Review

Vol. 67, No. 10 December 1985

THE FEDERAL RESERVE BANK of ST. LOUIS

The Review *is published 10 times per year by the Research and Public Information Department of the Federal Reserve Bank of St. Louis. Single-copy subscriptions are available to the public free of charge. Mail requests for subscriptions, back issues, or address changes to: Research and Public Information Department, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, Missouri 63166.*

In This Issue . . .

Some prominent economists and consulting firms have argued recently that financial problems in the agricultural sector may slow real growth and increase unemployment in the economy as a whole. The likelihood of such spillover effects from the farm economy to the aggregate economy is the subject of "The Farm Credit Crisis: Will It Hurt the Whole Economy?" by Michael T. Belongia and R. Alton Gilbert. Whether farm loan losses will harm aggregate economic activity is quite important since, to a large extent, greater federal aid to farmers and their lenders is being justified by some legislators on this basis.

Belongia and Gilbert examine the effects of farmers' financial problems on general economic activity in several ways. Looking at data since 1981, when farm sector loan problems began to arise, they do not find the kinds of effects described in studies that project adverse effects on the economy from farm financial problems. They then review data for the 1920s when a similar financial crisis was concentrated in the farm sector. This earlier episode also fails to reveal any strong links between losses on farm loans and general economic activity. Overall, Belongia and Gilbert conclude there is little historical evidence to support the assertion that farm loan losses imperil aggregate economic activity.

In the second article of this issue, "Mergers and Takeovers — The Value of Predators' Information," Mack Ott and G. J. Santoni discuss the recent increase in corporate takeover activity and examine a number of criticisms that have been leveled at this method of changing corporate ownership. Instability in financial markets and the misdirection of corporate planning to short-term goals have been attributed to corporate takeovers. Takeovers also have been criticized for stripping management, labor and owners of career, livelihood and wealth.

The authors' conclusions contrast sharply with those critical of the recent wave of takeovers. Ott and Santoni find that both theory and evidence suggest that takeovers are expected to produce a more efficient use of the targeted firm's assets and that the firm's owners generally benefit through a rise in the value of their ownership shares. As with any economic change, third-party effects probably exist. The third-party effects most frequently advanced by the critics, however — negative employment effects, higher interest rates or neglect of long-term planning — do not seem to be caused by merger and takeover activity.

Weekly values of the adjusted monetary base have been more variable since the adoption of contemporaneous reserve requirements in February 1984 than before this change. This increase in weekly variability reflects problems with the seasonal adjustment of the monetary base series. In the final article in this *Review*, "New Seasonal Factors for the Adjusted Monetary Base," R. Alton Gilbert describes a method of adjusting the monetary base for its new seasonal patterns under contemporaneous reserve requirements and compares the new series that derived using the previous seasonal adjustment procedure. Gilbert's evidence indicates that applying the new seasonal factors substantially reduces the short-run variability in the adjusted monetary base since February 1984.

The Farm Credit Crisis: Will It Hurt the Whole Economy?

Michael T. Belongia and R. Alton Gilbert

SOME economists estimate that 5 percent or more of all farms currently in business will go into bankruptcy in 1986, and that one farm in seven will fail within the next four years.[1] A recent study by two agricultural economists estimates that farm lenders may write off as much as $50 billion in bad farm debt over the next four years, with $20 billion cited as the "most probable" loss estimate.[2]

Such projections of losses on farm loans may be high. Nevertheless, actual losses to date already have been large enough to cause a substantial increase in the failure rate among agricultural banks. Accounting for 22 percent of bank failures between 1981 and 1983, agricultural banks have made up about two-thirds of all failed banks since July 1984; 62 agricultural banks failed during 1985.[3] Moreover, the Farm Credit System, a group of federally sponsored agencies that lends to farmers, announced this fall that it will need direct assistance from the federal government to stay in operation.[4]

Ordinarily, the failure of some farmers and some farm lenders need not attract more attention than we currently pay to the thousands of business firms that fail each year.[5] For several reasons, however, the current farm debt situation has attracted special attention. First, projections of large losses concentrated in agriculture have created concern about the economic health of the entire industry. Moreover, the farm credit crisis has developed at a time when loan losses of commercial banks already are relatively high. Finally, the apparent vulnerability of the banking system to the farm credit crisis has increased public concern about the continued viability of many banks that have been heavily committed to agricultural lending.

Some economists further believe that problems in the farm sector will spill over into the rest of the economy, causing slower economic growth and lower employment. One recent study suggested that bank failures resulting from losses on farm loans could cause investors to view investments in all privately issued securities as more risky.[6] Consequently, interest rates on all privately issued securities could rise relative to the interest rates on U.S. Treasury securities, causing a slowing in economic growth. This article discusses reasons for thinking that this effect either will not occur or will be relatively insignificant and/or short-lived.

Michael T. Belongia is a senior economist and R. Alton Gilbert is an assistant vice president at the Federal Reserve Bank of St. Louis. *Laura A. Prives provided research assistance.*

[1]Schink and Urbanchuk (1985), Drabenstott and Duncan (1985), and "The Farm Slide" (1985).

[2]Schink and Urbanchuk.

[3]Agricultural banks are identified as those with a ratio of farm loans to total loans above the national average for all commercial banks. This average is currently 17 percent.

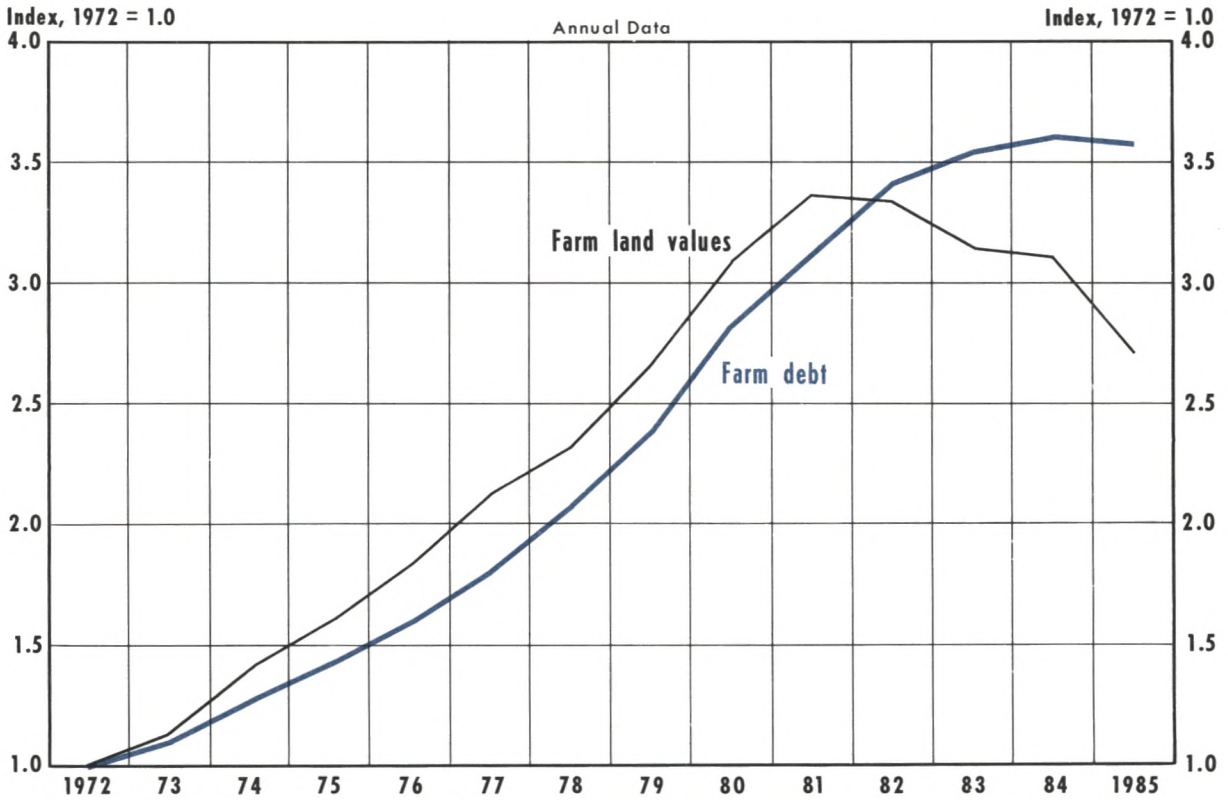
[4]Karr and McCoy (1985). For a discussion of the financial condition of farm lenders, see Belongia and Carraro (1985).

