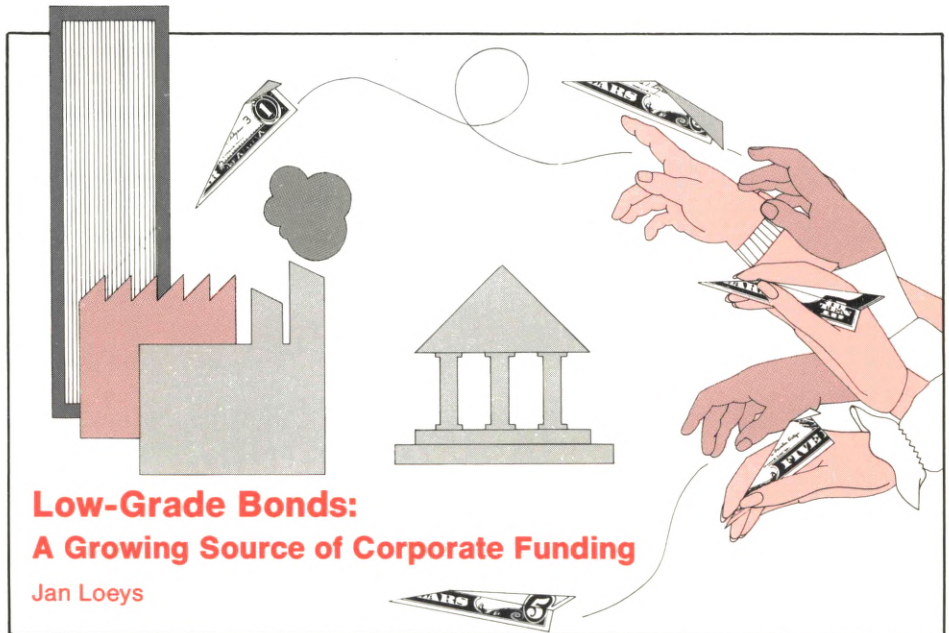


# BUSINESS REVIEW

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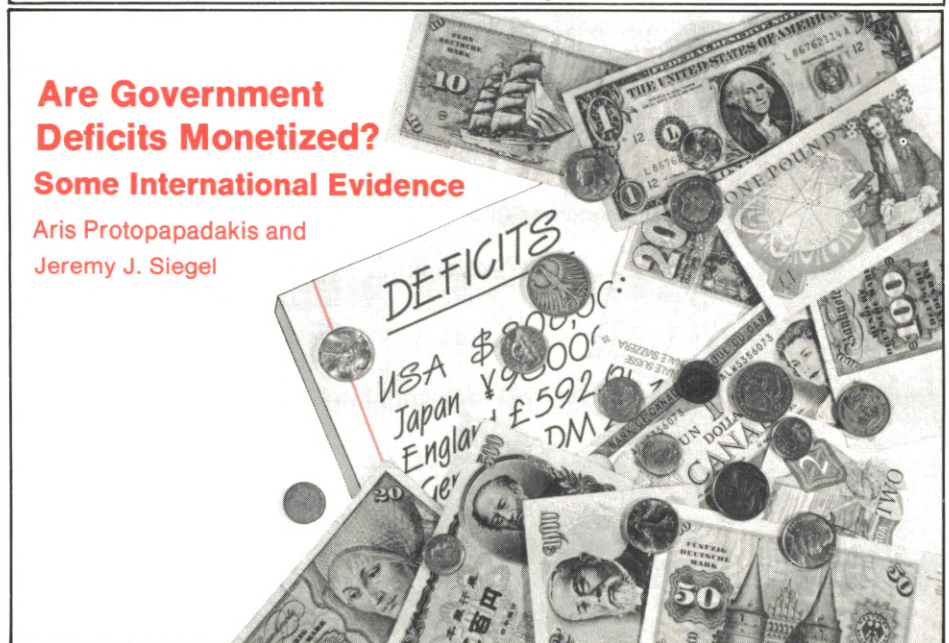


PHOTO BY ANNE GRIFFITH-McNALLY

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Ten Independence Mall  
Philadelphia, Pennsylvania 19106

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## LOW-GRADE BONDS: A GROWING SOURCE OF CORPORATE FUNDING ..... 3

*Jan Loeyes*

Low-grade bonds—rated as speculative investments by the rating agencies—recently have stirred the interest of investors. In part, their growth is due to improvements in information technology that have lowered the costs of monitoring these securities. In addition, because of increased economic uncertainty, institutional investors have shifted their focus toward assets that are somewhat more marketable, as low-grade bonds are. As a result, certain smaller, less well known firms that traditionally relied on bank loans and private placements can now issue low-grade bonds and borrow directly in the public capital markets.

## ARE GOVERNMENT DEFICITS MONETIZED? SOME INTERNATIONAL EVIDENCE ..... 13

*Aris Protopapadakis and Jeremy J. Siegel*

The enormous federal deficit has a lot of people concerned. One of the more subtle issues is whether economic and political pressures force the monetary authority to “monetize” the debt—does the central bank buy up much of the deficit, thereby pumping more money into the economy, and ultimately leave us with high inflation? While a precise answer is difficult to provide, we can look at historical experience both here and in other industrialized countries to see if large deficits are accompanied by high money growth.

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# Low-Grade Bonds: A Growing Source of Corporate Funding

*Jan Loeys\**

In recent years, a growing part of corporate borrowing has taken the form of “low-grade bonds.” Called “junk bonds” by some, and “high-yield bonds” by others, these bonds are rated as speculative by the major rating agencies, and they are therefore considered more risky than high- or investment-grade bonds. Lately, low-grade bonds have received a lot of public attention because of their use in corporate takeovers. But in fact, most low-grade bond issues are not used for this purpose.

Corporations that now issue low-grade bonds

are firms that, because of their lack of size, track record, and name recognition, used to borrow mostly via bank loans or privately placed bonds. Recently, investors have become more willing to lend directly to smaller and less creditworthy corporations by buying these low-grade bonds. There are several reasons for the new popularity of these bonds. But before discussing those reasons, it is useful to examine in more depth exactly what low-grade bonds are and how their market first developed.

## WHAT ARE LOW-GRADE BONDS?

Low-grade bonds represent corporate bonds that are rated below investment grade by the major rating agencies, Standard & Poor’s and

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Moody's. These ratings, which firms usually request before issuing bonds to the public, reflect each agency's estimate of the firm's capacity to honor its debt (that is, to pay interest and repay principal when due). The highest rating is AAA (for firms with an "extremely strong" capacity to pay interest and repay principal), and then AA ("very strong"), A ("strong"), and BBB ("adequate"). Bonds rated BB, B, CCC, or CC are regarded as "speculative" with respect to the issuer's capacity to meet the terms of the obligation.<sup>1</sup> Firms generally strive to maintain at least a BBB rating because many institutions or investment funds cannot, because of regulation, or will not, because of firm policy, invest in lower-grade bonds. This explains why bonds rated below BBB are also known as "below-investment" grade bonds.

There is no set formula for determining a bond rating—the rating agencies say they look at the entire spectrum of financial and product market conditions. But a certain issue may be considered too risky to be rated investment grade for several reasons. For one, certain financial ratios—such as a high debt-equity ratio or a high ratio of interest expenses to total income—may indicate that even moderate fluctuations in cash flow could endanger the issuer's capacity to pay the bondholders. Or the firm's assets may not be well diversified (too dependent upon a single product), which also makes the firm's revenues highly variable. Alternatively, if the firm is relatively new and thus lacks a proven track record, the firm's cash flow might be hard to predict. Finally, the firm or its industry may be considered in decline, which increases the likelihood of a default.

