past a mandatory retirement age; people can work overtime, or work at second jobs ("moonlighting"); and self-employed people, like farmers or physicians, can decide to increase (or decrease) their workloads. Probably the most common example of choice about work is in the context of the family. In this case, it is not simply an individual's flexibility that allows for a labor supply response, but instead it is the household's flexibility. To a large extent, households have been characterized as having one member provide the primary source of income, traditionally the husband. Whether the other member of such a household joins the labor force (traditionally the wife, or the so-called secondary worker) depends on weighing the advantages of supplementing the primary income against the advantages of engaging in activities outside the labor force (such as child-rearing). And a major factor in that decision is the after-tax wage rate the secondary worker receives.

According to economic theory an increase in after-tax wages can influence people's decisions about how much to work in two conflicting ways. If a worker's tax rate goes down, he is likely to be inclined to work more hours, since for each extra hour worked he gets more after-tax pay. This is known as the substitution effect, because the higher a worker's hourly after-tax pay, the more income he would lose by not working, so he substitutes work for leisure. But if the worker's

tax rate goes down he also may decide that, since he could get the same amount of pay for less work, he could cut back his working hours somewhat, and still get more income as well as enjoy more leisure. This reaction to a change in after-tax pay is known as the income effect.

In trying to predict the labor response to lowering tax rates, then, theory suggests that the substitution effect and the income effect work in opposite directions. But lowering tax brackets while keeping government revenues the same means that the income effect will not come into play for the typical worker in each income group. The average worker in each income group still gets the same take-home pay for the same number of hours worked because there is no change in the total taxes paid by such a worker. Lowering the tax brackets will affect only the decision about additional hours—lower taxes on additional hours makes working more and having less leisure more appealing for many workers.

In principle, then, lowering the tax brackets will increase hours worked—that is, it will increase the labor supply and, hence, national income. But how large could this increase be? Economists have tried to estimate the magnitude of the substitution effect. The estimates change as more data and better estimation techniques become available, but these estimates are far from perfect. For example, economists usually estimate responses to changes in wage rates separately for married men and married women—rather than for primary workers and secondary workers—because the available data are collected for married men and women. Also, economists cannot yet estimate the responsiveness of individuals like the self-employed and other special groups, because the data necessary to do so are not available. A number of different labor supply studies find that while the substitution effect is not very large for married men, it is substantially larger for married women.<sup>4</sup> Such

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fine themselves to measuring losses in national income that arise from these inefficiencies. But there is no one-to-one correspondence between these inefficiencies and the level of national income. It is possible, under certain circumstances, to have an *increase* in welfare and a *reduction* in output. An example of what may seem perverse behavior is the case where higher wages induce workers to work less and enjoy more leisure. Though workers would be better off, output would fall.

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<sup>4</sup>See Jerry Hausman, "Income and Payroll Tax and Labor Supply," in Lawrence Meyer, ed., *The Supply-Side Effects of*



studies imply that the magnitude of the substitution effect can be large. Thus, lowering the tax brackets can increase significantly labor supply and hence national income.

**Saving.** Another potential source of inefficiency of high tax brackets is their effect on saving and capital accumulation. People save for a variety of reasons—such as planning a nest-egg for retirement or for a bequest, accumulating enough funds for a large purchase, or setting aside something for the proverbial “rainy day.” Since the quantity of saving determines, to a large extent, how much the national stock of productive capital can grow, inefficiencies that reduce saving will reduce domestic wealth, and they are likely to reduce capital formation and the level of output in the future.

Lowering the tax brackets increases the future after-tax return from savings. As with labor supply, an increase in the return on savings has conflicting effects on saving behavior. A rise in the after-tax return to saving—that is, the return to assets people buy with their savings—makes saving more lucrative because the future purchasing power of saving is higher. Therefore, people will reduce their spending, and they will save more—once again, the substitution effect. But the income effect also plays a role in saving decisions, and it works opposite to the substitution effect. The higher return on already accumulated savings means that people can consume more in their retirement years with the same saving strategy. Or else they can save less from now on, consume more until retirement and still attain their original desired consumption during retire-

ment. But there is still a third influence on the saving decision—the wealth effect. The wealth effect exists because income tax reform in combination with a given tax scheme for corporate income will change the prices of assets, such as housing and corporate stock shares. If asset prices rise, then people will be wealthier, and they will want to consume more of their income—and save less; but if asset prices fall, then people will be poorer and they will want to consume less—and save more.

Economists generally have found the overall responsiveness of saving to its return to be small. But such estimates cannot be used with much confidence because the response of saving depends on the specifics of a given tax reform proposal.<sup>5</sup>

Less inefficiency, and with it more output, is the gain from lowering the tax brackets. But it may not be possible to lower all the tax brackets and still generate the same amount of tax revenue. In such a case, efficiency gains may be had by flattening the tax schedule—lowering the high end and increasing the low end—because inefficiencies at the high end are larger than those at the low end.<sup>6</sup> At the same time, widening the tax base by simplifying the tax code will increase efficiency gains by making it possible to lower all the tax brackets while collecting the same amount of tax revenues. So, substantial changes in the tax code inevitably will result in some people gaining and some people losing—the income distribution will change. Therefore, there is a trade-off between efficiency gains and changes in income distribution.

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*Economic Policy* (Federal Reserve Bank of St. Louis, May, 1981), pp. 173-202. Hausman analyzes 1975 data and finds that, if there had been no income tax at all, married men would have worked 8.2 percent more hours per year, and married women would have worked 18.2 percent more hours per year. A useful review of empirical labor supply studies can be found in Don Fullerton's article “On the Possibility of an Inverse Relationship Between Tax Rates and Government Revenues,” *Journal of Public Economics*, Vol. 19, (1982), pp. 3-22.

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<sup>5</sup>Summaries of the issue of how much savings react to changes in marginal tax rates can be found in: Robert DeFina, “The Link Between Savings and Interest Rates: A Key Element in the Tax Policy Debate,” this *Business Review*, (November/December, 1984), pp. 15-21, and Lawrence Summers, “Tax Policy, the Rate of Return, and Savings,” National Bureau of Economic Research Working Paper No. 995, (September 1982).

<sup>6</sup>This statement assumes that people's labor supply response to a change in wage rates is the same whether their wage rates (or tax brackets) are high or low.



A decision to flatten the tax schedule and to simplify the tax code clearly will be influenced by how much is to be gained from doing so, that is, the size of inefficiencies of the current tax system. One way to get an idea of the importance of these inefficiencies is to estimate how much national income is lowered by the current tax system relative to a benchmark tax system.

### HOW INEFFICIENT IS THE CURRENT TAX SYSTEM?

It is difficult to estimate by how much national income would increase if the tax schedule is flattened and the code is simplified. Because of the complexity of the issues and the limits of available data and of current economic methodology, studies of the impact of the tax system have to make many assumptions and ignore a variety of important considerations. Despite these problems, advances have been made in the analysis of the consequences of tax reform, and further advances are certain to come. Two recent studies employ modern economic techniques to analyze closely some of the likely gains in national income by comparing the existing tax code to a flat-tax system, as a benchmark. Both studies estimate that a flat-tax system would lead to significant increases in national income. The estimates from these studies are not conclusive by any means, but they suggest that gains in national income could be large, and that flattening the tax schedule could yield important dividends.

The first study, by Hausman, estimates the effect of a flat-tax system, that is, a single tax rate for all taxable income on labor supply.<sup>7</sup> It ignores the effect of potential decreases in wages induced by increases in labor supply—so-called feedback

effects—as well as changes in saving behavior. Examining combinations of single tax rates and personal exemptions that produce the same tax revenue, Hausman finds that both married men and women would increase their hours of work. For example, married men would increase their desired hours of work by 2 to 4 hours per week, depending on which combination of a single tax rate and personal exemption is analyzed. And married women would increase their hours worked by 4 to 8 hours per week. The combined increase in hours worked means that national income could have been 4 to 8 percent higher if the economy were operating under one of these schemes. This is between \$150 to \$300 billion, translated to 1984 income levels—a 4 to 8 percent rise in national income.<sup>8</sup> These income gains come both from the *flattening* of the tax brackets and from the *lowering* of the brackets made possible by the tax code simplification.