[5]From 1979 through 1984, an average of 20,000 business firms failed each year. U.S. Department of Commerce (1985).

[6]Schink and Urbanchuk. In particular, the Wharton study indicates wider spreads between the commercial paper rate and the three-month Treasury bill rate. A related study by Chase Econometrics (1985) deals with the more narrow question of a default by the Farm Credit System on its bonds. Its study shows even more substantial spillover effects, with private debt interest rates rising by 300–400 basis points over rates on government debt.

Chart 1

Farm Land Values and Farm Debt



If the failure of large numbers of farms affects both interest rates and general economic activity adversely, then assisting the agricultural sector of the economy may make sense over and above the usual rationale based on the social benefits of maintaining the family farm. The magnitude of federal aid necessary to keep farm lenders viable, however, has been estimated to be in the "multi-billions" of dollars for the Farm Credit System alone. In light of current efforts to reduce the federal budget deficit, it seems prudent to assess the likelihood that the current financial problems of the farm sector will affect the whole economy adversely.

This article analyzes the influences of the current farm credit crisis on the economy in two ways. The first approach examines the performance of financial markets and the economy in recent years. Since the financial trouble of farmers became widespread after the average price of farmland started declining in 1981, we might expect to observe some adverse effects on the economy already. The second approach examines the effects of the farm financial crisis of the 1920s on the economic activity of that period.

THE ORIGIN AND EFFECTS OF THE CURRENT FARM CREDIT CRISIS

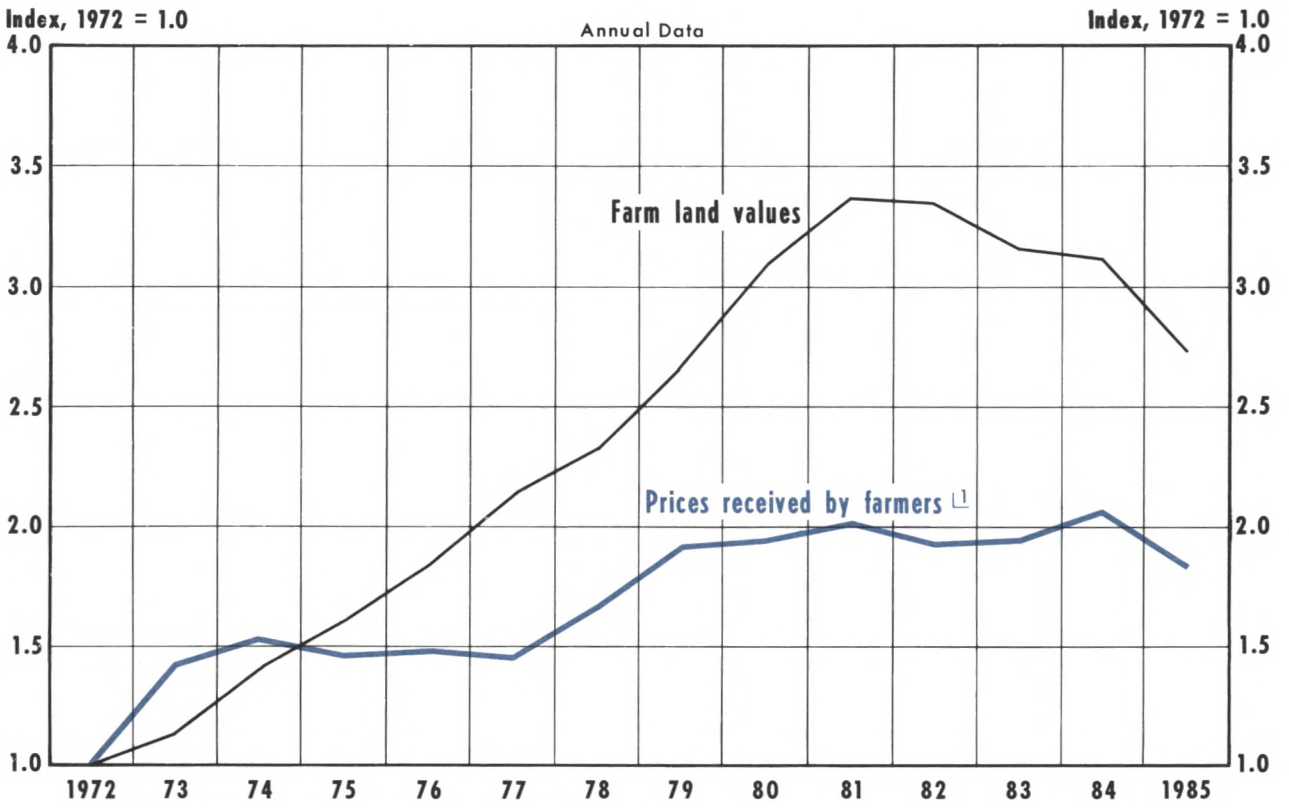
Today's farm crisis developed as a result of the rapid increases in the prices of farmland in the 1970s through 1981 and the subsequent declines in land prices since then. The 1970s and early 1980s were years of rapid inflation. From 1972 through 1981, the GNP deflator rose at an 8.1 percent average annual rate while the CPI rose at a 9 percent average rate. The price of farmland rose even more rapidly: the average price of an acre of farm real estate rose at a 14.4 percent annual rate from 1972 through 1981.

Chart 1 indicates that total farm debt rose in step with the rise in the prices of farmland. Movements in

[7]Between 1972 and 1981, the price of farmland increased at an average annual rate of 14.4 percent, while, over the same period, total farm debt increased at a 13.5 percent average annual rate.

Chart 2

Farm Land Values and Prices Received by Farmers



land prices and farm debt over this period were closely related for two reasons: First, many farmers who bought land while land prices were rising borrowed heavily to finance their purchases. Second, the rising land prices enabled farmers to pledge their land as collateral for general purpose loans.

Unfortunately for farmers, prices of farm commodities did not rise as fast as farmland prices (chart 2). From 1972 through 1981, an index of prices received by farmers on all farm products rose at an 8.1 percent rate, equal to the general inflation rate. Furthermore, most of the rise in the index of farm prices over these years was concentrated in 1973–74 and 1978–79. Prices received by farmers have not risen as rapidly as the GNP deflator since 1979. Thus, during the years of rapid inflation, the price of farmland rose substantially faster than the prices received by farmers for their output.

The general rate of inflation slowed sharply after 1981, making farmland ownership less valuable as an inflation hedge. In addition, the price of farm output relative to nonfarm prices has declined by 1.8 percent since 1981. For many farmers who borrowed heavily during the period of rapid increases in the price of farmland, prices received for farm products have not been high enough to cover their operating expenses and meet their loan payments. Consequently, farm lenders have begun incurring losses on the loans on which farmers have defaulted, and the protection of collateral for farm lenders has been eroded by falling farmland prices.

Only A Minority of Farmers Have Financial Problems

The data in table 1 show that the "farm credit crisis" is concentrated primarily among a minority of the family-size commercial farms, which have annual

Table 1

Distribution of Family-Size Commercial Farms by Their Ratio of Debt to Assets, January 1985

Nature of financial condition	Ratio of debt to assets	Percentage of farms	Percentage of debt of all family-size commercial farms
Technically insolvent	Over 100%	6.3%	14.5%
Extreme financial problems	70 to 100%	7.4	17.3
Serious financial problems	40 to 70%	20.0	40.3
No apparent financial problems	Under 40%	66.3	27.9

NOTE: Family-size commercial farms are identified as those with annual sales of farm output between $50,000 and $500,000.