## THE MARKET FOR LOW-GRADE BONDS

Low-grade bonds have received widespread

<sup>1</sup>These are the ratings for Standard & Poor's. The corresponding ratings for Moody's are Aaa, Aa, A, Baa, Ba, B, Caa, and Ca, with ratings below Baa considered below investment grade. For both agencies, the rating C is reserved for bonds on which no interest is being paid, while bonds rated D are in default.

attention from the press in recent years, largely because of their association with certain corporate takeover techniques.<sup>2</sup> But low-grade bonds have been around for a long time. In fact, during the 1920s and 1930s, about 17 percent of domestic corporate bond offerings (that is, new issues) were low grade.<sup>3</sup> Furthermore, as the Depression of the 1930s wore on, many bonds that were originally issued with a high-grade rating were downgraded to below-investment grade. These so-called "fallen angels" were bonds of companies that had fallen on hard times. By 1940, as a result of both these downgradings and the earlier heavy volume of new low-grade offerings, low-grade bonds made up more than 40 percent of all bonds outstanding.

After 1940, the market for new public offerings of low-grade bonds shrank significantly. Many investors avoided low-grade bonds due to their high default rate during the 1930s—an average of almost 10 percent of outstanding low-grade bonds (valued at par) defaulted each year.<sup>4</sup> Most additional low-grade bonds represented only new fallen angels. By the mid-1970s, only about 4 percent of all public corporate bonds outstanding in the U.S. consisted of low-grade bonds.<sup>5</sup>

<sup>2</sup>For a discussion of these issues, see Kevin F. Winch and Carol Kay Brancato, "The Role of High-Yield Bonds (Junk Bonds) in Capital Markets and Corporate Takeovers: Public Policy Implications," in *The Financing of Mergers and Acquisitions*, Hearing before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance and Urban Affairs, House of Representatives, 99th Congress, 1st session (May 3, 1985) pp. 246-297.

<sup>3</sup>See W. Braddock Hickman, *Corporate Bond Quality and Investor Experience*, (Princeton University Press, 1958) p. 153.

<sup>4</sup>See W. Braddock Hickman, *Corporate Bond Quality and Investor Experience*, p. 189.

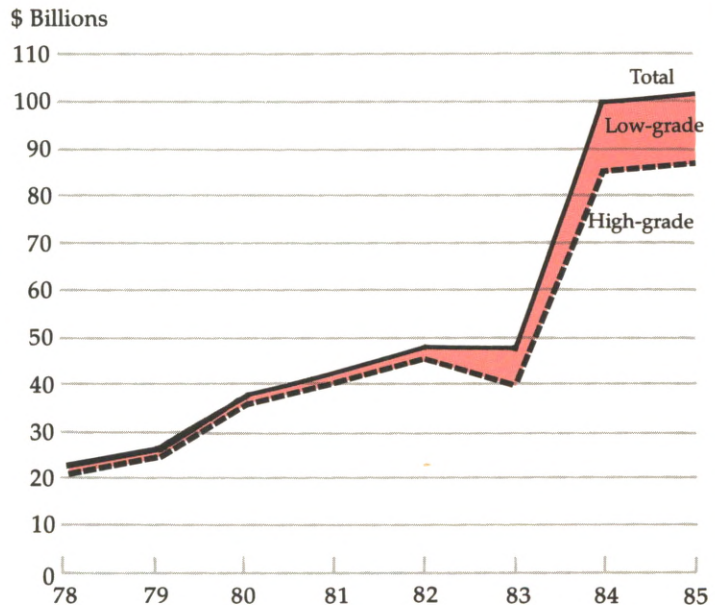
<sup>5</sup>Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market," Morgan Stanley (September 1985), Table 2. These and the following data refer only to publicly issued, nonconvertible debt that is rated below BBB (or Baa). Including unrated debt, which would probably be low grade if it were rated, and debt that is convertible into stock, would raise the outstanding amount of low-grade bonds by up to 30 percent.

In 1977, Drexel Burnham Lambert, an investment bank that was already making a secondary market in fallen angels, started an effort to revitalize the market for original-issue low-grade bonds by underwriting new issues and subsequently making a secondary market in them. By 1982, low-grade bond issuance had grown gradually to about \$2.8 billion per year (or 6 percent of total corporate bonds issued publicly that year). In 1983, the market started growing much faster, reaching an annual issue volume of about \$15 billion in 1985 (or 15 percent of total corporate issues that year; see Figure 1). Most low-grade bonds were issued by industrial companies and utilities, accounting for more than a third of the bonds raised by these firms in 1985. By the end of 1985, the total stock of low-grade bonds outstanding reached about \$75 billion (or 14 percent of the total), less than a third of which consisted of fallen angels.

Historically, default rates on low-grade bonds have been much higher than those on high-grade bonds, lending credibility to the speculative rating of low-grade bonds. A recent study finds that between 1970 and 1984, this average annual default rate for low-grade bonds was only 2.1 percent, while the default rate for investment-grade debt was close to zero percent.<sup>6</sup>

<sup>6</sup>Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market: 1985 Update," Morgan Stanley (June 1986) Table 10. One must be careful in interpreting these data. A default does not necessarily

**FIGURE 1**  
**New Domestic Corporate Bond Issues: 1978-1985**



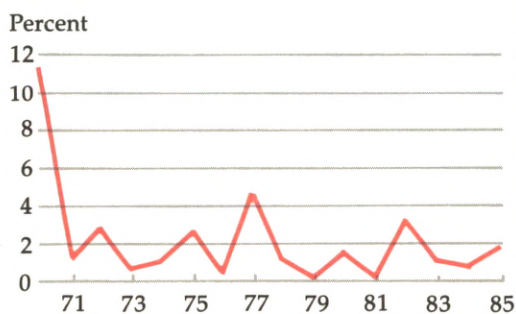
SOURCE: Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market: 1985 Update," Morgan Stanley (June 1986) Table 2. Data do not include exchange offers, secondary offerings, tax exempts, convertible bonds, or government bonds.

This average for low-grade bonds, however, hides a lot of year-to-year variability: it varied from a high of 11.4 percent in 1970, when Penn Central went under, to a mere 0.15 percent in 1981, when only two firms defaulted on their bonds (see Figure 2, p. 6).

To compensate investors for the risk they bear by holding low-grade debt—or indeed any debt of private firms—rather than (presumably) default-free Treasury securities, firms promise to pay higher yields on their debt than the

mean that bondholders lose all of their investment. If the firm in default has some assets left, bondholders may still retrieve part of their investment, although it may be some time before these funds are returned.

**FIGURE 2**  
**Historical Default Rates**  
**On Low-Grade Bonds**  
**1970-1985**



SOURCE: Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market: 1985 Update," Morgan Stanley (June 1986) Table 10.

Treasury does.<sup>7</sup> This difference between yields is called a "risk premium." In general, the lower a firm's rating, the higher the risk premium will be. As Figure 3 shows, high-grade (AAA) bonds usually yield only 50 to 100 basis points more than Treasury bonds, while medium-rated (BBB) bonds may yield from 150 to 300 basis points above Treasury yields. The risk premium of lower-grade bonds over Treasuries, however, has run from 300 to 600 basis points over the last five years. But default risk is probably not the only reason for these yield differentials. Low-grade bonds may require a higher return to compensate investors for the fact that the secondary market for low-grade securities is much less liquid than that for Treasury securities.<sup>8</sup>

<sup>7</sup>Sometimes this compensation takes the form of a "warrant," which gives the bondholder the right to buy equity in the firm at an attractive price, or an option to convert the bond to the common stock of the firm. These so-called "equity kickers" allow bondholders to benefit from any improvements in the value of the firm.

<sup>8</sup>In addition, unlike most Treasury securities, most corporate bonds are callable; that is, the issuer has the option to

Actual realized returns frequently differ from promised returns, however. Aside from the promised return, the actual return includes capital gains and losses due to defaults, upgradings and downgradings, and changes in market interest rates. For example, from 1978 to 1985, low-grade bonds realized an average annual return of 12.9 percent, compared with 10.8 percent on Treasury bonds.<sup>9</sup>

This average return hides a lot of variability, however. In 1983, low-grade bonds outperformed Treasury securities by almost 20 percentage points (see Figure 4, p. 8). But in 1982, and again in 1985, as yields on new Treasury issues dropped much more than the yield on new low-grade issues, the larger capital gains on Treasury securities allowed them to beat low-grade bond returns by almost 10 percentage points. Therefore, although low-grade bonds have yielded a higher return than Treasury or investment-grade bonds on average, there is no guarantee that they will do so in any given year.