Auerbach, Kotlikoff, and Skinner (AKS) take a different approach to estimating the potential gains in national income from flattening the tax schedule.<sup>9</sup> They use an abstract but simplified economic model to simulate the effects of tax reform. These simulations do not rely on estimates from any one study, but instead they use “reasonable” values for the various income and substitution effects. Their study, unlike Hausman’s, takes into account changes in wages due to feedback effects and changes in saving behavior. AKS find that converting from a set of tax brackets somewhat similar to those in the current income tax code (ranging from 23 to 43

<sup>8</sup>Hausman’s work has been replicated with similar results for Swedish data by N. S. Blomquist in “The Effect of Income Taxation On the Labor Supply of Married Men in Sweden,” *Journal of Public Economics*, 22 (November 1983), pp. 169-197. He concludes that “the progressive income tax [in Sweden, using 1973 tax data] decreases hours of work by 12 percent [relative to no taxes]. If a proportional tax was used to collect the same tax revenue, hours of work would decrease by only 6 percent [relative to no taxes]” (p. 190).

<sup>9</sup>A. J. Auerbach, L. J. Kotlikoff, and J. Skinner, “The Efficiency Gains From Dynamic Tax Reform,” *International Economic Review* 24 (February 1983), pp. 81-100.

<sup>7</sup>This study is reported in two articles by Hausman: “Labor Supply,” in Henry J. Aaron and Joseph A. Pechman, eds., *How Taxes Affect Economic Behavior* (Washington, D.C.: The Brookings Institution, 1981), pp. 27-83; and “Income and Payroll Tax Policy and Labor Supply,” in Lawrence Meyer, ed., *The Supply-Side Effects of Economic Policy* (May 1981), pp. 173-202.



percent) to a flat-tax system with no personal exemption produces an increase in national income of roughly 9 percent, which would have been about \$340 billion if done in 1984. The hypothetical tax systems they analyze have no personal exemptions or tax deductions before or after flattening the tax brackets. Therefore, the improvement in efficiency they find is produced solely by flattening the tax brackets.

**Estimating the Costs of Other Inefficiencies.** There are some additional inefficiencies created by high marginal tax rates. One is that as marginal tax rates rise, so does the reward—and the temptation—to evade taxes. Though some tax evasion is due to unreported income from illegal activities, otherwise respectable people sometimes fail to report all or part of their income. The Internal Revenue Service estimates that if the tax law had been fully complied with in 1981, government would have collected about \$95 billion more in tax receipts than it did—a 15 percent increase in revenue.<sup>10</sup> A reduction in the level of the tax brackets, among other things, would reduce the incentive to evade taxes, which would increase the tax base. Such an increase in the tax base would make it possible to have even lower marginal tax rates, increasing the potential gains in efficiency and in national income. A recent economic study finds that a 10 percentage point reduction in marginal tax rates could result in a 9 to 26 percent reduction in tax evasion, though other studies find more modest effects.<sup>11</sup>

Another source of inefficiency is the high costs of compliance and collection that stem from the complexity of the tax code. According to government surveys, in 1982 about 40 percent

of all taxpayers paid for professional assistance in filling out their tax forms, and taxpayers collectively spent approximately 300 million hours filling out their tax forms. A recent economic study of the income tax compliance costs, by extrapolating from a sample of Minnesota taxpayers, estimates that in 1982 U.S. taxpayers bore between \$17 and \$27 billion in compliance costs—5 to 7 percent of the income tax revenue collected by the federal and state governments.<sup>12</sup> To that must be added the costs of operating the Internal Revenue Service and the court system that deals with the legal controversies created by the tax code. A wholesale simplification of the tax code would reduce these costs.

A variety of evidence suggests that there are solid income gains to be had from flattening the tax schedule and simplifying the tax code. And some analysts argue that a flat-tax system has some special advantages (see **UNIQUE FEATURES OF FLAT TAXES**). But such major reforms of the tax system could result in important changes in the existing income distribution. What trade-offs might there be between efficiency gains in national income and changes in income distribution?

## WHAT MIGHT TAX REFORM DO TO INCOME DISTRIBUTION?

If so many inefficiencies could be reduced or eliminated by a flatter, simpler tax system, why is there resistance to tax reform? For one thing, there is broad concern about whether such reforms would alter key aspects of income and wealth distribution. An important concern expressed by the public and legislators is whether flattening the tax schedule means abandoning progressivity.

There is a loosely defined public consensus that the tax system ought to be progressive,

<sup>10</sup>These numbers are cited in Congressional Budget Office, *Revising the Tax Code*, 1983, p. 3, and "The Underground Economy's Hidden Force," *Business Week*, (April 5, 1982), pp. 64-70, and "Unearthing the Underground Economy," by K. Bacon, *Wall Street Journal*, (February 4, 1985).

<sup>11</sup>See Charles T. Clotfelter, "Tax Evasion and Tax Rates: An Analysis of Individual Returns," *Review of Economics and Statistics*, (August 1983) pp. 363-373.

<sup>12</sup>Reported in *Revising the Tax Code*, pp. 2-3. Also see Joel Slemrod and Nikki Sorum, "The Compliance Cost of the U.S. Individual Income Tax System," *National Tax Journal* (December, 1984), pp. 461-474.



## UNIQUE FEATURES OF FLAT TAXES

While some of the recent tax reform proposals advocate partial flattening of the tax brackets and partial simplification of the tax code, other proposals advocate going all the way to a completely flat, completely simplified tax system. Though such an extreme proposal may strike some as unprecedented, there are many flat-tax systems in operation here in the U.S. already: the states of Illinois, Indiana, Massachusetts, and Pennsylvania impose a flat tax on income, and the cities of Cleveland and Philadelphia impose a flat tax with no personal exemption on wage income.

Flat-tax schemes have a number of unique features that no tax system with graduated tax brackets can have. In particular flat-tax schemes eliminate the bias in the current tax system against taxpayers with fluctuating incomes, eliminate the incentive to manipulate income to take advantage of tax rate differences, and eliminate the pattern of taxes and subsidies that depends on marital status.

**Income Variability.** Under a graduated income tax system, a taxpayer with a variable income will end up paying more taxes than a taxpayer with a steady income, even if they both have the same *average* income over time and the same deductions. When the taxpayer with a variable income has a high income year, her taxes go up by more than they go down in a low income year because the higher income is taxed at a higher bracket than the low income. Although the current tax code deals with this effect by allowing those with fluctuating incomes to “income average,” the method in the current tax code is only partially successful. (An income averaging method that did eliminate all the effects would involve very complex record-keeping and laborious computation.) As a result, there is some economic inefficiency in that people will leave or refuse to enter occupations that are characterized by fluctuating incomes. Under a flat-tax system, people with fluctuating incomes will not pay more taxes because their high income and their low income are taxed at the same tax rate, as long as income is higher than the allowed personal exemption.

**Tax Rate Manipulation.** Graduated income taxes create incentives to rearrange income so as to pay taxes in a lower tax bracket. For example, some taxpayers transfer income-producing assets to their children so that the income from those assets are taxed at their children’s (lower) tax rate. And taxpayers earning relatively high incomes near retirement have an incentive to postpone realization of income until after retirement when almost certainly they will be in a lower tax bracket. Similarly, taxpayers have an incentive to avoid realizing capital gains until they are in a lower tax bracket so as to reduce their taxes. And there is an incentive to realize capital losses in order to shelter other income. Because the graduated tax brackets distort such decisions, they cause inefficiencies. A flat-tax system diminishes greatly the incentives to manipulate tax bracket differentials.

**The Marriage Tax/Subsidy.** Under the current tax system, a couple will generally find that their taxes rise or fall after they marry: a feature called “marital non-neutrality.” This non-neutrality is created by graduated tax rates and the fact that married people and single people are not allowed to use the same tax schedule. The change in taxes that results from marriage depends on the balance of income between the spouses. If one spouse earns most of the family’s income, the tax liability will fall after marriage, producing a “marriage subsidy;” but if two people with similar incomes marry, they would pay more taxes jointly than singly, a “marriage tax.” Generally, the more nearly equal the incomes of the couple, the greater the marriage tax. The tax code was revised in 1981 to reduce the marriage tax, but the revision does not eliminate it.

There are only two ways to eliminate completely the marriage tax/subsidy. The first is to allow each person to file a separate tax return regardless of marital status. The shortcoming of doing so, however, is that households with the same joint income can pay very different tax bills, depending on the distribution of income between the spouses. The other solution is to have a flat-tax system. As long as both members of the couple have taxable income, their joint tax bill will not depend on marital status or the distribution of income between the two.



meaning that people with higher incomes pay a higher proportion of their income in taxes—*average* tax rates rise with income. One might think that the only way to have a progressive tax system is to have graduated tax brackets, that is, to have tax brackets rise with income, but this is not so. Even a flat-rate income tax would be progressive as long as a personal exemption is allowed.