Source: U.S. Department of Agriculture (1985).

sales of farm output between $50,000 and $500,000.[8] About two-thirds of the family-size commercial farms have ratios of debt to assets below 40 percent; the USDA considers these farms to have no apparent financial problems. Moreover, these farms account for less than 30 percent of the debt held by medium-size farms. In contrast, about 14 percent of family-size commercial farms have debt-to-assets ratios of 70 percent or higher, and these account for over 30 percent of the debt. In total, about one-third of family-size commercial farms hold more than 70 percent of this farm category's debt and have debt-to-assets ratios that indicate some financial stress. It is this minority of farmers — and their lenders — who account for the problem debt.

Has the Farm Credit Problem Affected the Economy in Recent Years?

The spread between the interest rates on commercial paper and Treasury bills — one measure of the spread between interest rates on private and public debt — appears to reflect a risk premium on privately issued debt. Of the years covered in chart 3, the spread was largest from 1980 through 1982, essentially one continuous period of economic recession.[9] This rate spread also widened for a few months around the time of the financial crisis at the Continental Illinois National Bank in May 1984, perhaps reflecting investors' concern about the possible consequences of failure by Continental Illinois.

There is little evidence, however, that the growing farm credit crisis since 1981 has had adverse effects on the economy. Real economic activity has been rising since late 1982. Moreover, the spread between the commercial paper rate and the Treasury bill rate generally has *narrowed* following the sharp rise in the failure rate among agricultural banks that began in the second half of 1984 (chart 3). In fact, since mid-1984, the spread between interest rates on private and public debt instruments of similar maturity has been as low as at any period since 1978. Thus, while this rate spread reflects a risk premium, the risk premium does not appear to be significantly correlated with problems in agriculture as suggested by studies warning of a general financial crisis.

ECONOMIC EFFECTS OF THE FARM FINANCIAL CRISIS IN THE 1920s

Since history frequently repeats itself, we may learn something by looking back to similar problems in an earlier era. The agricultural sector of the U.S. economy experienced a financial crisis during the 1920s that was similar in many respects to farmers' and farm lenders' current financial problems. To make this experience relevant for an analysis of the 1980s, we first

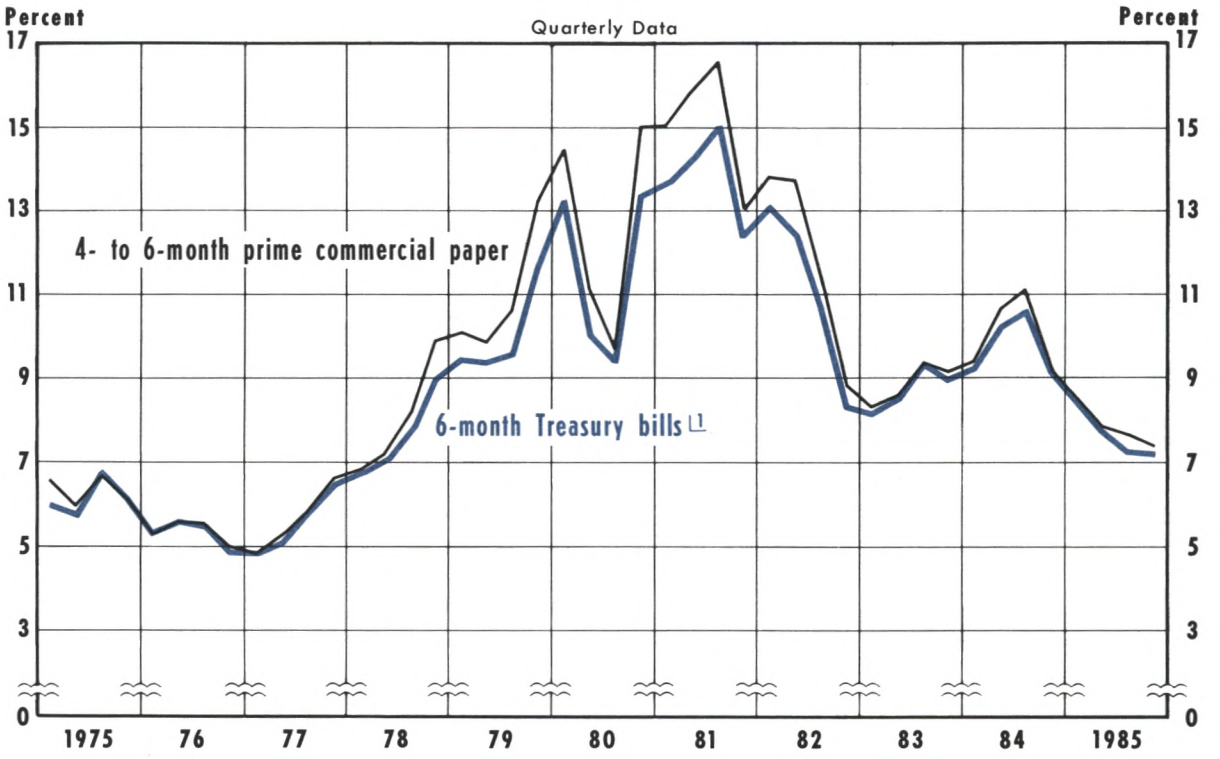
[8]Farms with less than $50,000 in annual sales tend to be part-time operations for the farmers; for these farms, there are nonfarm sources of income available to meet the debt payments. In contrast, many of the farms with annual sales over $500,000 are specialty operations, like cattle feedlots and poultry farms, which have operated profitably with high debt-to-assets ratios for many years. Farms with relatively large annual sales tend to be more profitable than smaller farms.

Only 1 percent of all farms have sales in excess of $500,000 but they account for more than 60 percent of farm income. In contrast, the group of farms with less than $40,000 in annual sales actually shows a loss equal to 6.5 percent of farm income.

In comparing farms that sell between $40,000 and $500,000 of product annually with those selling more than $500,000, the larger farms have an income-to-equity ratio of 16.5 and an income-to-debt ratio of 28.6 vs. figures of 3.3 and 11.9, respectively, for the smaller category of commercial-size farms. For more detail on holdings of farm debt by size of farm and alternative estimates of the number of farms in serious financial trouble, see Bullock (1985).

[9]The average spread between 1975 and 1980 was 52 basis points. This widened to an average of 140 basis points between 1980 and 1982. Since the beginning of 1983, the average commercial paper-Treasury bill rate spread has been 40 basis points, with a high of 95 basis points in June 1984 and a low of 7 basis points in July and August 1983.

Chart 3
Short-Term Interest Rates



must examine some of the important similarities and differences between the farm crises of the 1920s and 1980s.

U.S. Agriculture before World War I

Agriculture accounted for much larger shares of employment and output in the U.S. economy before World War I than in the 1980s.[10] In 1900, for example, about 41 percent of total employment was in the farm sector. The share of the labor force on farms was declining, falling to just under 30 percent by 1913. In contrast, the farm sector accounted for only 3 percent of civilian employment in 1981, the year of the recent peak in farmland prices.

During the five years ending in 1901, the dollar value of farm output accounted for 23.5 percent of gross private domestic product. By the five years ending in 1921, that percentage declined to 14.5 percent. In contrast, farm output accounted for about 3 percent of gross private domestic product in 1981. These contrasts suggest that adverse developments in the farm sector should have had larger effects on the economy before World War I than in the 1980s.

The farm sector was the major export sector of the U.S. economy before the war, with farm exports accounting for 65 percent of the dollar value of all U.S. exports in 1901. That share of total exports declined gradually to 46 percent in 1913, but rose again to 48 percent in 1920. In 1981, agricultural products accounted for 18.6 percent of U.S. merchandise exports.