The recent revival of the low-grade bond market raises the question of why this product has become successful again. One popular misconception is that these bonds are used solely to finance corporate takeovers. But while the sudden rise in corporate mergers and acquisitions in the last few years did contribute to the growth in low-grade bond offerings, the market had taken off well before the first major use of low-grade bonds in corporate takeover attempts in 1983. And even in 1985—a year of unprecedented merger activity—low-grade bonds issued for takeover purposes made up only about 38 percent of total low-grade bond issuance (see **LOW-GRADE BONDS AND TAKEOVERS**, p.

pay off part (or all) of the issue at a predetermined price during a predetermined period prior to maturity. The issuer pays for this option in the form of a higher yield.

<sup>9</sup>Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market: 1985 Update," Table 1. See also Marshall E. Blume and Donald B. Keim, "Risk and Return Characteristics of Lower-Grade Bonds," Rodney L. White Center for Financial Research, University of Pennsylvania (August 1986).

**FIGURE 3**  
**Promised Yields**  
**On Treasury and Corporate Bonds**



SOURCE: Salomon Brothers and Moody's.

9). Rather than reflecting a rise in one particular use for low-grade bonds, the reemergence of the market paralleled more fundamental changes in financial markets that made low-grade bonds relatively more attractive compared with other forms of financing.

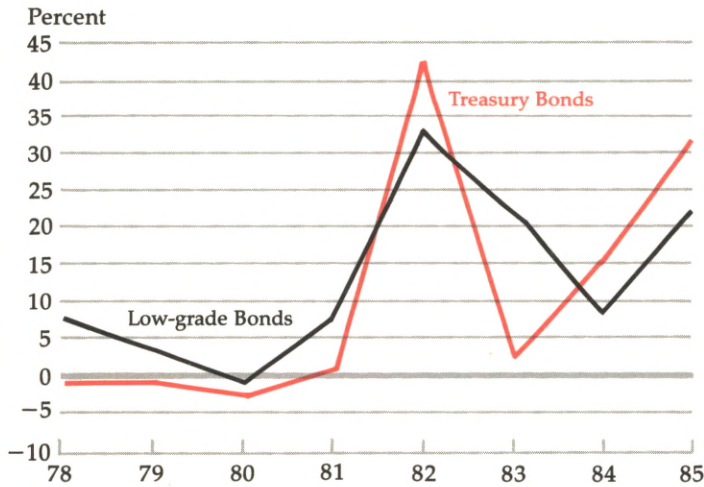
#### WHY DID THE MARKET GROW?

The main alternative to issuing public debt securities directly in the open market is to obtain a loan from a specialized financial intermediary that issues securities (or deposits) of its own in the market. These alternative instruments usually are commercial bank loans—for short- and medium-term credit—or privately placed bonds—for longer-term credit. Unlike publicly issued

bonds, privately placed bonds can be sold directly to only a limited number of sophisticated investors, usually life insurance companies and pension funds.<sup>10</sup> Moreover, privately placed bonds are held for investment purposes rather than for resale, and they have complex, custo-

<sup>10</sup>The Securities Act of 1933 exempts privately placed bonds from the normal registration process that the Securities and Exchange Commission enforces on public securities offerings. For more details on this market, see John D. Rea and Peggy Brockschmidt "The Relationship Between Publicly Offered and Privately Placed Corporate Bonds," Federal Reserve Bank of Kansas City *Economic Review*, (November 1973) pp. 11-20, and Patrick J. Davey, "Private Placements: Practices and Prospects," *The Conference Board Information Bulletin* (January 1979).

**FIGURE 4**  
**Realized Yields on Treasury**  
**and Low-Grade Bonds**



SOURCE: Edward I. Altman and Scott A. Nammacher, "The Anatomy of the High Yield Debt Market: 1985 Update," Morgan Stanley (June 1986) Table 1.

mized loan agreements (covenants). The restrictions in the covenants range from limits on dividend payments to prohibitions on asset sales and new debt issues. They provide a series of checkpoints that permit the lender to review actions by the borrower that have the potential to impair the lender's position.<sup>11</sup> Thus, these agreements have to be regularly renegotiated prior to maturity. As a result, these privately placed bonds in effect are much more like loans than public securities.

Before the reemergence of original-issue low-grade bonds, only large, well-known firms with established track records found it economical to raise money by issuing their own debt securi-

ties in the public capital markets. For smaller, relatively new or unknown firms, the expense was usually prohibitive. Because of the risk of underwriting low-grade bonds, investment bankers would demand hefty underwriting fees. Also, less credit-worthy issuers would have had to pay a very high premium on their debt because investors perceived them as particularly risky investments.

Such borrowers thus found it more economical simply to obtain a loan from a bank or to place a private bond issue with a life insurance company. These alternatives proved cheaper because banks and life insurance companies specialize in credit analysis and assume a large amount (if not all) of a borrower's debt. Consequently, they could realize important cost savings in several functions, such as gathering information about the condition of debtor firms, monitoring their actions, and renegotiating loan agreements.

The reemergence of a market for public original-issue low-grade bonds suggests that this situation is changing. Certain lower-rated corporations now apparently find it economical to issue their own bonds directly in the public capital markets (see *THE GROWTH OF SECURITIES MARKETS*, p. 10). As with many financial innovations, it is impossible to identify all the factors responsible for this development. But it is possible to suggest several important ones that may have made a contribution to the reemergence of original-issue low-grade bonds, and three seem particularly noteworthy—a greater demand by investors for marketable assets; lower information costs; and changes in

<sup>11</sup>See Edward Zinbarg, "The Private Placement Loan Agreement," *Financial Analyst Journal* (July/August 1975) pp. 33-35 and 52.



## Low-Grade Bonds and Takeovers

Low-grade bonds became the center of public attention because of their association with corporate takeover attempts. In a takeover, one firm or a set of investors acquires the stock (and thus ownership) of another firm. When the stock purchase is not financed with cash or newly issued stock of the acquiring firm, the acquisition is financed by borrowing funds. As a result, equity in the combined firm is replaced with debt and its debt-equity ratio rises. Many of these cases involve so-called “leveraged buyouts” (LBOs), in which a group of investors, usually including the management of the firm being acquired, buy out stockholders in order to take the firm private.<sup>a</sup>

In the past, there was little LBO borrowing and what there was took the form of bank loans. However, because an increased debt-equity ratio raises the default risk of a firm’s debt, bank loans usually come with a lot of restrictions and collateral requirements. In response to an increased demand for LBO financing, Drexel Burnham Lambert, in late 1983, started using its extensive network of private and institutional buyers of low-grade debt to float LBO bonds. These bonds are frequently rated below investment grade, especially when they are junior to already existing debt, and when cash flow projections barely exceed the higher required interest payments. The flexibility of this new source of LBO financing allows some investors to attempt acquisitions of firms several times their own size.<sup>b</sup>

In contrast to the amount of public discussion about this topic, low-grade bond issues actually involved in takeovers make up only a small part of the market. During 1984, LBOs amounted to only \$10.8 billion, compared with \$122.2 billion in total merger and acquisition activity.<sup>c</sup> Drexel estimates that of about \$14 billion in publicly issued low-grade bonds in 1984, only “approximately 12 % was issued in acquisition or leveraged buyout transactions, of which a de minimis amount was connected with the financing of unsolicited acquisitions.”<sup>d</sup> By 1985, however, other analysts had estimated that the proportion of new low-grade issues used to finance acquisitions and LBO transactions had risen to 38 percent.<sup>e</sup>

<sup>a</sup>For details, see Carolyn K. Brancato and Kevin F. Winch, “Merger Activity and Leveraged Buyouts: Sound Corporate Restructuring or Wall Street Alchemy?” U.S. Congress, House, Committee on Energy and Commerce, Subcommittee on Telecommunications, Consumer Protection, and Finance, 98th Congress, 2nd Session (November 1984).