For example, suppose the tax code allows an \$8,000 exemption for each family and imposes a 20 percent tax rate on all income above the exemption. (Table 1 shows the average tax rate created by such a tax system for families with different income levels.) Even though every taxpayer is in the same tax bracket, the average tax rate rises with income. A flat-tax system can be progressive because a personal exemption that is the same for all families exempts a larger percentage of the income of lower-income families from taxation than the percentage of the income of higher-income families. Only if there is no personal exemption will a flat-tax system not be progressive—in which case all families pay the same average tax rate.

Within limits, a flat-tax system can be made more progressive while yielding the same

amount of revenue as the current tax system by increasing the personal exemption and the tax rate at the same time. As the personal exemption and the tax rate rise together, the system becomes more progressive both because more low-income families are removed from the tax rolls, and because higher-income people pay an increasingly higher average tax rate. But in order to keep revenues constant, making the system more progressive also requires a higher tax rate, which increases inefficiencies and reduces national income. Thus, there is a trade-off between progressivity and national income—more progressivity means lower national income.

Progressivity and efficiency also are affected by tax deductions, credits, and exclusions (DCEs), such as deductions for interest payments, child care expenses, state and local taxes, energy tax credits, and tax exempt retirement accounts. The more DCEs the tax code allows, the smaller is the tax base, and the higher the tax brackets must be to generate the same revenue. For instance, the IRS calculates that the personal income tax base in 1979 was only 44 percent of total personal income—52 percent excluding the personal exemption from total income. Reducing the DCEs improves efficiency and

**TABLE 1**  
**A SIMPLE CASE OF PROGRESSIVITY WITH A FLAT TAX**

**Exemption: \$8,000 per family**

**Tax rate on all incomes: 20%**

Income	Taxable Income	Taxes	Average Tax Rate
\$8,000 or less	\$0	\$0	0.0%
10,000	2,000	400	4.0
15,000	7,000	1,400	9.3
20,000	12,000	2,400	12.0
30,000	22,000	4,400	14.7
50,000	42,000	8,400	16.8
100,000	92,000	18,400	18.4
1,000,000	992,000	198,400	19.8

NOTE: This example is strictly illustrative and does not represent a revenue-neutral tax reform proposal.



increases national income because it allows for the same tax revenues to be raised with lower tax brackets. At the same time, reducing DCEs tends to increase the progressivity of the tax system, for any tax schedule, since higher income people tend to use more DCEs than do lower income people.<sup>13</sup>

The two main tools of recent tax reform proposals—flattening tax brackets and reducing DCEs—work in the same direction on efficiency, but in opposite directions on progressivity. While flattening the tax schedule increases efficiency (and national income) and *reduces* progressivity, reducing the DCEs also increases efficiency but it *increases* progressivity.

<sup>13</sup>According to data from the *Statistics of Income-1982* (Washington, DC: GPO, 1984), those taxpayers whose adjusted gross income (AGI) is in the \$5,000 to \$15,000 range have itemized deductions which amount to 7 to 8 percent of AGI, on average. Those with AGI in the \$20,000 to \$30,000 range take about 13 to 15 percent of their AGI in itemized deductions. And those with AGI of \$40,000 or more take about 20 to 22 percent of their AGI in itemized deductions.

Perhaps, then, it is possible to use these tools together to reap the efficiency gains without major changes in progressivity. Hausman's study contains an example of how this could be done (see Table 2). In his analysis of different feasible flat-tax systems that raise equal revenue, Hausman estimates how the average tax rate for different income classes would be affected by a flat-tax system with no DCEs other than a personal exemption. Hausman finds that, in 1975, a flat-tax system with a personal exemption for each family of \$1,000 or more reduces the average tax rate of *all* income classes compared to the actual average tax rates. Moreover, with a family exemption of \$2,000 a flat-tax system would have been *more progressive* at lower-income and middle-income levels than the 1975 income tax system. However, even though every income class receives a reduction in its average tax rate, higher-income families receive a larger reduction in their average tax rate than lower-income families. Hausman's estimates suggest that it may be possible to flatten the tax schedule and simplify the tax code at the same time, so that all

**TABLE 2**  
**FOUR REVENUE-NEUTRAL FLAT-TAX STRUCTURES**

Exemption Level Per Family	Flat-tax Rate	Average Tax Rate at These Income Levels			
		\$4,000 (7,720)	\$ 8,000 (15,440)	\$16,000 (30,880)	\$24,000 (46,320)
\$0	14.6%	14.6%	14.6%	14.6%	14.6%
\$1,000 (1,930)	15.4	11.6	13.5	14.4	14.8
\$2,000 (3,860)	16.9	8.5	12.7	14.8	15.5
\$4,000 (7,720)	20.7	0.0	10.4	15.5	17.2
1975 Tax Code	Graduated brackets (14% - 70%)	11.9	14.7	17.3	18.8

These data are computed by J. Hausman in "Income and Payroll Tax Policy and Labor Supply," in *The Supply-Side Effects of Economic Policy*, ed. by L. Meyer, Federal Reserve Bank of St. Louis, 1981. The calculations are based on the 1975 federal income tax system. The income levels and the exemptions are in 1975 dollars while the numbers in parentheses represent what the income levels and the exemptions would be in 1984 dollars. The first column shows the different exemptions Hausman uses in his analysis. The second column shows the tax rate needed to maintain the same tax revenue as the personal exemption rises. Naturally, a higher tax rate is required as the personal exemption increases. The next four columns show the average tax rate for taxpayers in the four income levels.



income groups reap at least some of the benefits of the gains in efficiency, and progressivity is retained.

But progressivity is only one of the areas of concern. Even if every income class gets a reduction in its average tax rate, still there may be winners and losers within each income class. If all the DCEs are wiped out and tax rates are reduced, those who rely on DCEs more than average may end up with an increase in their average tax rate. Furthermore, since many DCEs were added to the tax code presumably to further certain social goals, the direct beneficiaries of those goals are likely to become financially worse off. And people who have organized their finances mindful of the DCEs—for example, by buying a house or making certain types of investments—are concerned that the elimination of DCEs will make them financially worse off. Three examples help illustrate some of these concerns about the effects of flattening tax brackets and simplifying the tax code.<sup>14</sup>

**Homeowners.** Many homeowners are concerned that if the deductions for interest payments and property taxes are eliminated, their tax bills will rise regardless of which income class they are in. But several other factors might offset the loss of the interest deduction. For example, all the tax reform proposals provide a larger personal exemption. Also, since homeowners tend to have higher than average incomes, they would pay a lower tax rate on their income. In addition, the tax reform may well reduce interest rates, thereby reducing the burden of mortgage payments on homeowners.<sup>15</sup> Such a reduction in interest rates at least partially would offset the loss due to the elimination of the interest deduction, though it is not clear by how much interest

rates might fall as a result of tax reform. Finally, homeowners are concerned that tax reform would lower the value of their homes. If the after-tax mortgage costs become substantially higher, house prices are likely to fall even if homeowners end up with at least as much after-tax income. But such a fall in house prices could be reversed as people demand more housing when the reductions in inefficiencies result in more income. Thus, no one is quite sure whether the benefits would outweigh the losses for homeowners.

**Charitable Deductions.** The government allows donations to nonprofit organizations engaged in charitable, educational, religious, or cultural activities to be deducted from taxable income. The rationale for allowing such deductions is to reduce the cost to the taxpayer of making such beneficial donations, and thereby to stimulate charitable donations. A number of economic studies have verified the stimulating effect of this deduction. Therefore, people who in one way or another benefit from the activities of these institutions are likely to become worse off if the deduction is eliminated, because this will have a depressing effect on charitable donations. However, the depressing effect of eliminating the deduction for donations will be offset to some extent by the rise in incomes following the adoption of a flat-tax system.

**State and Local Taxes.** Many of the proposals—including the Treasury proposal—plan to eliminate the federal deductibility of state and local taxes. Many state and local government officials have expressed grave concern and opposition to the elimination of this deduction. They are concerned that if state and local taxes are no longer deductible, these taxes will be more costly

<sup>14</sup>See "Wealth Changes and the Flat Rate Tax," by Robert Tannenwald, *New England Economic Review*, (January/February, 1983), pp. 5-17, for a more detailed description of the redistributional issues involved and what might be done to mitigate them.

<sup>15</sup>Eliminating the personal interest deduction increases the after-tax cost of borrowing which decreases demand for

it. This decrease in demand in turn tends to lower interest rates. If lowering the tax brackets elicits more saving, the interest rate will fall some more. And corporate tax reform—such as eliminating the corporate interest deduction—could make interest rates fall by enough to offset the loss of the personal interest deduction for homeowners.



to the taxpayers. As a result, they fear that the taxpayers may demand state and local tax reductions, or even relocate to states or municipalities with lower tax rates.