The Growing Importance of Credit for Agriculture

Several developments made the availability of credit more important for farmers by the late 1800s than it

[10]Data used in this discussion are taken from the U.S. Department of Commerce (1975).

Table 2

Farm Mortgage Debt and Its Distribution Among Lenders: 1910–29

Year	Total debt (millions of dollars)	Percentage held by: Federal Land Banks	Joint-stock land banks	Life insurance companies	Commercial banks	Individuals and others
1910	$3,207			12.0%	12.7%	75.3%
1913	4,347			12.7	15.5	71.8
1915	4,990			13.4	15.0	71.6
1918	6,536	0.6%	*	14.6	15.4	69.3
1920	8,448	3.5	0.7%	11.5	14.3	70.0
1925	9,912	9.3	4.5	19.6	12.1	54.5
1929	9,756	12.1	6.7	21.9	10.7	48.5

*Less than 0.1 percent.

Source: U.S. Department of Commerce (1975).

had been earlier in U.S. history. In the early 1800s, homesteaders could obtain land and become farmers relatively cheaply; by the late 1800s, new farmers had to buy land from other landowners. Farming also became more capital-intensive as specialized machinery and buildings made farm operations more efficient.

Prior to World War I, farm mortgage credit was available from commercial banks, life insurance companies, individuals, and others (table 2). The category of "individuals and others," which accounted for 75 percent of farm mortgage credit in 1910, included the farm mortgage loan companies that began operating in the late 1800s. Mortgage loan companies generally were funded by investors in the eastern states. These companies employed agents who worked in farm communities, accepted mortgage loan applications from farmers and transmitted the loan applications to the mortgage companies for approval.[11]

Most farm mortgage loans had maturities of three to five years.[12] Maturities of farm mortgage loans tended to be shortest at commercial banks; about half of these loans had maturities of one year or less.[13] Shorter loan maturities made farmers more vulnerable to foreclosure by creditors. Although a farmer experiencing temporary financial distress ordinarily might be able to meet the payments on an outstanding mortgage loan, lenders might not renew the mortgage loan if it matured while a farmer was having a financial problem.

Farmers turned their complaints about the terms of credit available to them into an important political issue by the early 1900s. Political initiatives by farmers resulted in the passage of the Federal Farm Loan Act of 1916, which established the Farm Credit Banks under the ownership and supervision of the federal government. That act also facilitated the development of joint-stock land banks, which were privately owned and managed firms that operated under the supervision of the federal government. These two categories of federally supervised lending institutions made most of their farm mortgage loans with maturities of 33 to 35 years.[14] Table 2 indicates that the Federal Land Banks and the joint-stock land banks did not become major farm lenders until the 1920s.

World War I and the Farm Financial Crisis of the 1920s

The farm financial crisis of the 1920s resulted from the response of the U.S. agricultural sector to the disruption to agricultural production that occurred in Western Europe during World War I. The nations of

[11]Eichengreen (1984) and Olsen (1925).

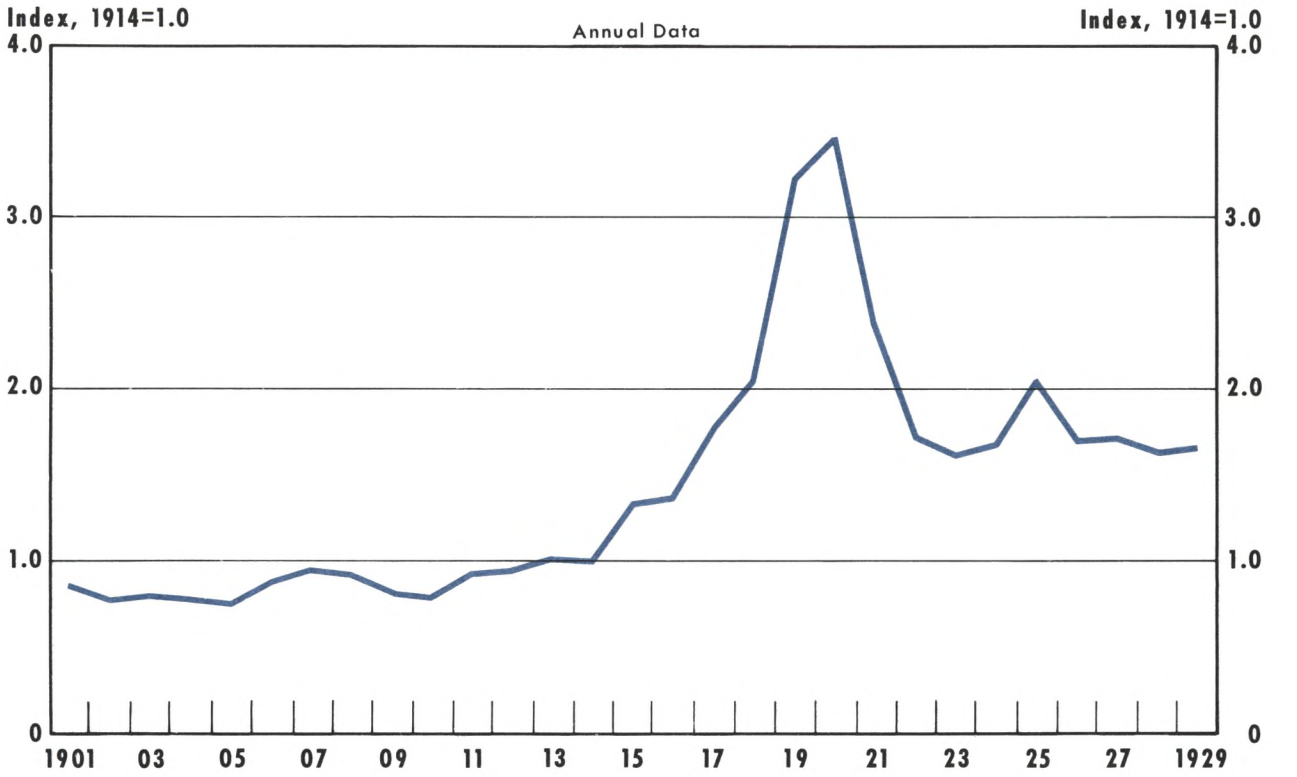
[12]Farmers did not like the terms on which mortgage credit was made available to them. They considered the interest rates on farm mortgage loans to be too high. Many farmers also considered the maturity of farm mortgage loans to be too short. See Eichengreen, Higgs (1971), and Stock (1984).

[13]Olsen, pp. 208–19.

[14]Olsen, p. 215.

Chart 4

Nominal Value of Farm Exports



Western Europe increased their agricultural imports to replace lost production. This caused the dollar value of U.S. farm exports to rise sharply during the war and shortly thereafter (chart 4). Prices of farm products and farmland rose sharply during these periods in response to the increase in foreign demand for U.S. farm products.

Farmers borrowed substantially during the war to buy land that was rising rapidly in value and to spend more on non-land inputs to expand production. Farm mortgage debt increased from $4.7 billion on January 1, 1914, to $10.2 billion on January 1, 1921. Non-real-estate farm loans at commercial banks rose from $1.6 billion to $3.9 billion over the same period.