<sup>b</sup>Early in 1986, the Board of Governors of the Federal Reserve System ruled that bonds that are issued by a corporation with no business operations and no assets other than the stock of the target company, are functionally equivalent to borrowing to buy stock (that is, buying stock on margin). Therefore, these bonds are subject to a 50 percent margin as required by Regulation G. That is, only 50 percent of the stock purchase can be financed with borrowed funds. However, the Board specifically excluded bonds that are issued simultaneously with the consummation of the merger or LBO—a standard practice in LBOs—because the assets of the firm, and not its stock, would be the source of repayment of the bond issue. For details, see Federal Reserve System 12 C.F.R. Part 207 (Regulation G; Docket No. R-0562).

<sup>c</sup>W. T. Grimm & Co. “1984 Merger/Acquisitions Set Ten-Year Record: Total Dollar Value Rose to 67% to a Record-Breaking \$122.2 Billion,” (Chicago: W. T. Grimm & Co., 1985). Press release, undated, duplicated.

<sup>d</sup>Drexel Burnham Lambert, Inc., “Acquisitions and High Yield Bond Financing,” submitted to the Subcommittee on Telecommunications, Consumer Protection, and Finance (March 20, 1985) p. 14.

<sup>e</sup>Martin Fridson and Fritz Wahl, “Plain Talk About Takeovers,” *High Performance* (February 1986) p. 2. Fridson and Wahl use a more restrictive definition of the size of the low-grade market than Drexel does.

investors’ risk perceptions.

**Marketability vs. Covenant Restrictions.** One reason for the growth in the public issuance of low-grade bonds is that buyers of privately placed bonds have become more willing to trade some of the safety they found in the contractual restric-

tions they placed on borrowers in return for the marketability and higher yields of publicly issued low-grade bonds. Private placements are bilateral, customized loan agreements with complex contractual restrictions on borrowers’ actions. However, the lack of standardization of these

## The Growth of Securities Markets

The growth of low-grade bond offerings is not an isolated phenomenon. In several other financial markets there is also a growing tendency for corporate borrowing to take the form of negotiable securities issued in the public capital markets rather than in the form of nonmarketable loans negotiated with financial intermediaries. For example, in the short-term credit market, commercial paper has become increasingly competitive with bank loans. By the end of 1985, bank loans constituted only 24 percent of short-term debt at large manufacturing firms, compared with 59 percent in early 1974.<sup>a</sup> And even in the Eurodollar market, large corporations are more frequently bypassing syndicated loans in favor of financing arrangements that allow them to issue debt under their own names. In fact, by 1985, financing in the form of securities made up 80 percent of total funds raised in international financial markets, compared to only 33 percent in 1980.<sup>b</sup>

This move towards borrowing in the form of securities reduces the role of the traditional intermediary that just makes loans and issues deposits. These financial intermediaries will still help link ultimate savers and borrowers, although the way in which they do business may change substantially. The traditional intermediary provides all forms of financial intermediation under one roof: it pools the funds of many small savers, issues insured deposits, provides a payments mechanism, and lends out the funds in a different form to a diverse set of borrowers. The new growth of securities markets implies an "unbundling" of this process with many of these services being provided by different intermediaries: a commercial bank or thrift may originate the loan; an investment bank may package it into a security and distribute it; an insurance company may insure it; and a mutual or pension fund may end up financing it by attracting funds from a large number of small savers.

<sup>a</sup>Large manufacturing firms are firms with more than \$1 billion in assets. Source: *Quarterly Financial Report*, U.S. Department of Commerce (1st Quarter 1975) p. 69, and (4th Quarter 1985) p. 134.

<sup>b</sup>*Financial Market Trends*, OECD (March 1986) p. 7, and earlier issues. See also *Recent Innovations in International Banking*, Bank for International Settlements (April 1986) Chapter 5.

covenants and the frequent need for renegotiation when borrowers want to transgress the covenant restrictions make it very costly to have a lot of lenders per issue, or to change the identity of the lenders. As a result, there is not much of a secondary market for private placements. That is, they are not marketable.

Low-grade bonds, in contrast, are public securities and are issued with relatively simple, standardized contracts without cumbersome restrictions on borrowers' actions, in order to facilitate their trading in a secondary market. And in exchange for the added freedom from covenant restrictions, borrowers pay a higher yield on low-grade bonds than on private placements. The marketability and liquidity of low-grade bonds still are not comparable to those of Treasury or high-grade bonds. But the recent development of a secondary market for low-

grade bonds and the increasing number of dealers in this market do make these securities much more liquid and marketable than privately placed bonds.

Historically, life insurance companies, to which most private placements were sold, had no great need for marketability or liquidity. They held long-term liabilities and received highly predictable cash flows. They had no particular preference for marketable securities because they expected to hold their investments to maturity.

But recent economic developments have forced life insurance companies to abandon their traditional buy-and-hold-to-maturity policy and to become more active in money management.<sup>12</sup>

<sup>12</sup>See James J. O'Leary, "How Life Insurance Companies Have Shifted Investment Focus," *Bankers Monthly Magazine*

On the asset side, life insurance companies, as well as other financial intermediaries, have been faced with increased interest rate volatility and higher credit risk.<sup>13</sup> On the liability side, increases in loan requests by holders of whole life insurance policies and the growth of “separate accounts”—accounts managed temporarily for pension funds or other types of mutual funds—convinced life insurance companies that their liabilities have become much more volatile. In order to gain more flexibility in responding to unexpected cash outflows or to changing perceptions about firms, industries, or interest rates, life insurance companies shifted their investment focus away from nonmarketable, illiquid assets, such as private placements, toward publicly traded securities, including low-grade bonds.<sup>14</sup>

**Information Costs.** A second factor contributing to the growth of the low-grade bond market is that, in recent years, it has become much easier for individual and institutional investors to obtain and maintain information about the condition of corporate borrowers. Thus lenders are now more likely to find it cost-effective to lend directly to smaller and less well-known corporations, rather than indirectly through financial intermediaries such as commercial banks.

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(June 15, 1982) pp. 2-28, and Timothy Curry and Mark Warshawsky, “Life Insurance Companies in a Changing Environment,” *Federal Reserve Bulletin* (June 1986) pp. 449-459.

<sup>13</sup>The early 1980s saw severe sectoral problems—for example in the farm and the energy sectors—and a third-world debt crisis. From 1980 to 1983, the business failure rate—that is, the annual number of failures per 10,000 listed enterprises—averaged 76, more than twice its level during the 1970s. See *The Economic Report of the President* (Washington, DC: GPO, February 1986) Table B-92. For evidence on interest volatility, see Harvey Rosenblum and Steven Strongin, “Interest Rate Volatility in Historical Perspective,” Federal Reserve Bank of Chicago *Economic Perspectives* (January/February 1983) pp. 10-19.

<sup>14</sup>Timothy Curry and Mark Warshawsky, “Life Insurance Companies in a Changing Environment,” p. 456, report that: “In recent years, however, life insurance companies have been committing to private placements smaller percentages of their investable cash flow: 25 to 30 percent in 1984, down from a historical level of 40 to 50 percent.”

Indeed, recent technological improvements in such areas as data manipulation and telecommunications have reduced greatly the costs of obtaining and processing information about the conditions—whether international or domestic, industry-wide or firm-specific—that affect the value of a borrowing firm. Any analyst now has computerized access to a wealth of economic and financial information at a relatively low cost. New information reaches investors across the world in a matter of minutes. Given the reduction in information costs, the cheapest method of lending to certain smaller and less creditworthy borrowers may no longer require a specialized intermediary as the sole lender to these borrowers, especially after recognizing the other expenses of using the intermediary.<sup>15</sup> For many institutional investors—such as mutual funds, pension funds, and insurance companies—the costs of being informed about certain borrowers have dropped enough that it has become profitable to acquire relatively small amounts of debt directly from those firms. As a result, firms that now issue their own low-grade bonds in the open market face a growing acceptance of their securities.