The loss of the deduction of state and local taxes will hit the higher-income taxpayers in high-tax states like New York harder than it will hit the higher-income taxpayers in low-tax states like Mississippi. (Lower-income taxpayers usually do not itemize their deductions, so the loss of this deduction would not affect them much.) The loss of the deduction to high-income taxpayers in the high-tax states would be at least partially offset by the lowering of the top tax brackets. This lowering of the top brackets would benefit high-tax states more since the citizens in high-tax states also tend to have higher than average incomes. To the extent that the offset is only partial, the tax burden on high-income families in high-tax states and cities will be higher following adoption of a flat-tax system. Furthermore, to the extent that the loss of deductibility leads to state and local tax revenue reductions, the services provided to residents may decline. People who use state and local government services more intensively would be affected adversely by such changes.

## CONCLUSION

Tax reform proposals which advocate flattening the tax schedule and simplifying the tax code have become the center of controversy. The rationales for these proposals are that they increase labor supply (especially among higher-paid workers and secondary workers), encourage saving, reduce the incentive to escape taxes via tax evasion or tax avoidance, and reduce the cost of administering and complying with the tax code. Recent economic studies suggest that the efficiency gains could be significant.

Many are concerned that flattening the tax schedule and simplifying the tax code would

injure the poor, abandon progressivity, and benefit only very high-income families. But converting to a flat-rate income tax need not entail abandoning progressivity, since, by varying the personal exemption, it is possible to make even a flat-tax system approximately as progressive as the current system. And some recent economic estimates indicate that if the tax code is simplified and if the personal exemption and the tax rate are chosen appropriately, not only will national income be larger, but the increase in national income will be distributed in a way that makes every income group better off.

Even if it is possible to make every income group better off, major changes in the tax system will create winners and losers within each income group, because people's financial well-being depends in varying degrees on their ability to use the deductions, credits and exclusions provided for in the current tax code. Homeowners are concerned that their after-tax housing costs may rise, and that housing prices may fall. Charitable institutions and their constituencies are concerned that there will be a major decline in charitable donations. And state and local governments worry that state and local taxes will become more expensive to their taxpayers, forcing major adjustments in their operations.

Though some of the impact of distributional effects of tax reform may be cushioned by the resulting overall gain in income, at this point no one knows precisely how the distribution of income and wealth will change. But that there is a trade-off is clear. The more the tax brackets are flattened and the more the tax code is simplified, the larger the gain in efficiency and in national income—but also the greater the chance that income and wealth distribution will change, and the greater the uncertainty about how they will change. This trade-off is at the heart of the controversy about any tax reform proposals.



CURRENT TAX PROPOSALS

There are a number of flat-tax proposals under active consideration: the Administration proposal; the FAST—"Fair and Simple Tax"—proposed by Congressman Jack Kemp and Senator Robert Kasten; the "Fair Tax" proposed by Congressman Richard Gephardt and Senator William Bradley; and Senator Dennis DeConcini's flat-tax proposal, which implements the proposal advanced by economist Robert Hall and Alvin Rabushka.<sup>a</sup> All four of these proposals raise the personal exemption, flatten and lower tax

brackets, and simplify the tax code, but they differ in degree. All these proposals are designed to raise the same amount of revenue as does the current tax law under the assumption that economic behavior (for example, labor supply and savings) *will not change* in response to the tax reform. They all modify corporate taxation also, but that issue goes beyond the scope of the current article.

<sup>a</sup>Robert Hall and Alvin Rabushka, *The Flat Tax* (Stanford, CA: Hoover Institution Press, 1985).

	Tax Rates	Personal Exemptions:		Zero Bracket Amount:			Maximum Income for Family of 4 to Pay No Taxes	Capital Gains Treatment	Major Deductions Kept	Major Deductions Eliminated	Indexation of Tax Brackets
		Taxpayer and Spouse	Dependent	Single Persons	Heads of Households	Married Couples					
Current Tax Code	11-50%	\$1,080 <sup>1</sup>	\$1,080	\$2,480	\$2,480	\$3,670	\$8,070	60% exclusion from tax base; distinction made between short and long term gains; no indexation of basis, capital losses deductible up to \$3,000 against ordinary income.			YES
Administration	15, 25, 35%	2,000	2,000	2,900	3,600	4,000	12,000	50% exclusion; capital losses deductible up to \$3,000; depreciable assets not eligible for exclusion; no indexation prior to 1991.	Mortgage interest on primary residence plus other interest up to \$5,000 over investment income, charitable contributions, IRAs, KEOGH accounts, medical expenses (over 5% of AGI), exemption of municipal bond interest, employee business expenses, casualty losses.	Income averaging, all state and local taxes, secondary-worker deduction, dividend exclusion.	YES
Bradley-Gephardt	14, 26, 30%	1,600	1,000	3,000	3,000	6,000	11,200	Exclusion eliminated; capital gains treated as ordinary income; no indexation of basis; capital losses deductible up to \$3,000 if a married couple.	Mortgage interest and personal interest up to the amount of passive investment income, <sup>3</sup> real-estate taxes, state and local income taxes, charitable contributions, IRAs, KEOGH accounts, medical expenses (over 10% of AGI), mortgage interest exemption of municipal bond interest, employee business expenses.	Income averaging, non-mortgage interest over investment income, secondary-worker deduction, dividend exclusion.	NO
Kemp-Kasten	24% <sup>2</sup>	2,000	2,000	2,600	2,700	3,300	14,125	Investor may choose to: (1) treat capital gains as ordinary income with the basis indexed to the price level; or (2) exclude 40% of gains from taxation, with no indexation, subject to 6 month holding period; capital loss deductible up to \$3,000 against ordinary income.	Real-estate taxes, charitable contributions, IRAs, KEOGH accounts, medical expenses (over 10% of AGI), mortgage and educational loan interest, employee business expenses.	Income averaging, all non-mortgage, non-educational interest, secondary-worker deduction, dividend exclusion, state and local income taxes.	YES
DeConcini	19%	4,500	1,800	NONE			12,600	Capital gains, dividends, and interest not taxed at the personal level; all capital income taxed at the business level.	NONE	ALL	YES

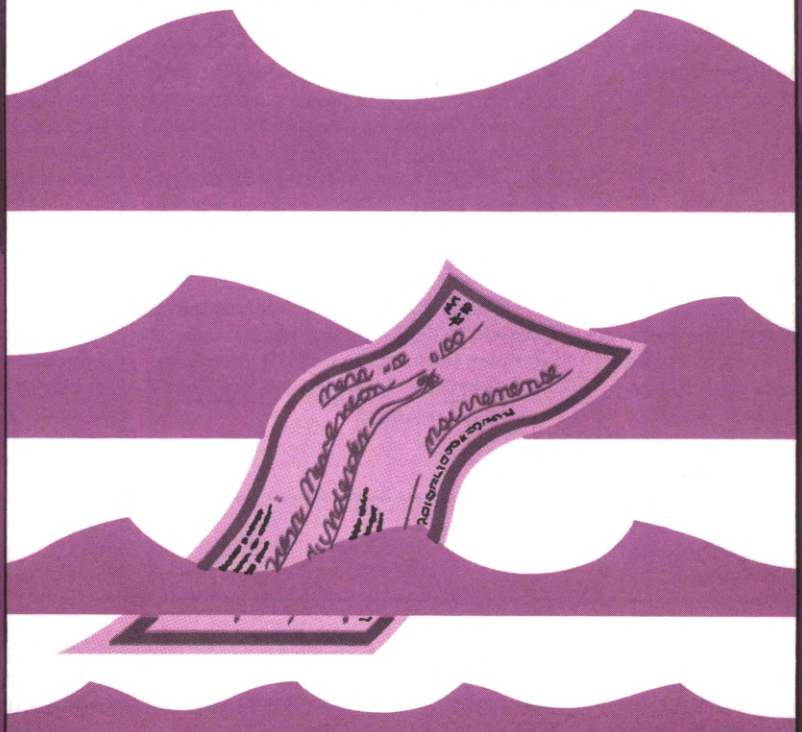
<sup>1</sup>These are the personal exemptions and standard deductions for 1986 under current law, as estimated by the Treasury Department.  
<sup>2</sup>The Kemp-Kasten bill allows a deduction of 20 percent of wage income below the FICA ceiling (\$41,700 in 1986), but adds in an extra 20 percent of income above the ceiling. Effectively, there are two marginal tax rates: 19 percent below \$41,700 and 29 percent above it.

<sup>3</sup>The Bradley-Gephardt bill only allows deductions to be charged against the 14 percent rate, so the deductions are, in reality, tax credits equal to 14 percent of the amount of the deductions. Mortgage interest in excess of the amount of passive investment income is treated as a tax credit at the 14 percent rate, but all interest expenses are fully deductible against passive investment income.