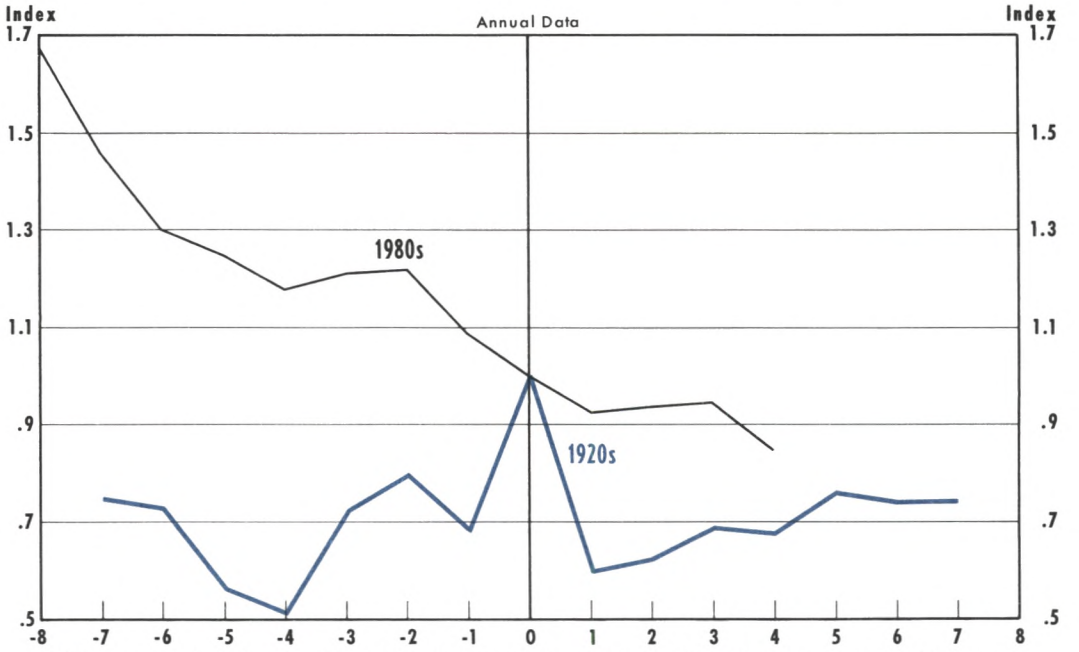
U.S. farm exports declined after the war, as farms in Western Europe resumed production (chart 4). The decline in export demand for U.S. farm products contributed to a reduction in farm prices relative to prices of industrial commodities. This ratio of farm to non-farm prices peaked in 1920, then declined sharply in 1921 (chart 5). The average price of farmland continued to rise through 1920, then declined in each subsequent year through 1928 (chart 6).

Declines in the prices of farm output and the value of farmland drove many farmers into bankruptcy and many agricultural banks into failure. From 1921 to 1929, an average of 635 banks failed per year, compared with an average of 88 bank failures per year over the previous 20 years.

Charts 5 and 6 compare the declines in prices of farm commodities and land in the 1920s with those of the 1980s. These comparisons show declines much more severe than what has been observed so far in the 1980s. First, the relative price of farm output declined more in the 1920s than in the 1980s (chart 5). Second, there were sharper declines in farmland prices, the collateral base for farm debt, after 1920 than after 1981 (chart 6). Other things equal, these declines would have had much greater effects on the ability of farmers to secure new short-term debt or sustain old debt in

Chart 5

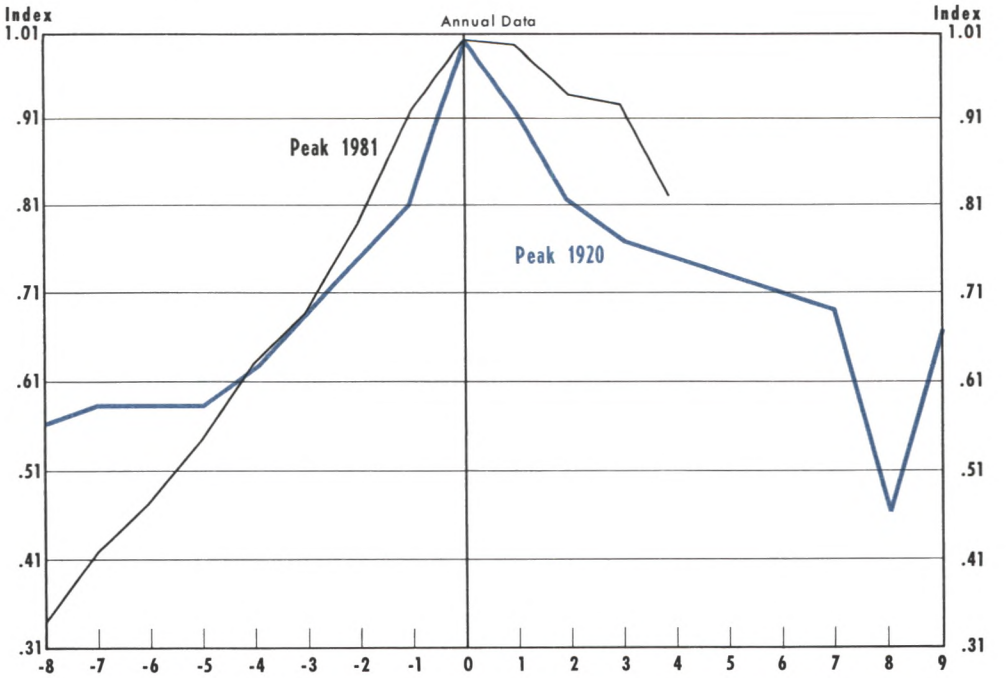
Trends in Relative Farm Prices in the 1920s and 1980s



NOTE: The ratios plotted are the GNP deflator for farm products relative to the GNP deflator for industrial (nonfarm) commodities. Relative price ratios are set equal to 1.0 in 1920 and 1981. Data for 1985 are preliminary.

Chart 6

Prices of Farm Real Estate per Acre Relative to Peak Prices in 1920 and 1981



the 1920s. Finally, with shorter maturities on most of the farm mortgage credit in the 1920s, the declines in farm prices and land values made farmers more vulnerable to foreclosure then than now.

Economic Adjustments to the Farm Financial Crisis of the 1920s: Implications for the 1980s?

As noted previously, agriculture's larger share of total output in the 1920s implies that problems in the farm sector would have had larger adverse effects on GNP and employment in the 1920s than in the 1980s. Yet the 1920s were years of general economic prosperity. Real GNP rose at a 4.2 percent annual rate from 1920 through 1929, up from an average of 3 percent annual growth over the prior 20 years. The number of persons employed grew at a 1.8 percent rate from 1920 through 1929, about the same rate as over the prior 20 years. Although general economic growth might have been even stronger without agriculture's problems, the actual economic performance certainly meets or exceeds most historical norms.

Declines in the prices of farm output and farmland in the 1920s also had relatively small effects on economic activity in the farm sector. Although farm output fell sharply in 1921, the index of overall farm output had regained its previous peak by 1925. Farm output rose at a 1.4 percent annual rate from 1925 through 1929, while real GNP rose at a 3.2 percent rate. Total employment in the farm sector essentially was unchanged in the 1920s; the growth of employment occurred in the nonfarm sector.

How could such a severe deflation in the farm sector, with widespread farm bankruptcies, have such small effects on farm output? The answer involves the process of bankruptcy in our capitalistic economic system. When farmers go bankrupt, their land and equipment do not go out of production; these resources instead are sold to other farmers at reduced prices. It is the lower prices that make it profitable for other farmers to buy the land and equipment even though prices for farm output are lower. Thus, through the process of bankruptcy, farm assets are repriced to levels low enough to make their continued use profitable for farmers.

Finally, if higher bank failure rates cause an increase in risk premiums on privately issued debt, this effect also should have been stronger in the 1920s than in the 1980s, especially since federal deposit insurance did not exist then. Despite the large number of bank failures during the 1920s, however, the spread between the commercial paper rate and the yield on short-term Treasury securities did not widen during that decade (chart 7).[15] Thus, the financial distress in the agricultural sector of the economy did not seem to produce an increase in risk premiums on privately issued debt.