**Risk Perceptions.** A third explanation of the growth in low-grade bond offerings is more on the psychological side. Investors are not only better informed about the risks they take on, but they may have also become more willing to invest in risky securities. After the 1930s, the market for newly issued low-grade bonds shrank as most investors—with the losses incurred during the Depression still vividly in mind—turned to high-grade securities and left it to financial intermediaries to manage the risk of lending to less creditworthy borrowers. But as time passed and the memory of the 1930s faded, portfolio managers probably started to discount the proba-

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<sup>15</sup>These added costs of using a financial intermediary instead of lending directly to a firm by buying its debt securities involve, for example, taxes, administration costs, and the costs of monitoring the condition and behavior of the intermediary.

bility that the economy would again become subject to a major system-wide shock.<sup>16</sup> It is thus possible that, as new generations of portfolio managers with no direct experience of the Depression took over, financial markets as a whole became more receptive to riskier securities, such as low-grade bonds.

### SUMMARY

Low-grade bonds are bonds that are rated "speculative" by the major rating agencies and that are therefore considered very risky investments. These bonds are either corporate bonds that have been downgraded, or, more recently, bonds that are issued originally with a rating below investment grade. Original-issue low-grade bonds are issued mostly by corporations that previously borrowed in the form of commer-

cial loans or privately placed bonds.

Several factors seem to have contributed to the growth in low-grade bond offerings. For one, increased volatility in their sources of funds and a worsening of interest rate and credit risk have forced life insurance companies, which are the major buyers of private placements, to shift their investment focus towards assets that are somewhat more marketable and liquid, such as low-grade bonds. Also, improvements in computer technology have lowered the information and monitoring costs of investing in securities and have thus allowed smaller and less known corporations to borrow directly from private and institutional investors. Third, it may be that the favorable post-World War II default experience on low-grade bonds has made investors more receptive towards investing directly in riskier securities, including low-grade bonds.

The growth in low-grade bond offerings thus represents mostly a rechanneling of corporate borrowing, away from individually negotiated loans, towards public securities. As such, it exemplifies a continuing effort by financial market participants to search out the most cost-effective way to channel funds from lenders to borrowers.

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<sup>16</sup>For a discussion of this type of behavior, see Jack Guttentag and Richard Herring, "Credit Rationing and Financial Disorder," *The Journal of Finance* (December 1984) pp. 1359-1382. As an example, the authors describe the behavior of a driver who has just witnessed a car accident. His immediate reaction is to drive much more cautiously. But gradually, as time passes and the image of the accident recedes from memory, the driver reverts to less cautious behavior.

# Are Government Deficits Monetized? Some International Evidence

*Aris Protopapadakis and Jeremy J. Siegel\**

## INTRODUCTION

One of the dominant economic concerns in the current decade is the persistence and size of U.S. federal budget deficits. The reasons for this concern vary from the general public's feeling that it is irresponsible for government to "live beyond its means," to economists' traditional concern that budget deficits may cause interest

rates to rise and thus "crowd out" private investment.

In the last few years, another reason to worry about deficits has received widespread attention. More and more, economists and informed citizens are claiming that large and sustained government budget deficits are the root cause of the high levels of inflation experienced by many countries. They claim that large budget deficits create economic and political pressures that force central banks to monetize some of the debt, that is, to create more money than is needed to accommodate real growth. The concern is that the resulting higher money growth translates into more inflation in the future. But are these concerns indeed valid? Do large deficits necessarily

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bring higher money growth and inflation? The question is one about balance. The answer turns on whether the economic and political pressures to monetize sustained deficits are typically strong enough to overcome the popular desire for a stable monetary environment and low inflation.

We can answer the question by finding out whether money growth and government debt growth seem to be related historically. This requires more than just looking at the U.S. data, however. Finding a relation between debt and money growth in the U.S., or in any one country, may not mean that monetization forces are strong. Economic circumstances specific to a certain country, or even plain chance, could result in money and government debt growing together for some time, even when there is no causal relation between them. But if the economic forces to monetize are strong, then the growth rates of debt and money should tend to change together in *most* countries. Therefore, we study the relation between government debt and money growth for ten industrialized countries. But in order to interpret the empirical findings, first we need to define "monetization," to explain its mechanics, and to examine closely the principal theories that claim that central banks tend to monetize government debt.

### MECHANICS OF DEBT MONETIZATION

Government runs a *deficit* whenever its revenues fall short of its expenditures. In order to obtain the funds necessary to cover the deficit, the treasury or the finance ministry must borrow, that is, it must sell bonds. Thus deficits increase the outstanding amount of government debt, otherwise known as the national debt. Central banks purchase government bonds, via what are known as "open market purchases," either directly from the government treasury or else in the private financial markets.<sup>1</sup> In either case,

<sup>1</sup>A central bank can create new reserves by purchasing any asset from the public, not just government bonds. But in practice central banks purchase government bonds almost exclusively.

open market purchases create additional currency and bank reserves.<sup>2</sup> The additional currency and reserves increase the monetary base immediately and provide more liquidity to the banking system. This new liquidity enables banks to increase their lending, which, through a complex process, ends up increasing the national money supply, measured by M1 or other, more inclusive, monetary aggregates.<sup>3</sup>

In countries with poorly developed financial markets, the relation between deficits and money creation is usually quite direct. Since the financial markets cannot absorb enough of the continuing increases of government debt, the central bank is forced to buy much of it. In these circumstances, government deficits automatically result in increases in the monetary base and thus in the money supply.<sup>4</sup>

In industrialized countries with well-developed financial markets, the situation is quite different. In these countries, new government debt generally is sold to the private sector rather than to the central bank. The central bank may buy some of this debt as part of its monetary policy, but generally it is under no obligation to do so. In fact, in some countries, including the U.S., it is illegal for the central bank to buy debt directly from the government, except in emergency circumstances.

To summarize: in countries with well-developed financial markets there is no *direct* connection between budget deficits and new money creation. Therefore, if there is a connection, it must be indirect. Sustained budget deficits can cause high base and money growth only if they set in motion economic and political pressures

<sup>2</sup>The term "bank reserves" used here refers to deposits held by banks at the central bank.

<sup>3</sup>Monetary base is currency in the hands of the public plus bank reserves. M1 is currency in the hands of the public plus checkable deposits. For a precise definition of these and other measures of money for the U.S., see a recent issue of the *Federal Reserve Bulletin*.

<sup>4</sup>Such countries sometimes can limit the effect their deficits have on their domestic money supply by borrowing abroad.

that make central banks reassess their monetary policy and decide to create more money than they would otherwise.

### ECONOMICS OF DEBT MONETIZATION

If central banks do respond to increasing levels of debt by creating more money, they are said to *monetize* the debt. A useful definition of monetization is that, in response to high debt growth, authorities create money at a rate *in excess* of the growth in goods and services, or real output. In other words, monetization is a relation between the *growth rates* of debt and money, after subtracting from both the growth rate of *real* output (see *The Economic Meaning of Monetization* in SOME ELEMENTS OF MONETIZATION THEORY, p. 21). According to this definition, government debt is monetized if money growth rates follow the pattern of the debt growth rates. This notion of monetization is different from what often is implied by the popular press—that monetizing the deficit means that the monetary authorities simply buy up the debt issued to finance a deficit by issuing equal amounts of reserves.

Economists have come up with two principal scenarios in which debt growing faster than real output may create incentives for monetization. The first is related to the premise that if government debt is growing faster than GNP and other assets, the private sector is not willing to purchase the additional debt at the going real interest rates (nominal rates minus expected inflation). In order for the private sector to hold more government bonds in their portfolios relative to their other assets and to their income, the real rates on these bonds must rise.<sup>5</sup> But the resulting rise in real rates tends to reduce investment spending and to slow real economic activity. To the extent that a central bank is concerned with helping to maintain the original pace of economic growth, it may try to resist such an increase in

<sup>5</sup>This reasoning assumes that government debt is net wealth. For a complete discussion of these issues, see Robert Barro, *Macroeconomics* (New York: John Wiley and Sons, 1984), and Robert Mundell, *Monetary Theory* (California: Goodyear Publishing Co., 1971).

real interest rates by making the money supply grow faster, and the result is inflation down the road (see *The Link Between Excess Money Growth and Inflation* in SOME ELEMENTS OF MONETIZATION THEORY, p. 22).