This booklet, produced by the Philadelphia Fed, discusses the Federal Reserve's role in the processing of checks. It also explains some varieties of float and the relationship of float and monetary policy. Copies are available without charge from the Federal Reserve Bank of Philadelphia, Public Services Department, P.O. Box 66, Philadelphia, PA 19105.

# ***Float in the Check Stream***



Federal Reserve Bank of Philadelphia



# Interest Rate Swaps: A New Tool For Managing Risk

*Jan G. Loeys\**

## INTRODUCTION

Sharp movements of interest rates in recent years have created serious problems for firms in which the maturity of their assets does not match the maturity of their liabilities. For example, some financial institutions and other corporations have long-term, fixed-rate assets financed with short-term liabilities. Such firms experience an earnings squeeze whenever market interest rates rise unexpectedly, because their cost of borrowing rises faster than the yield on their

assets. As a result, many firms look for ways to reduce the sensitivity—or exposure—of their earnings to interest rate fluctuations. A recent technique that allows firms to hedge (reduce) this exposure is the “interest rate swap.” Used first in the Eurobond market during 1981, interest rate swaps have taken the market by storm; and now the volume of interest rate swaps in the United States alone is close to \$80 billion.

Why are interest rate swaps so popular? What are the advantages of this instrument over other hedging techniques, such as refinancing the firm’s debt or purchasing interest rate futures? The answers to these questions require first an explanation of what interest rate swaps are and how they can be used to reduce interest rate risk.

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## WHAT ARE INTEREST RATE SWAPS?

An interest rate swap typically involves two firms that want to change their exposure to interest rate fluctuations in opposite directions. For example, one firm has long-term assets that yield a fixed rate of return; but it also has liabilities with interest payments that fluctuate with market rates of interest (that is, floating rate liabilities).<sup>1</sup> This firm loses when interest rates rise unexpectedly, because the interest cost of its liabilities rises but the revenue from its (fixed-rate) assets remains the same. Conversely, this firm gains from an unexpected drop in interest rates. This sensitivity of a firm's net earnings to interest rate fluctuations is the firm's *exposure to interest rate risk*. The other firm involved in the swap faces the opposite situation: its assets yield a return that fluctuates with market rates, but the interest payments on its liabilities are fixed for a longer period of time. A rise in interest rates benefits this firm, because its revenues rise faster than its cost of borrowing; but a drop in market rates reduces its net earnings.

When two firms such as these have opposite interest risk exposures, one has the makings of a swap. In a typical swap the two firms get together—sometimes through an intermediary—and, in effect, exchange some of their interest payments. A firm with floating-rate liabilities essentially takes over some of the interest payments of a firm with fixed-rate liabilities, and in return the firm with the fixed-rate liabilities takes over some of the interest payments of the firm with floating-rate liabilities. For example, a firm that has liabilities on which the interest rate fluctuates with the 3-month Treasury bill (T-bill) rate could agree to pay another firm a fixed rate of 12 percent on an agreed upon dollar amount (principal) in exchange for a floating-rate payment of 50 basis points over the 3-month T-bill rate on the same principal. *In effect*, one firm converts

the interest payments on its liabilities from a floating-rate to a fixed-rate basis, and the other converts its liabilities from fixed to floating rate. (For a more detailed discussion of the mechanics of swap arrangements, see HOW A SWAP WORKS.) Parties to a swap agree to make *interest payments* to each other—they do not actually swap liabilities, nor do they lend money to each other. Each firm remains responsible for paying the interest and principal on its own liabilities. Therefore, swaps do not appear on a firm's balance sheet; instead they are used to alter the exposure to interest rate risk implied by the balance sheet.

In just a few years, interest rate swaps have become very popular as a hedging instrument (see FROM ZERO TO \$80 BILLION IN THREE YEARS p. 21). But why are firms using swaps rather than other more established hedging techniques, such as purchasing interest rate futures?

## SWAPS: LONGER THAN FUTURES, BUT MORE EXPENSIVE

Futures are contracts that generate cash flows that can be used to reduce a firm's interest risk exposure. An interest rate futures contract is an agreement to buy or sell a certain financial asset, such as a T-bill, for a specific price at a specific date in the future. During the life of the futures contract, each time the market value of the asset falls (interest rates rise), the seller in the contract makes a profit, and receives cash, and the buyer takes a loss, and pays cash, and vice versa if the asset's market value rises.<sup>2</sup>

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<sup>2</sup>Cash flows are generated because the exchange where the contract is traded requires that both the buyer and seller in a futures contract post a certain margin. If the price of the underlying asset falls, the buyer has to deposit additional funds with the exchange to maintain the margin requirement, and the seller has his account credited by the same funds. Margins may consist of Treasury securities. For more details, see Howard Keen, Jr., "Interest Rate Futures: A Challenge for Bankers," this *Business Review* (November/December, 1980), pp. 13-25; Mark Drabenstott and Anne O'Mara McDonley, "Futures Markets: A Primer for Financial Institutions," Federal Reserve Bank of Kansas City *Economic Review*

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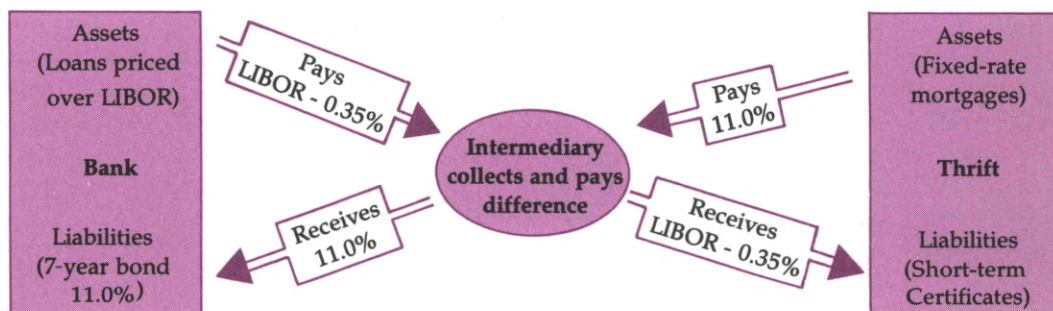
<sup>1</sup>There are two types of floating-rate debt: one is a short-term liability that has to be refinanced frequently; the other is a long-term liability on which the interest rate fluctuates with the interest rate of a specific market instrument.



## HOW A SWAP WORKS

The following example is based on an actual transaction that was arranged by an investment bank between a large thrift institution and a large international bank; it is representative of many swaps that have been arranged since 1982. "Thrift" has a large portfolio of fixed-rate mortgages. "Bank" has most of its dollar-denominated assets yielding a floating-rate return based on LIBOR (the London Interbank Offered Rate).

On May 10, 1983, the "Intermediary," a large investment bank, arranged a \$100 million, 7-year interest rate swap between Thrift and Bank. In the swap, Thrift agreed to pay Bank a fixed rate of 11 percent per year on \$100 million, every 6 months. This payment covered exactly the interest Bank had to pay on a \$100 million bond it issued in the Eurodollar market. Thrift also agreed to pay Bank the 2 percent underwriting spread that Bank itself paid to issue this bond. In exchange, Bank agreed to make floating-rate payments to Thrift at 35 basis points (.35 percent) below LIBOR. Intermediary received a broker's fee of \$500,000.



Twice a year, Intermediary (for a fee) calculates Bank's floating-rate payment by taking the average level of LIBOR for that month (Col. 2), deducting 35 basis points, dividing by 2 (because it is for *half* a year), and multiplying by \$100 million (Col. 3). If this amount is larger than Thrift's fixed-rate payment (Col. 4), Bank pays Thrift the difference (Col. 5). Otherwise, Thrift pays Bank the difference (Col. 6).

1 Date	2 LIBOR	3 Floating-rate payment 1/2 (LIBOR - 0.35%)	4 Fixed-rate payment 1/2 (11%)	5 Net Payment from Bank to Thrift	6 Net Payment from Thrift to Bank
May 1983	8.98%	—	—	—	—
Nov 1983	8.43%	\$4,040,000	\$5,500,000	0	\$1,460,000
May 1984	11.54%	\$5,595,000	\$5,500,000	\$95,000	0
Nov 1984	9.92%	\$4,785,000	\$5,500,000	0	\$ 715,000
May 1985	8.44%	\$4,045,000	\$5,500,000	0	\$1,455,000

The swap allows both Bank and Thrift to reduce their exposure to interest rate risk. Bank can now match its floating-rate assets priced off LIBOR with an interest payment based on LIBOR, while the fixed-rate interest payments on its bond issue are covered by Thrift. At the same time, Thrift can hedge part of its mortgage portfolio, from which it receives fixed interest earnings, with the fixed-rate payment it makes to Bank. However, the floating-rate payment that Thrift receives is linked to LIBOR while its cost of borrowing is more closely linked to the T-bill rate. Since LIBOR and the T-bill rate do not always move in tandem, Thrift is still exposed to fluctuations in the relation between LIBOR and the T-bill rate.