Individual Bank Failures vs. the Liquidity of the Banking System

The primary reason that the bank failures had such little influence on overall economic activity in the 1920s was that the money supply grew fast enough to support growth in economic activity and to forestall liquidity problems in the banking system as a whole. Deposits in the many failed banks were simply transferred to solvent banks, with no overall reduction in the money stock. Because the quantity of money is closely related to aggregate spending and economic activity, the growth in the money stock facilitated growth in overall economic activity (chart 8). Although the money supply dropped sharply in 1921, during a recession after World War I, M1 (demand deposits plus currency) rose at about a 3 percent annual rate from June 1921 through June 1929. This increase facilitated the economic growth that occurred over that period, in sharp contrast to the beginning of the Great Depression (1930–33), which saw the money stock decline at an 11 percent annual rate (chart 8).[16]

CONCLUSIONS

Many farmers with high ratios of debt to assets will go bankrupt unless they receive large government subsidies. Some economists have warned that rising farm bankruptcies will cause the failure of many farm banks and possibly the Farm Credit System. Others even have suggested that farm loan losses are likely to produce a genuine financial crisis unless federal aid is provided.

The evidence presented in this article does not support the argument that the farm financial crisis will adversely affect the entire economy. The financial problems of many farmers have become serious since 1981 primarily because the average price of farmland has declined. The financial problems of farmers, however, have not increased the relative interest rates on

[15]The average spread in the 1920s was 127 basis points. The lowest and highest average spreads were 73 basis points in 1928 and 231 basis points in 1920.

[16]For a detailed analysis of how declines in the money stock were related to the Great Depression, see Friedman and Schwartz (1963).

Chart 7

Short-Term Interest Rates

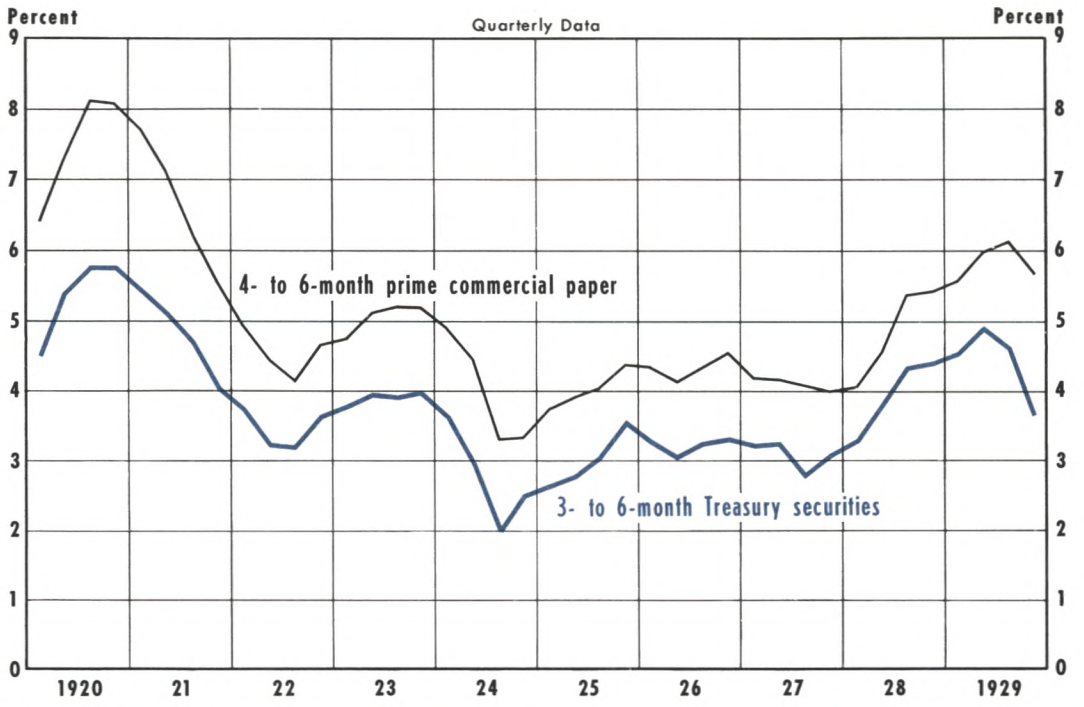
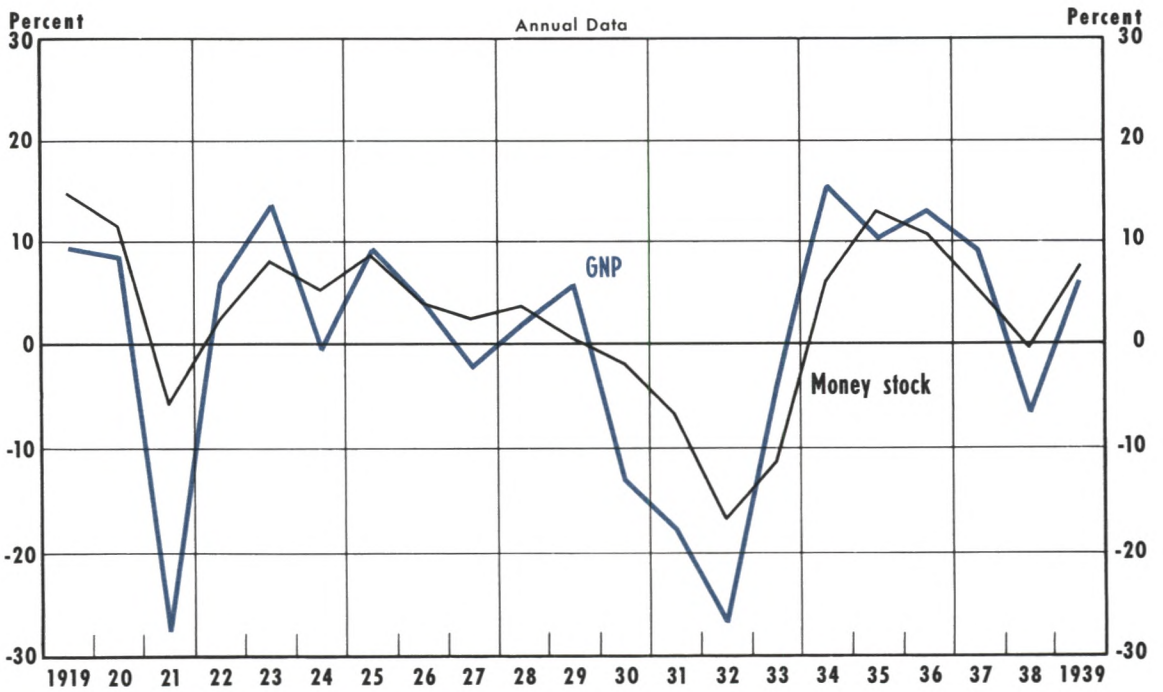


Chart 8

Changes in Gross National Product and the Money Stock



all privately issued debt or slowed the growth of total output. Evidence from the 1920s, a period of similar crisis in the farm sector, indicates that the farm financial crisis of that decade also had no adverse effects on the interest rates on privately issued debt or on overall economic growth. If we want to rationalize government support for farmers with high debt-to-assets ratios, such support should be sought on other grounds.

REFERENCES

Belongia, Michael T., and Kenneth C. Carraro. "The Status of Farm Lenders: An Assessment of Eighth District and National Trends," this *Review* (October 1985), pp. 17–27.

Bullock, J. Bruce. "Farm Credit Situation: Implications for Agricultural Policy," FAPRI #4-85, (Food and Agricultural Policy Research Institute, March 1985).

Chase Econometrics. "Economic Impacts of a Farm Credit System Default," report to the Farm Credit Council, October 1985.

Drabenstott, Mark, and Marvin Duncan. "Agriculture's Bleak Outlook," *New York Times,* August 14, 1985.

Eichengreen, Barry. "Mortgage Interest Rates in the Populist Era," *American Economic Review* (December 1984), pp. 995–1015.

"The Farm Slide." *Christian Science Monitor,* August 20, 1985.

Friedman, Milton, and Anna J. Schwartz. *A Monetary History of the United States, 1867–1960* (Princeton University Press, 1963).

Higgs, Robert. *The Transformation of the American Economy, 1865–1914* (John Wiley and Sons, 1971).