The second scenario involves governments' incentives to lower the real burden of this debt through inflation.<sup>6</sup> Government uses some of the taxes it collects to pay the interest on its debt. The larger the debt, the larger the government's interest expense, and hence the higher taxes must be to pay the interest. Since these higher taxes would go right back to the taxpayers who own government bonds in the form of interest payments, one might think that these taxes would "wash" in an aggregate sense. But this is wrong. Taxation distorts economic decisions and creates economic inefficiencies because it reduces the relative attractiveness of taxed activities, like working or investing, and it increases the relative attractiveness of untaxed activities, like leisure. The inefficiencies caused by taxing to pay interest on the debt are a major aspect of what economists call the "burden of the national debt."<sup>7</sup> This burden can be reduced only by finding ways to reduce tax rates on the various economic activities.

One way to reduce this burden is to engineer a *higher than anticipated* inflation. Inflation must be higher than anticipated because if the bondholders had correctly expected the coming inflation, they would have incorporated this expectation into higher interest rates, in order to compensate them for the expected loss in the

<sup>6</sup>For expository convenience, the discussion here assumes that central banks react to whatever fiscal policy the government chooses. We do not mean to imply by this that monetary policy is subservient to fiscal policy, or that the two policies are not formulated jointly. The incentives to monetize that we discuss operate regardless of the nature of the decision-making process, and they exist even under optimal public financing policies.

<sup>7</sup>This theory is based on the view that government has strong incentives to maintain an efficient tax scheme. Alternatively, if the government finds it politically impossible to raise sufficient taxes, it may resort to inflation as a source of revenue, even if this action results in an inefficient tax scheme.

purchasing power of their investment. Higher than expected inflation reduces the real value of all the interest expense government has to pay on the existing long-term, fixed-coupon bonds until they mature.<sup>8</sup> Since the government's interest expense is in nominal dollars, its real value declines with inflation, and this means that tax rates can be reduced (or at least not be raised). To the extent that the inflation is not expected, it does not distort economic incentives. Therefore, engineering an unexpectedly high inflation substitutes a non-distortionary tax on bondholders for the distortionary taxes levied on taxable economic activities.<sup>9</sup>

Since the real burden of government debt can be reduced only by inflating more than bondholders expect, policymakers may be tempted to keep raising the rate of money growth, and hence inflation, to stay one step ahead of the expectations of bondholders. And this could lead to a continuously accelerating inflation.<sup>10</sup>

To counteract this temptation to inflate, other economic and political forces push policymakers towards lower money growth and lower inflation. Once inflation gets started, people soon begin to

anticipate it, and anticipated inflation carries costs of its own. High or accelerating inflation is considered extremely detrimental in industrialized market economies, where individuals and firms rely on the price mechanism to signal the relative scarcity of goods. When the overall price level is uncertain, it becomes difficult to compare relative prices and to use the price system for decisionmaking.<sup>11</sup> Furthermore, uncertain inflation increases the risks of long-term commitments, because it causes capricious windfall gains for those who happen to hold the right investments and losses to those who don't. For instance, people who have put their savings in fixed-interest long-term securities—like government bonds—will find the purchasing power of their income diminishing through time, if inflation turns out to be higher than anticipated.

For these reasons, the overwhelming majority of people support price stability as an appropriate goal of economic policy. Monetary policymakers then must balance the benefits of engineering an inflation in order to reduce the burden of the debt with the costs of having to live with the inflation. In the end, whether high debt growth leads regularly to high money growth depends on whether the inflationary forces generated by large deficits are stronger than the incentives for price stability.<sup>12</sup>

Unfortunately, economists cannot run to their

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<sup>8</sup>For this to work, at least some of the debt must be fixed-coupon, long-term debt. If all government debt were short-term (or if it all were floating-rate), then there would be no time lag over which the government could gain from an unexpected increase in inflation, since the government would have to pay an inflation premium promptly, as it continually refinances its short-term debt. And this will keep the real interest expense, and the tax rates, from falling.

<sup>9</sup>For an analysis of the underlying economics of this mechanism, see Robert Barro, "A Positive Theory of Monetary Policy in a Natural-Rate Model," *Journal of Political Economy* 93, 4 (August 1983) pp. 589-611. For an exposition of the connection between inflation, the real value of the debt, the burden of the debt, and the related tax issues, see Brian Horrigan and Aris Protopapadakis, "Federal Deficits: A Faulty Gauge of Government's Impact on Financial Markets," this *Business Review* (March/April 1982) pp. 3-16, and Brian Horrigan "The Tax Reform Controversy: A Guide for the Perplexed," this *Business Review* (May/June 1985) pp. 3-15.

<sup>10</sup>This argument is one aspect of the general problem of policymaking often referred to as the "time inconsistency" problem of government policies. For a broad exposition of the issues involved, see Herb Taylor "Time Inconsistency: A Potential Problem for Policymakers," this *Business Review* (March/April 1985) pp. 3-12.

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<sup>11</sup>There is very strong empirical evidence that inflation and uncertainty about relative prices go together. See Stanley Fischer, "The Benefits of Price Stability," in *Price Stability and Public Policy*, (Federal Reserve Bank of Kansas City, 1984). Though there have been various explanations for this phenomenon, there is no consensus as to its causes.

<sup>12</sup>Of course, debt growth cannot *forever* grow arbitrarily faster than money growth, or else the economy will be literally overwhelmed with government debt. If this happens, the monetary authority must monetize the debt to ensure the solvency of the government. For a detailed analysis of these issues, see Bennett McCallum, "Are Bond-Financed Deficits Inflationary? A Ricardian Analysis," *Journal of Political Economy* (February 1984) pp. 123-135, and Thomas Sargent and Neil Wallace, "Some Unpleasant Monetarist Arithmetic," *Federal Reserve Bank of Minneapolis Quarterly Review* (Fall 1981) pp. 1-18.



laboratories and concoct experiments to find out which forces will generally prevail. Instead, we can examine the experience of several industrialized countries to see if increases in debt growth in these countries tend to coincide with increases in money growth. That is, we can find out if debt growth and money growth are positively correlated, even though the tradeoff between the desire for low inflation and the benefits from engineering an inflation is likely to be somewhat different in each country. If the inflation incentives generated by large deficits are strong and pervasive, then we should find a positive correlation between debt growth and money growth across these countries.<sup>13</sup> If we find no correlation between debt growth and money growth, then it is unlikely that monetization occurs regularly.

We want to emphasize that the statistical results shown in the following section *cannot* support or reject any of the individual economic scenarios that may push towards monetization or work against it. Rather, these results can only show whether or not *in fact* monetization has taken place systematically.

## WHAT IS THE EVIDENCE?

**Assessing the Data for Ten Countries.** In order to see whether countries typically monetize rapidly growing debt, we examine the post-war experience of ten industrialized countries: Canada, Finland, France, Germany, Holland, Japan, Italy, Switzerland, the United Kingdom, and the United States. First we look at the behav-

ior of the debt-to-GNP ratio in each of the countries, since both of the monetization scenarios discussed depend on the relation of government debt to nominal income. (See Figure 1, DEBT GROWTH IN TEN COUNTRIES, p. 18.)