Consider again the case of a thrift institution that has long-term fixed-rate assets, like mortgages, that it funds with short-term liabilities, like certificates of deposit (CDs). If interest rates rise unexpectedly, this thrift will lose—it suffers reduced net earnings. But the thrift could hedge its interest rate risk with a futures contract to deliver (sell) a CD. Then, if interest rates rise, the market value of the CD falls, and the thrift receives a cash flow. This cash inflow offsets the reduced net earnings from the higher interest cost of the thrift's short-term liabilities. When interest rates *drop*, the futures contract produces a cash outflow, but this loss is offset by a lower interest cost on the thrift's short-term liabilities. By buying enough of these futures contracts, the thrift can, in principle, fully hedge its exposure to interest rate fluctuations.

One disadvantage of futures is that they are standardized contracts that exist only with certain specific delivery dates and deliverable types of financial instruments.<sup>3</sup> In particular, futures are available only for delivery dates at 3-month intervals out to about 2-1/2 years. This makes it impossible to hedge interest rate risk beyond 2-1/2 years.<sup>4</sup> Interest rate swaps, in contrast, are private contracts with virtually every aspect of the agreement open to negotiation. Conse-

quently, a swap can be tailor-made to fulfill one firm's particular needs, assuming another firm can be found to fit the other end of the contract. This flexibility allows firms to set up long-term arrangements—most swaps have a final maturity of three to ten years—thereby filling the gap left by futures.

The ability to customize interest rate swaps does not come without its disadvantages. The lack of product standardization makes it more difficult to find another party and to negotiate a mutually agreeable contract. It also costs more to close out a swap contract if the need arises, than a futures contract position, which can be closed out readily. Apart from certain fixed costs of setting up an account with a trader and meeting regulatory requirements, the brokerage costs of initiating and eventually closing out a futures contract are 2 to 5 basis points. This is much lower than the arrangement fee of about 25 basis points that most swap brokers charge (not including additional fees for settling and guaranteeing the agreement).

Because swaps are agreements between private parties, they also have the disadvantage that one of the parties may default and thus be unable to continue the agreement. Although the other party has no principal at risk, it would again be stuck with an interest risk exposure. It could negotiate a new swap arrangement with another firm, but the terms of that agreement would depend on current market interest rates, which may be more or less advantageous to the firm. Default risk can be reduced by requiring collateral, standby letters of credit, or a third-party guarantee—all of which are costly.<sup>5</sup> Fu-

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(November 1984), pp. 17-23; and Nancy Rothstein (ed.), *The Handbook on Financial Futures*, (New York: McGraw-Hill, 1984).

<sup>3</sup>The four delivery dates are March, June, September, and December. The deliverable assets are Treasury bills, notes, and bonds; Bank and Eurodollar CDs; Sterling CDs and Gilts; and Ginny Maes. However, there are no interest rate futures on the prime rate or on the London Interbank Offered Rate (LIBOR), although many firms have their cost of borrowing tied to either of these two rates. Firms that use, say, a T-bill futures to hedge their LIBOR-based borrowing are still exposed to fluctuations in the relation between the T-bill rate and LIBOR. Swaps, though, frequently have the same problem as it is difficult to find two firms with opposite exposure to the same market rate of interest (see the example in HOW A SWAP WORKS).

<sup>4</sup>As a practical matter, a firm that wants to hedge as closely as possible, say, a 5-year fixed-rate asset when only 2-1/2 year futures contracts are available, has to buy the contract

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with the longest available delivery date and then replace it every three months with the new 2-1/2 year contract. In this way, the firm can keep the delivery date of its futures contract as close to 2-1/2 years as possible. The firm will keep doing this until the remaining maturity of the asset reaches 2-1/2 years.

<sup>5</sup>Often the third-party guarantee is provided by the intermediary who would be required to step in and take over the obligation of the defaulting party. So far, there have been no reports of defaults on a swap agreement.



## FROM ZERO TO \$80 BILLION IN THREE YEARS

Interest rate swaps first emerged in the Eurobond market in late 1981.<sup>a</sup> Large international banks, which do most of their lending on a floating-rate basis, were involved in the first swaps so that they could use their fixed-rate borrowing capacity to obtain lower-cost floating-rate funds. Initially, the swapping partners consisted mainly of utilities and lower-rated industrial corporations that preferred fixed-rate financing. During 1982, the first domestic interest rate swap occurred between the Student Loan Marketing Association (Sallie Mae) and the ITT Financial Corp., with Sallie Mae making floating-rate payments to ITT. Since then, the market has grown tremendously; in 1984 about \$80 billion in swap agreements were concluded.<sup>b</sup> Any large corporation can now use interest rate swaps as an instrument for asset-liability management.

Both investment banks and commercial banks have been active in arranging interest rate swaps. These intermediaries earn fees by bringing the different parties together, by acting as settlement agent (that is, collecting and paying the net difference in the interest payments), and by serving as guarantor of the agreement. Most intermediaries have recently gone beyond their initial role of merely bringing different parties together and function also as dealers. As a dealer, the intermediary is also the counterparty to each swap it "sells." That is, each party has an agreement only with the intermediary and is totally unaware of who might be on the other side of the swap. This arrangement allows the intermediary to sell one leg of the swap before selling the other and to work with an inventory of as yet unmatched swap agreements. The existence of dealers also facilitates an informal secondary market in swaps, where parties to a swap can sell their position to the intermediary or to another party, thereby increasing the liquidity of this instrument.

A typical swap involves a bond issue for \$25 to \$75 million with a 3 to 10 year maturity on one side, and a floating-rate loan on the other side. Initially, this floating rate loan was priced at a fraction over LIBOR, the London Interbank Offered Rate. Recently floating-rate loans have also been using the prime rate, the T-bill rate, or other indices of the cost of short-term borrowing.

The most common type of swap is the one described above: a dollar fixed-rate loan swapped for a dollar floating-rate loan, otherwise called the "plain-vanilla" swap. However, several variations on this basic swap have emerged in the market. One such variation is a floating-to-floating swap where parties agree to swap floating rates based on different indices. For example, a bank with assets tied to the prime rate and liabilities based on LIBOR may want to swap the interest payments on its liabilities with payments on a prime-tied, floating-rate loan. Another type of arrangement involves currency swaps such as a swap of a sterling floating-rate loan for a dollar fixed-rate loan. For firms whose assets are denominated in a different currency than are its liabilities, this type of swap may be more appropriate. Finally, rather than exchanging interest payments on liabilities, swaps can also be used to exchange yields on *assets* of different maturities or currencies.

The interest rate swap market has proven to be very flexible in adjusting its product to new customer needs. This innovativeness all but guarantees that swaps will remain a permanent feature of international capital markets.

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<sup>a</sup> For more technical and institutional details on interest rate swaps, see Carl R. Beidleman, *Financial Swaps: New Strategies in Currency and Coupon Risk Management*, (Homewood, Illinois: Dow Jones-Irwin, 1985); and Boris Antl (ed.), *Swap Financing Techniques*, (London: Euromoney Publications Limited, 1983).

<sup>b</sup> Since there are no official reporting requirements on swaps, estimates of the size of this market vary tremendously. The amount of \$80 billion, as estimated by Salomon Brothers (see *The Economist*, March 16, 1985, p. 30, Table 16), appears to be somewhere in the middle.



tures, on the other hand, are guaranteed by the exchange in which the contracts are traded and by the funds that both parties to a futures contract must hold on margin with the exchange.

To reduce the costs stemming from the customized nature of swaps, many intermediaries have started to standardize the contract terms of swap agreements, such as the type of floating interest rate, repricing dates, and margin or collateral requirements.<sup>6</sup> As a result, interest rate swaps may become similar to futures contracts, but with longer periods available for hedging.

Given a choice, firms that want to reduce their exposure to interest rate fluctuations for up to 2-1/2 years may be better off with interest rate futures than with swaps because futures are less costly to use than swaps.<sup>7</sup> For longer-term hedges, interest rate swaps are a more appropriate, though relatively more expensive, hedging instrument.