Karr, Albert R., and Charles F. McCoy. "Farm Credit Will Need Massive U.S. Aid in 18 to 24 Months, Chief Regulator Says," *Wall Street Journal,* September 6, 1985.

Olsen, Nils A. et al. "Farm Credit, Farm Insurance, and Farm Taxation," *Agriculture Yearbook 1924,* (U.S. Department of Agriculture, 1925), pp. 185–284.

Schink, George R., and John M. Urbanchuk. "Economy-Wide Impacts of Agricultural Sector Loan Losses," Wharton Econometric Forecasting Associates, July 1985.

Stock, James H. "Real Estate Mortgages, Foreclosures, and the Midwestern Agrarian Unrest, 1865–1920," *Journal of Economic History* (March 1984), pp. 89–105.

U.S. Department of Agriculture, Economic Research Service. *The Current Financial Condition of Farmers and Farm Lenders,* Agricultural Information Bulletin No. 490, March 1985.

U.S. Department of Commerce, Bureau of the Census. *Statistical Abstract of the United States* (U.S. Government Printing Office, 1985).

_____ . *Historical Statistics of the United States* (GPO, 1975).

Mergers and Takeovers–The Value of Predators' Information

Mack Ott and G. J. Santoni

If $150 is the proper "free market" value of a share of CBS, isn't there something fundamentally wrong with a system that values a share at barely half that unless some buccaneer comes along?

— Michael Kinsley

SKEPTICISM about the efficiency of capital markets causes people to be uneasy about corporate mergers and acquisitions.[1] In many cases corporate takeovers have been criticized for stripping management, labor and owners of career, livelihood and wealth.[2] Even the jargon that is used to describe this method of changing corporate ownership is notable for its value-laden terms (see "The Language of Corporate Takeovers" on opposite page). It creates the impression, perhaps deliberately so, of innocence on the part of the target — e.g., maiden, defense, white knight — and evil on the part of the buyer — e.g., raider, stripper, pirate.

Why is all of this brouhaha being raised now? Is the rate or size of corporate takeovers much larger in the 1980s than in the past and, if so, why? Are takeovers harmful — to the efficient operation of targeted firms, to stockholders' wealth, or to third parties? This article addresses each of these questions.

MERGERS AND ACQUISITIONS — AN HISTORICAL PERSPECTIVE

Economic historians identify three major merger waves from 1893 to 1970:[3]

(1) 1893–1904 — horizontal mergers for monopoly following the Sherman Antitrust Act of 1890, which outlawed collusion, but not mergers; ended by the Supreme Court's *Northern Trust* decision in 1904 which "made it clear that this avenue to monopoly was also closed by the antitrust laws."[4]

(2) 1926–30 — horizontal mergers resulting in oligopolies in which a few large firms dominated an industry; ended by collapse of securities markets associated with the Depression.

(3) mid-1950s–1970 — conglomerate mergers in which corporations diversified their activities through mergers; driven by the Celler-Kefauver Merger Act (1950) which "had a strongly adverse effect upon horizontal mergers" and the financial theory of diversification; the merger wave ended in 1970 with the decline in the stock market, which eroded the equity base for the leveraged purchases.[5]

Mack Ott and G. J. Santoni are senior economists at the Federal Reserve Bank of St. Louis. *James C. Poletti provided research assistance.*

[1]Kinsley's statement contrasts with the conventional view of economists and financial analysts that stock markets are "efficient" in the sense that asset prices reflect all publicly available information. Changes in individual asset prices, therefore, are caused by changes in information. See, Fama, Fisher, Jensen and Roll (1969); Jensen (1983), (1984); and Jensen and Ruback (1983).

[2]See Grossman (1985), Lipton (1985), Saddler (1985), Sloan (1985), Werner (1985); for examples of legislative or regulatory proposals, see Rep. Leach on "Talking Takeovers" (1985), Domenici (1985), Rohatyn (1985) and Martin (1985).

[3]Simic (1984), pp. 2–3; Greer (1980), pp. 142–46.

[4]Stigler (1968), p. 100.

[5]Stigler, p. 270.

The Language of Corporate Takeovers

Crown Jewel: The most valued asset held by an acquisition target; divestiture of this asset is frequently a sufficient defense to dissuade takeover.

Fair Price Amendment: Requires super majority approval of non-uniform, or two-tier, takeover bids not approved by the board of directors; can be avoided by a uniform bid for less than all outstanding shares (subject to prorationing under federal law if the offer is oversubscribed).

Going Private: The purchase of publicly owned stock of a company by the existing or another competing management group; the company is delisted and public trading in the stock ceases.

Golden Parachutes: The provisions in the employment contracts of top-level managers that provide for severance pay or other compensation should they lose their job as a result of a takeover.

Greenmail: The premium paid by a targeted company to a raider in exchange for his shares of the targeted company.

Leveraged Buyout: The purchase of publicly owned stock of a company by the existing management with a portion of the purchase price financed by outside investors; the company is delisted and public trading in the stock ceases.

Lockup Defense: Gives a friendly party (see White Knight) the right to purchase assets of firm, in particular the crown jewel, thus dissuading a takeover attempt.

Maiden: A term sometimes used to refer to the company at which the takeover is directed (target).

Poison Pill: Gives stockholders other than those involved in a hostile takeover the right to purchase securities at a very favorable price in the event of a takeover.

Proxy Contest: The solicitation of stockholder votes generally for the purpose of electing a slate of directors in competition with the current directors.

Raider: The person(s) or corporation attempting the takeover.

Shark Repellants: Antitakeover corporate charter amendments such as staggered terms for directors, super-majority requirement for approving merger, or mandate that bidders pay the same price for all shares in a buyout.

Standstill Agreement: A contract in which a raider or firm agrees to limit its holdings in the target firm and not attempt a takeover.

Stripper: A successful raider who, once the target is acquired, sells off some of the assets of the target company.

Target: The company at which the takeover attempt is directed.

Targeted Repurchase: A repurchase of common stock from an individual holder or a tender repurchase that excludes an individual holder; the former is the most frequent form of greenmail, while the latter is a common defensive tactic.

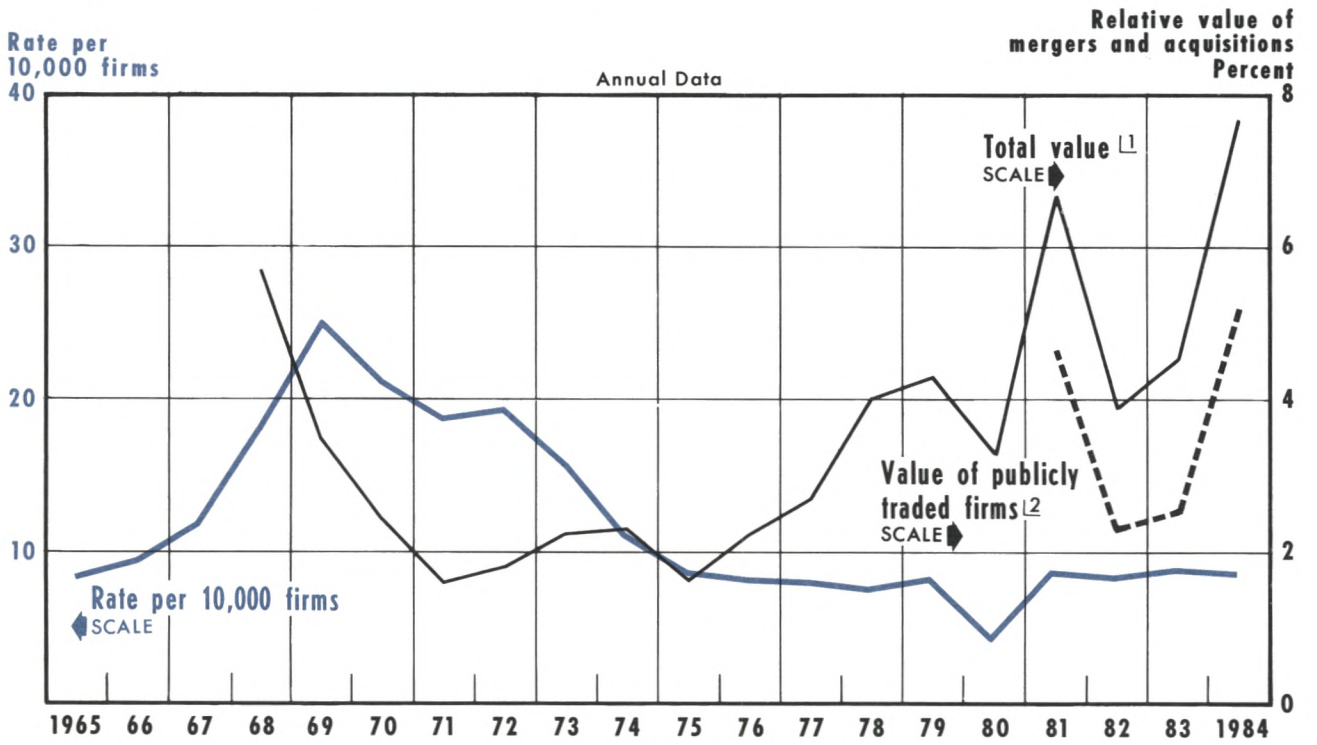
Tender offer: An offer made directly to shareholders to buy some or all of their shares for a specified price during a specified time.