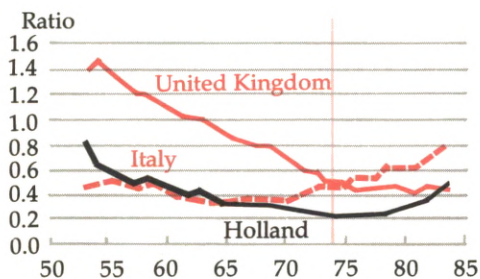
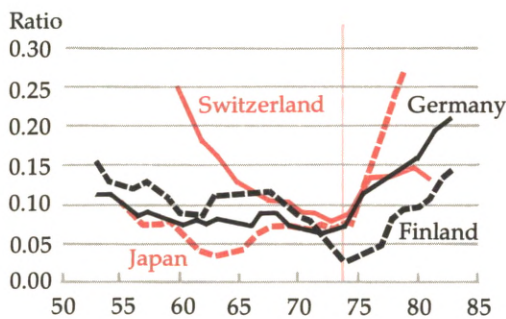
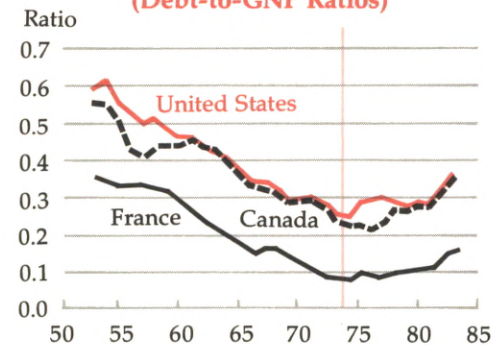
The histories of the debt-to-GNP ratios of these countries show strong similarities. Though the levels of these ratios and their year-to-year behavior vary from country to country, the ratio for each country, except Italy, declines until 1974. After 1974, each country's debt-to-GNP ratio increases, and only in Switzerland and in the U.K. does the ratio eventually resume its downward trend through the end of our sample period in 1983. One reason for the growth in the debt-to-GNP ratio after 1974 is the slow growth of output in all these countries. But the primary reason for the growth in the ratio is the explosive growth of government debt in all ten countries, unprecedented in the post-war period.<sup>14</sup> Furthermore, this high growth of government debt is sustained to the present in most of these countries.

Whatever the reasons for this uniformly high growth of government debt after 1974, this period provides an excellent setting in which to assess the importance of the forces to monetize deficits. In order to implement our tests, we define *excess debt growth* as the growth rate of government debt less the growth rate of real output (real GNP). Similarly, *excess money growth* is the growth of a measure of money (such as the monetary base or M1) less real output growth. If the pressures to monetize debt play a big role in monetary policymaking, we should find excess money growth increasing as excess debt growth increases, so that countries with the largest increase in excess debt growth should tend to have the largest increase in excess money growth. If monetization were systematic, a graph of changes in excess debt growth and in excess

<sup>13</sup>Note that if there is a significant correlation between debt and money growth, one still cannot conclude that debt growth *causes* money growth. Establishing empirically which way causality goes is an extremely complex and as yet unresolved issue. Econometricians have developed tests for a causal relation between variables under a very restrictive definition of causality. These are called "Granger causality" tests. For more information, see *Three Aspects of Policy and Policymaking: Knowledge, Data, and Institutions* Carnegie-Rochester Conference Series on Public Policy, Vol. 10, (Amsterdam: North Holland, 1979), and "Exogeneity," by R. Engle, D. Hendry, and J. F. Richard, *Econometrica* 51, 2 (March 1983) pp. 277-304.

<sup>14</sup>For a review of the theoretical and actual characteristics of the debt-to-income ratio in the U.K. and the U.S., see *Macroeconomics* by Robert Barro.

**FIGURE 1**  
**Debt Growth**  
**In Ten Countries**  
**(Debt-to-GNP Ratios)**



NOTES: All the data are from monthly issues of *International Financial Statistics* (Washington, D.C.: International Monetary Fund). Where GNP data were not reported, GDP (gross domestic product) data were used.

money growth should show a very similar pattern.

**The Results.** The facts are otherwise. Although excess debt growth increases after 1974 in all ten countries, excess money growth does not increase by nearly as much, and in some cases it actually declines. Figure 2 illustrates this fact for the case of the monetary base.<sup>15</sup> Excess debt growth in each period (1962-74 and 1974-83) is calculated as average government debt growth minus average real output growth. The change in excess debt growth then is the difference in excess debt growth between the two periods. The change in excess money growth is calculated the same way.

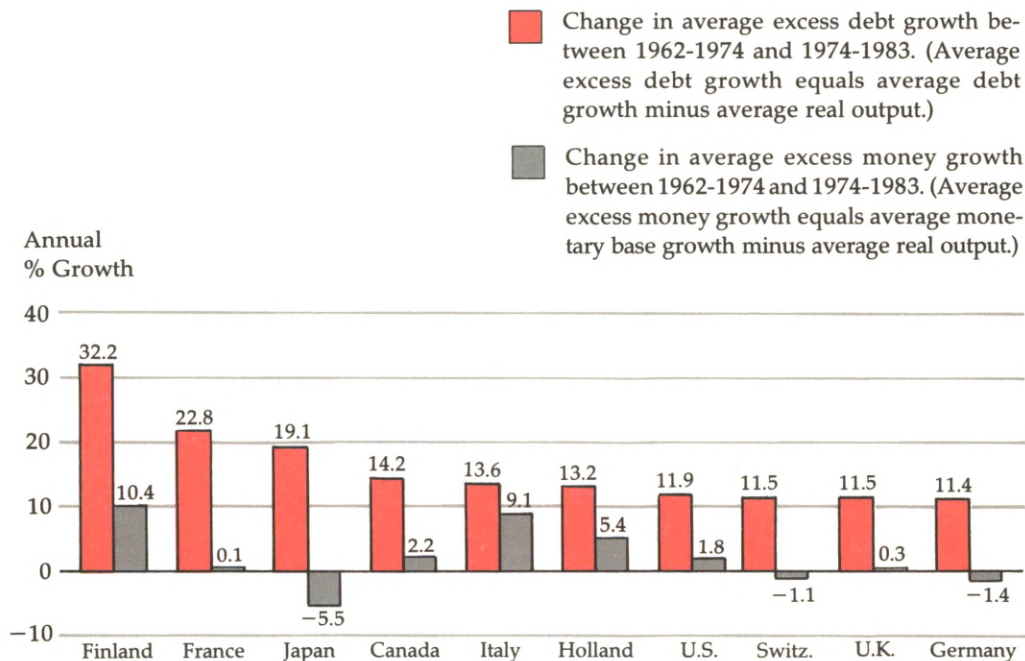
It is easy to see from Figure 2 that the relation between excess base growth and excess debt growth varies widely across countries. Three of the ten countries in our sample, Germany, Japan, and Switzerland, show reductions in their excess base growth rate after 1974, despite high excess debt growth. And in two other countries with high debt growth, France and the U.K., the increase in excess base growth is negligible. The other five countries, Canada, Finland, Holland, Italy, and the U.S. do show some increase in their excess base growth. However, in each of these countries, the increases in excess base growth are always much smaller than the increases in excess debt growth. Only in Italy do the data suggest that substantial monetization of deficits was taking place, because only in this case are the debt growth and base growth rates similar. By contrast, though the Finnish base growth is substantial, it is only one third of the growth rate of debt. So, in contrast to what we would expect if systematic monetization was taking place, the pattern in Figure 2 looks pretty much random.

However, this analysis is rather casual. We can make it more rigorous by performing a statis-

<sup>15</sup>We use the monetary base as the money measure to illustrate the pattern that emerges, but the overall conclusions are very similar when we use M1 as a measure of money.

FIGURE 2

**The Post-1974 Increase in Excess Debt Growth Has Not Been Matched By Similar Increases in Excess Base Growth**



tical test to quantify the relation between debt growth and money growth. This requires making a ranking so that the country with the lowest average excess debt growth is at the top of the list, and the country with the highest average excess debt growth is at the bottom of the list. Similarly, we rank countries according to their excess money growth, from lowest to highest. Then we calculate a statistic called the “rank correlation coefficient,” which measures how similar the rankings in the two lists are. Now, if higher debt growth is very closely related to higher money growth, the countries will be ranked in almost exactly the same order in the two lists; in that case, the value of the rank correlation coefficient will be close to 1. If there is no relation between high debt growth and high

money growth, the rankings in each list will look quite random, and the coefficient will be near 0. If the rankings are exactly opposite, then the coefficient’s value will be  $-1$ .