### SWAPS: MORE FLEXIBLE AND CHEAPER THAN REFINANCING

Rather than using complicated instruments such as swaps and futures, it may seem a lot less trouble for a firm to adjust its exposure directly by issuing liabilities (debt) with the pricing characteristics it desires. For example, a firm that has only floating-rate liabilities but now desires more fixed-rate liabilities, could buy back some of its floating-rate liabilities and issue fixed-rate liabilities instead; that is, it could refinance some of its liabilities. However, "sellers" of interest

rate swaps claim that swaps may be less costly than refinancing for several reasons. One is that firms with lower credit ratings may have to pay relatively higher interest rates—that is higher quality spreads—in the fixed-rate market than in the floating-rate market. Thus, they claim, such firms should borrow in the floating-rate market and then swap, if they desire fixed-rate liabilities. Another reason is that swaps circumvent transactions costs associated with refinancing—such as legal fees, advertising, and regulatory restrictions—because swaps do not involve new borrowing; they only involve the exchange of interest payments on existing liabilities. To understand the advantages swaps can have over refinancing requires a closer look at these quality spread differentials and transactions costs.

**Quality Spread Differentials.** A quality spread is the premium that a borrower with a low credit rating has to pay over a borrower with a high credit rating. For example, during 1982 when interest rate swaps first became popular in the U.S., the quality spread between Aaa and Baa rated firms in the fixed-rate corporate bond market was over 2 percentage points, a post-war high.<sup>8</sup> At the same time, these quality spreads were less than 1 percentage point in the floating-rate market.

To see how interest rate swaps could exploit this apparent difference in quality spreads, consider an example typical of many of the early swaps. "Company" is a manufacturer whose assets yield a fixed rate of return. Company finances a major part of its assets by borrowing at a floating rate of 1 percentage point above the 3-month T-bill rate. Company prefers to finance its assets with a fixed-rate bond issue, but because of its low Baa credit rating it would have to pay, say, 16 percent.

On the other side is "Bank," a large inter-

<sup>6</sup>For more details, see "Swaps: Managing the Future," *Euromoney* (October 1984), pp. 201-221; and "Making a Market in Slightly Used Swaps," *Institutional Investor* (November 1984), pp. 77-84.

<sup>7</sup>Firms could also use options in this case. An option is the right (rather than the commitment) to buy or sell an asset before a certain date in the future. Options are not discussed in this paper because a comparison of options with swaps is very similar to a comparison of futures with swaps. Options, like futures, are mostly standardized products, traded mostly on organized exchanges, and available only up to 2 years. However, certain over-the-counter options are increasingly available for longer periods.

<sup>8</sup>Aaa and Baa are credit ratings assessed by Moody's Investors Services, Inc., a major credit-rating agency. This rating system consists of 10 grades, ranging from Aaa (highest quality) to Baa (medium quality) to Caa (poor quality) to D (default).



national bank, with a portfolio of commercial loans on which it charges a rate based on the 3-month T-bill rate. Bank currently finances its portfolio by issuing CDs at 1/2 percentage point above the 3-month T-bill rate. Given its high Aaa credit rating it has the option of borrowing in the bond market at a fixed rate of 14 percent. Table 1 shows the different alternatives for the two firms. Note that the quality spread is 1/2 percentage point in the floating-rate market, and 2 percentage points in the fixed-rate market.

If each simply wanted to match maturities, Bank would borrow in the floating-rate market at 1/2 percentage point above the T-bill rate and Company would borrow in the bond market at 16 percent. But both borrowers could reduce their cost of borrowing if Bank borrows at a fixed rate and Company borrows at a floating rate and they swap interest payments, with Company agreeing to pay Bank, say, an additional 1 percentage point. In effect, this means that Bank borrows at a 14 percent interest rate, pays Company the T-bill rate plus 1 percentage point (Company's borrowing cost), and receives payments from Company at a 15 percent interest rate. On net, Bank makes interest payments at the T-bill rate  $[14\% + (\text{T-bill rate} + 1\%) - 15\%]$ .

On the other side of the transaction, Company in effect borrows at the T-bill rate plus one percentage point, pays Bank a 15 percent interest rate, and receives payments from Bank at the T-bill rate plus one percentage point. On net, then, Company makes interest payments at a 15 percent interest rate  $[(\text{T-bill rate} + 1\%) + 15\% - (\text{T-bill rate} + 1\%)]$ .<sup>9</sup> As a result, Bank effectively borrows at the T-bill rate, better than it could do by itself, and Company borrows at a fixed 15 percent, less than the 16 percent it would have to pay if it had entered the bond market on its own. The source of this reduction in borrowing costs is the difference in quality spreads between the fixed-rate and the floating-rate market. By being able to borrow at a fixed rate through Bank, Company saves more than enough over its own fixed-rate cost of borrowing to compensate Bank for Company's higher (than Bank's) cost of borrowing in the floating-rate market (1/2 percentage point).

The reduction in borrowing costs made possible by these quality spread differentials has been a major selling point for swaps. These cost reductions may be more apparent than real, however. There is a lot of evidence that financial markets are efficient, and that pure arbitrage profits are not readily available.<sup>10</sup> Market efficiency suggests that the difference in quality spreads between fixed-rate and floating-rate markets—200 vs. 50 basis points in the example—reflects differences in risk to lenders in these respective markets. Indeed, the quality spread that is typically quoted does not refer to debt of the same maturity. The floating-rate debt that firms use as a basis for swaps is mostly short- to medium-term, while the fixed-rate debt consists

**TABLE 1**  
**QUALITY SPREAD**  
**DIFFERENTIALS**

Issued By:	Interest Rate on Liabilities	
	Floating Rate	Fixed Rate
Company (Baa)*	T-bill + 1.0%	16.0%
Bank (Aaa)*	T-bill + 0.5%	14.0%
Quality spread:	0.5%	2.0%

\*Credit ratings are in parentheses. Baa is the lower rating.

<sup>9</sup>As explained in HOW A SWAP WORKS, only the difference between these two flows of payment actually changes hands. Unless the T-bill rate is above 14 percent, company pays the difference between 14 percent and the T-bill rate.

<sup>10</sup>For a survey of the evidence, see Thomas E. Copeland and J. Fred Weston, *Financial Theory and Corporate Policy*, Second Edition, (Reading: Addison-Wesley, 1983).



of long-term bonds.<sup>11</sup> Debt-holders consider *short-term* debt less risky than long-term debt because they have the option not to renew the debt if the firm looks shakier than anticipated. Therefore, debt-holders require smaller quality spreads on short-term debt than on long-term debt. The possibility that debt will not be renewed, however, makes issuing short-term debt rather than long-term debt more risky to *equity-holders*. Issuing short-term rather than long-term debt therefore merely shifts risk from debt-holders to equity-holders.<sup>12</sup> A firm that considers swapping the floating-rate interest on its short-term debt for a fixed-rate interest payment as an alternative to borrowing directly long term must take into account that the lower cost of borrowing produced by the swap comes at the cost of increased risk to the firm's equity-holders.

Quality spread differentials may seem to offer profit opportunities, and they may look like a good reason to use swaps instead of refinancing. But market efficiency suggests that true profit opportunities are likely to be short-lived at best, and that most of the time they are illusory. But there are more solid reasons why refinancing is more costly than interest rate swaps, and they are transactions costs and other non-interest

costs (as opposed to interest costs in the form of high quality spreads).

**Transactions Costs.** Refinancing can take a lot of time, while a swap can be arranged within a few days. To refinance, a firm has to buy back its outstanding liabilities, which can be expensive, or wait until these liabilities mature. Then the firm must try to convince its regular lenders to provide a different type of funds. A thrift, for example, may have to expend much time, effort, and expense to convince its depositors of short-term funds to invest instead in long-term time deposits.

If a firm's regular customers are unwilling to provide, say, fixed-rate funds, the firm can look to alternative markets, such as the domestic or the Eurodollar bond market. Bond markets, however, are costly to use. Domestic bond markets, for one, are highly regulated. To issue a new domestic bond, a firm has to register with the Securities and Exchange Commission (SEC) and meet its disclosure requirements.<sup>13</sup> In addition, a prospective bond issuer is well-advised to obtain a credit rating from the major rating agencies, such as Moody's, or Standard and Poor's, which requires additional expense. The actual selling of a bond issue involves other costs such as advertising, legal fees, and an underwriting spread—that is, the difference between what the firm issuing the debt receives and the (higher) price that ultimate investors pay for the debt. This spread, which runs anywhere from 25 to 500 basis points and which averages about 80 basis points for investment grade debt, serves as payment to the underwriter (or underwriter's syndicate) for distributing the issue to the ultimate investors, and for committing himself to buy that part of the issue that is not bought by the public at a given price.

<sup>11</sup>The floating-rate debt that firms use as a basis for a floating-to-fixed interest rate swap consists mostly of bank credit, commercial paper, certificates of deposits (CDs), and floating-rate notes (FRNs). More than 90% of commercial and industrial loans by U.S. banks are short term. Commercial paper usually has a maturity of 3 to 6 months, while most large negotiable CDs of financial institutions are for 6 months or less. Although FRNs have stated maturities of 7 to 15 years, almost all FRNs issued in the U.S. have covenants that give the holder the right to redeem the note at 3-year intervals, thereby reducing the effective maturity of these FRNs to 3 years. Some of the FRNs that do show large quality spreads usually give the issuer the option to exchange the issue for fixed-rate debt before a certain date. Thus, these last FRNs are more like fixed-rate bonds.

<sup>12</sup>For a formal treatment of this issue, see Thomas Ho and Ronald Singer, "Bond Indenture Provisions and the Risk of Corporate Debt," *Journal of Financial Economics* (1982), pp. 375-406.

<sup>13</sup>Under SEC rule 415 firms can shortcut the normally lengthy registration procedure by filing a single registration statement covering securities they expect to sell from time to time within two years. These firms can then sell securities "off the shelf" whenever they choose. However, this procedure is only available to the largest and most creditworthy corporations.



As an alternative to the domestic bond market, a firm also can try the Eurodollar bond market. Eurodollar bonds are dollar-denominated bonds issued by international syndicates anywhere outside the United States. The Eurobond market has the advantage that it is almost totally unregulated (that is, there are almost no registration or disclosure requirements), so that issuing a bond does not take a lot of time. On the negative side, however, underwriting spreads on Eurodollar bonds are three to four times those on domestic bond issues. Also, because there are no disclosure requirements in Eurobond markets, investors are reluctant to lend to firms that do not have an excellent credit rating. Therefore, for relatively unknown firms the Eurodollar bond market is even less accessible than the domestic bond market.

The existence of interest rate swaps makes it possible for firms to borrow in the markets in which they have a comparative advantage rather than refinancing in markets in which they don't. These firms can then swap interest payments with firms that have a comparative advantage in another market to achieve the interest payments characteristics they desire. Comparative advantage can take the form of lower interest costs and lower transactions costs. Such lower costs can be the result of name recognition, an established retail network for issuing liabilities, government subsidies and regulations, or other attributes associated with borrowing or lending in certain markets. For example, international banks have the name recognition that allows them to borrow in the Eurodollar market. Domestic banks and thrifts, on the other hand, have the retail network and deposit insurance that give them a comparative advantage in attracting retail savings-type deposits. Interest rate swaps allow banks and thrifts to protect themselves against interest rate risk without having to give up the retail (short-term) savings market in which most of them specialize.

## SUMMARY

The high interest rate volatility of recent years

has induced many firms to look for ways to protect their profit margins—to hedge—against interest rate fluctuations. A recent and popular technique is the interest rate swap, in which different parties *in effect* swap the interest rate payments on each other's liabilities. An interest rate swap typically allows a firm with floating-rate liabilities to exchange its floating-rate interest payments with another party for fixed-rate payments, thereby effectively acquiring a fixed-rate cost of borrowing.

In only a few years, interest rate swaps have become very popular hedging instruments because frequently they are better suited or less expensive than other hedging techniques, such as purchasing interest rate futures or refinancing the firm's debt. Because interest rate futures are standardized products traded on an organized market, they are inexpensive to use. But because of their standardization, they do not always meet a firm's specific requirements to hedge its interest rate risk exposure. In particular, futures have delivery dates only out to 2-1/2 years, while there is no such limit for swaps. Swaps are freely negotiated agreements between private parties, and, therefore, they can be tailor-made. But this customization makes swaps more expensive to use than futures.

Interest rate swaps can also be very useful when the high costs of entering a market as a new borrower make it too expensive for a firm to obtain directly the type of financing it needs to achieve its desired interest risk exposure. A firm may find that attracting fixed-rate financing in the bond market, for example, is very costly because of high underwriting fees, disclosure costs, or the high risk premium that relatively unknown borrowers may have to pay. An interest rate swap allows a firm to exchange interest flows in order to achieve the desired characteristics of its interest payments without changing the structure of its balance sheet. Interest rate swaps are thus an indirect way of entering financial markets in situations where firms find it very costly to obtain financing directly.



# Philadelphia/RESEARCH

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- 84-2 Jan G. Loeys, "Market Perceptions of Monetary Policy and the Weekly M1 Announcements."
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- 84-4 Aris A. Protopapadakis and Jeremy J. Siegel, "Government Debt, the Money Supply, and Inflation: Theory and Evidence for Seven Industrialized Economies."
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- 84-6 Gary Gorton, "Measuring Economic Activity with the Indexes of Leading, Lagging, and Coincident Indicators." Published in *The Handbook of Economic and Financial Measures*, Frank J. Fabozzi and Harry I. Greenfield, eds., Homewood, Ill: Dow Jones Irwin, 1984.
- 84-7 Gary Gorton, "Clearinghouses and the Origin of Central Banking in the U.S." Published in *Journal of Economic History*, March 1985.
- 84-8 Gary Gorton, "Bank Suspension of Convertibility." Published in *Journal of Monetary Economics*, March 1985.
- 84-9 Michael Smirlock and Simon Benninga, "The Pricing of Treasury Bond Futures: The Quality Variation Option."
- 84-10 Brian Gendreau, "Imperfect Competition and Postbellum U.S. Regional Interest Rates."



# Selected Abstracts 1984

84-2

## MARKET PERCEPTIONS OF MONETARY POLICY AND WEEKLY M1 ANNOUNCEMENTS

*Jan G. Loeys*

The way financial markets react to money announcements depends upon how financial markets think the Fed decides and executes monetary policy. This paper investigates when and how the response pattern of interest rates to money announcements changed in recent years in order to find out how markets have altered their perceptions of policymaking. We find that markets react fast (once even before the fact) and consistently to Fed announcements of major shifts in monetary policy. Also, bond markets seem to become very uncertain about long-run money growth whenever the Fed announces major changes in the way it implements monetary policy.

84-4

## GOVERNMENT DEBT, THE MONEY SUPPLY, AND INFLATION: THEORY AND EVIDENCE FOR SEVEN INDUSTRIALIZED ECONOMIES

*Aris Protopapadakis  
and Jeremy J. Siegel*

This paper analyzes the theoretical and empirical relation between the growth of government debt and monetary policy for seven industrialized countries: France, Germany, Italy, Japan, Switzerland, the U.K., and the U.S. After analyzing the data we find that:

(i) rates of monetary growth frequently differ sharply from the rate of growth of nominal government debt, so that there is no evidence that a rapidly growing level of government debt encourages immediate monetization;

(ii) the rate of inflation is approximately equal to the difference between the rate of growth of the money supply and real output in all countries over all subperiods, so there is no evidence that an increase in government debt is a significant independent cause of inflation; and

(iii) 1974 signals a turning point in postwar data trends, marked by a decline in the rate of growth of real output and a sharp rise in the rate of growth of nominal debt for all the countries.

84-5

## THE EQUILIBRIUM PRICING OF EXCHANGE RATES AND ASSETS WHEN TRADE TAKES TIME

*Aris Protopapadakis and Simon Benninga*

This paper shows that in a two-country monetary model with the following characteristics: (i) generalized uncertainty, (ii) complete markets, (iii) each country producing one good and trading for the other, (iv) trade in goods takes time, but (v) trade in assets is instantaneous, the Law of One Price holds only infrequently. Foreign exchange risk exists in this model because the exchange rate deviates regularly from its Law of One Price value. Thus, residents of different countries perceive the riskiness of an asset differently, because of foreign exchange risk. The forward premium depends both on foreign exchange risk and on the relative inflation risk in the two countries.

84-7

## CLEARINGHOUSES AND THE ORIGIN OF CENTRAL BANKING IN THE U.S.

*Gary Gorton*

The pre-1914 U.S. banking industry is not easily characterized as a market operating through a price system. The endogenous development of the clearinghouse as the industry's organizing institution can be explained by inherent characteristics of demand deposits. During banking panics the clearinghouse united banks into an organization resembling a single firm which produced deposit insurance.

84-8

## BANK SUSPENSION OF CONVERTIBILITY

*Gary Gorton*

A banking panic occurs when depositors at all banks seek a large reduction in their deposit holdings. Suspension of convertibility of demand deposits into currency was the banking system's response to a banking panic. When depositors are incompletely informed about the state of bank investments, a panic can occur when depositors expect capital losses, conditional on having observed noisy indicators of the state of bank investments. Banks, with superior information about the investments, can signal to depositors, by suspending convertibility, that continuation of the long-term investments is mutually beneficial.





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