Table 1 (p. 20) presents rank correlation coefficients, which were calculated using both the monetary base and M1 as measures of money, since the theories we rely on are not specific as to which money measure is the more appropriate. The first line in the table shows the statistical significance of the data in Figure 2. The correlation across countries between *changes* in excess debt and money growth is small and statistically insignificant, whether the monetary base or M1 is used as the measure of money. The second line in Table 1 shows a somewhat different rank correlation test. Rather than calculating

TABLE 1  
Rank Correlation Coefficients

	Debt-Monetary Base	Debt-M1
Rank correlation of the change in excess debt and money growth between 1962-74 and 1974-83.	0.36 (1.08)	-0.08 (0.22)
Rank correlation of average excess debt and money growth, 1974-1983.	0.26 (0.70)	0.20 (0.58)

NOTE: t-statistics are in parentheses. None of the rank correlations is significantly different from zero, from a statistical standpoint.

the correlation of changes of excess debt and money growth between the two periods, we calculate the correlation between the 1974 to 1983 average excess debt growth and the corresponding average excess money growth for the ten countries.

The results suggest that not only were large *changes* in excess debt growth not accompanied by comparable *changes* in excess money growth, but also high *average* excess debt growth is not accompanied by high *average* excess money growth. We conclude that in our sample of industrialized countries, it is unlikely that high excess debt growth generates sufficiently powerful economic and political forces for monetization.<sup>16</sup>

## CONCLUSION

Theories have been advanced to show that large government deficits can create incentives for monetary authorities to increase money growth (that is, to monetize the debt) and thereby cause inflation. These incentives take two principal forms. One is the desire to hold down interest rates by purchasing some of the newly

floated government debt in the open market, and the second is the desire to reduce the burden of the national debt by generating unanticipated inflation. But working against these inflationary forces is the popular desire to keep inflation low and to have a stable monetary environment.

We examine the period after 1974 for ten industrialized economies to determine whether excess government debt growth and excess money growth are related across these countries. This period is particularly appropriate, because it is marked by such a rapid growth of debt in all of these countries. We find that over this period there is no evidence that excess money growth is systematically related to excess debt growth. Remarkably, even though government debt grew rapidly after 1974 in all the countries in our sample, the monetary base shrank or did not grow in five of these ten countries over the same period. Statistical tests we conduct lead us to conclude that, for at least a period up to a decade, it seems likely that monetary authorities can pursue monetary policies that are independent of the growth of government debt.

<sup>16</sup>A variety of additional econometric tests we conducted on these data support these conclusions. For example, we calculated regressions of money growth on its own lags, lagged debt growth, and lagged real growth (4 lags each). For all countries, we *rejected* the hypothesis that permanent increases in debt growth increase money growth permanently. These tests ask whether debt growth systematically led to money growth in any of these countries during the post-war period. In contrast, the tests we present here ask

whether it is likely that countries responded to the uniformly high debt growth after 1974 by increasing their money growth, on average. For more detailed discussions of the tests and the results, see Aris Protopapadakis and Jeremy Siegel, "The Impact of Government Debt Growth on Money Growth and on Inflation: Evidence from Ten Industrialized Countries," Federal Reserve Bank of Philadelphia Working Paper No. 86-11.

## Some Elements of Monetization Theory

### The Economic Meaning of Monetization

When economists say that “deficits are monetized,” they generally mean that debt growth puts enough economic and political pressure on the monetary authority so that it purchases some or all of the new debt. In order to be able to interpret the empirical evidence, we need to develop a more precise definition of monetization. To do so, first we need to introduce some simple macroeconomic equilibrium growth concepts.

Suppose U.S. output (GNP) were growing in real terms by 3 percent a year. If money demand is proportional to income (a reasonable approximation), then the economy could absorb a 3 percent annual growth rate in the monetary base without causing any inflation, since money growth would not exceed real output growth. To give a sense of the numbers, the U.S. monetary base is currently around \$220 billion, so the Federal Reserve could increase the base by \$6.6 billion next year (3 percent). The economy also could absorb a 3 percent annual increase in the level of government debt (that is, a deficit equal to 3 percent of the debt) without causing any pressures on the financial markets, since other assets and incomes would be growing at the same rate in this scenario. With our national debt slightly over \$2 trillion, that means the Treasury could run a deficit of \$60 billion next year without causing any increase in the economy’s overall ratio of government debt to nominal income. This pattern could continue indefinitely; it is an example of what economists call a “steady state,” that is, an unchanging pattern of economic growth. In such a steady state we would *not* say that the deficit is monetized, even though the central bank buys \$6.6 billion of the \$60 billion deficit through open market operations in the next year. This is because the central bank’s purchases are intended to create enough money to support real output growth with no inflation, and they are not caused by the deficits.

Suppose now that a change in fiscal policy sends the deficit to \$200 billion, implying a 10 percent growth rate for the debt. If the debt is not monetized at all, then the base will continue to grow at 3 percent. But what if the Federal Reserve decides to monetize the deficit? Can that mean that it must buy the additional \$140 billion of new debt?

The answer is, no! To buy all the additional \$140 billion would expand the monetary base by almost 64 percent, and this would eventually increase the price level by over 60 percent! Instead, the Federal Reserve could buy enough of the new debt to let the monetary base grow by only 10 percent to match the debt growth. Then the base would expand by \$22 billion (that is, the Fed would buy only an extra \$15.4 billion of debt). That would mean debt and the monetary base would grow by 10 percent, and nominal GNP also would grow by 10 percent. The 10 percent growth for nominal GNP would come from the 3 percent real growth and from the 7 percent increase in the price level generated by the higher level of the base. In the end, this particular strategy will leave the ratios of government debt to money and to nominal GNP unchanged, which is consistent with a steady state.

To summarize, monetization occurs when fiscal decisions cause the government debt to increase at a rate faster than the growth rate of real output, and when the central bank responds by increasing the growth of the monetary base (and, hence, other measures of money, such as M1) to a rate also in excess of real output growth.<sup>a</sup>

It is clear that there are various degrees of monetization. If, as in our example, the central bank decides to match the growth rate of the monetary base to the new growth rate of debt, then the central bank is monetizing the debt fully, because such a decision will keep the debt-to-nominal GNP ratio stable, and

<sup>a</sup>This notion can be amended to take account of some low underlying inflation rate that may be desirable for a variety of reasons. If the desired inflation is greater than zero, then monetization occurs when the growth rate of the monetary base exceeds the amount required to support real output growth plus this desired inflation.

this policy can continue indefinitely. However, the central bank could allow the base to grow by less than the new growth rate of the debt (although faster than real growth), and only partially monetize the debt. It is even possible that the central bank could let the base grow faster than debt for a time, and more than fully monetize the debt.

### **The Link Between Excess Money Growth and Inflation**

Technically, the link between money growth and inflation is quite complex, but it is possible to give an intuitive description of the process by considering a few fundamental relations in the economy. Let us start from an economic equilibrium in which money and prices are growing at some trend rate. For simplicity, assume that money growth matches real output growth, so that the price level is stable. An increase in the growth rate of the money supply initially leaves the private sector with more money than it wants for its desired transactions. Individuals and firms try to buy more interest-earning assets or more goods and services with the newly acquired money.

As they attempt to buy more such assets, they bid up the price of these assets and cause interest rates to decline. The decline in interest rates leads to greater demand for goods throughout the economy. This rise in demand comes from firms that find that the lower interest rates make it attractive to boost their investment plans, or by consumers who increase their demand for durable goods. The decline in interest rates and the increases in spending on goods and services are such that the private sector now wants to hold all the new money, because now this new growth rate of money is consistent with its new spending plans and the new interest rates.

The increase in demand for goods may translate into increases in real output in the short run, particularly if there are unemployed resources in the economy. But increases in demand cannot always be met with higher output, especially once all the resources in the economy become employed. As increasing demand outpaces the ability to produce more output, eventually the higher money growth will force up the prices of goods and services in the economy. Therefore, money growth in excess of real output growth will produce inflation in the long run. For instance, if money demand is proportional to income, and if real output grows at 3 percent, then a 3 percent money growth rate will result in a stable price level (0 percent inflation) while a 10 percent money growth will result in a 7 percent inflation.

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