Two-Tier Offer: A takeover offer that provides a cash price for sufficient shares to obtain control of the corporation, then a lower non-cash (securities) price for the remaining shares.

White Knight: A merger partner solicited by management of a target who offers an alternative merger plan to that offered by the raider which protects the target company from the attempted takeover.

Chart 1

Merger and Acquisition Activity



Sources: W.T. Grimm and Company and U.S. Securities and Exchange Commission.

[1] Ratio of the dollar value of total mergers and acquisitions to the total dollar value of common and preferred stock of all publicly traded domestic firms.

[2] Ratio of the dollar value of mergers and acquisitions of publicly traded firms to the total value of common and preferred stock of all publicly traded domestic firms.

Some have suggested a fourth major wave in the 1980s, perhaps beginning at the end of the 1970s.[6] Yet, as can be seen in chart 1, the overall rate of U.S. mergers and acquisitions per 10,000 firms peaked in 1969 at 25. From 1969 to 1975, it declined to slightly less than 10 and has remained there.

An alternative measure of merger and acquisition activity is its share as a percentage of the total value of common and preferred stock listed on U.S. exchanges. While this measure also declined sharply at the end of the 1960s, after a trough in 1975, it increased from less than 2 percent to nearly 8 percent in 1984.[7] For the four years of available data, chart 1 also shows the mergers of listed firms in relation to the value of listed stock; as can be seen, it follows the pattern of total mergers. Consequently, while this latest merger wave is not as widespread as was the conglomerate merger wave in terms of the rate per 10,000 firms, it is notable for the number of very large transactions.

DEREGULATION AND THE CURRENT MERGER WAVE

There are basically two explanations that economists and other analysts have offered for the current wave of mergers: (1) the removal of the U.S. Justice Department's antitrust rules against vertical mergers in 1982 and the relaxing of rules against horizontal mergers in 1984; (2) the deregulation of specific industries since 1978.[8]

[6]Simic, p. 3; Jensen (1984), p. 109.

[7]The figures for the first half of 1985 imply a similar rate for 1985; see *Acquisition/Divestiture Weekly*, p. 2095.

[8]Council of Economic Advisers (1985), pp. 192–95.

Antitrust

In 1982, the U.S. Justice Department repealed restrictions against vertical mergers, that is, between suppliers and customers. Summarizing this policy, Assistant Attorney General William F. Baxter asserted that "mergers are never troublesome except insofar as they give rise to horizontal problems."[9] In the same year, constraints on horizontal mergers — mergers between competitors — also were relaxed.

Nonetheless, the standard measure of concentration by which the Justice Department assessed the monopoly power in potential mergers continued to be criticized by economists as inefficiently restrictive:

> But while horizontal mergers have the clearest anticompetitive potential, there are also potential efficiency gains from such mergers that the new antimerger policy may sacrifice. In addition to the obvious possibility of complementarities in production and distribution, managers in the same industry may have a comparative advantage at identifying mismanaged firms. By foreclosing these managers from the market for corporate control, an anti-horizontal merger policy may impair efficient allocation of managerial talent and, perhaps more importantly, weaken significantly the incentive of incumbent managers to maximize the value of their firms.[10]

Consistent with view, the Justice Department further relaxed its restrictions on horizontal mergers in June 1984. The Department's new test for anticompetitive effects takes into account the market shares of all significant competitors, including foreign sellers.[11] Moreover, the new guidelines consider merger-related efficiencies as a positive criterion that may counterbalance a rise in market concentration. Finally, the new guidelines "permit failing divisions to be sold to direct competitors if the units face liquidation in the near future and a noncompetitive acquirer can't be found."[12]

[9]Quoted in Stillman (1983), p. 225.

[10]Stillman, p. 226.

[11]This new test employs the Herfindahl-Hirschman Index of market concentration which is calculated by summing the squares of the individual market shares of all of the firms (domestic and foreign) included in the market. Unlike the four-firm concentration ratio previously used, the new test reflects both the distribution of the market shares of the top four firms and the composition of the market outside these firms.

[12]Simic, p. 125. In addition, he notes that divestitures have amounted to between one-third and one-half of corporate acquisitions during the last 10 years (p. 78). Thus, the relaxed antitrust policy has led to greater specialization, a movement exactly opposite to the conglomerate merger wave of the 1960s; see Toy (1985).

Industry-Specific Deregulation[13]

Beginning in the late 1970s, a sequence of changes loosened restrictions in a number of industries. The Natural Gas Policy Act of 1978 lessened restrictions on the setting of well-head gas prices and set in motion their phaseout for most natural gas by 1984; crude oil prices were deregulated by an executive order in 1981.

The Depository Institutions Deregulation and Monetary Control Act of 1980 and the Depository Institutions Act of 1982 made banking and finance more competitive. These acts deregulated interest rates on deposits and allowed thrifts to offer checking accounts, money market accounts and consumer loans. In addition, decisions by the Comptroller of the Currency (1982) and Federal Reserve Board (1983) permit banks to engage in some insurance activities and to own discount security brokerages. Finally, the Supreme Court has upheld the constitutionality of regional interstate banking pacts, which permit combinations of banks in member states.

The transportation industry was changed more fundamentally by deregulation than any industrial group beginning with the Airline Deregulation Act of 1978. Deregulation of railroad, trucking and household movers followed in 1980. These acts reduced entry restrictions in these industries and made it easier to change prices and routes.

Beginning in 1982, a sequence of Federal Communications Commission decisions eased ownership transfers in the broadcasting industry. In addition, rules were relaxed on children's programming in 1983 and public service or local programming in 1984. Time and frequency restrictions on commercials were eliminated in 1984. In December of that year, the commission replaced its 7–7–7 rule with a 12–12–12 rule — allowing a single corporation to own as many as 12 TV, 12 FM, and 12 AM stations as long as the combined audience reached is less than 25 percent of all television viewers and radio listeners.

Mergers and Acquisitions, 1981–84

The 1985 *Economic Report of the President* points out that "these recently deregulated industries [bank-

[13]Details on these deregulatory acts and decisions are contained in the following sources: for the oil and gas industry, Executive Order 12287 (1981), pp. B1–B2; for banking and financial services, Gottron (1981), vol. V, pp. 261–65, also Fischer, et al (1985) and Garcia (1983); for the insurance and insurance agency industries, Felgran (1985), pp. 34–49; for the transportation industry, Gottron, vol. V, pp. 311–13, 331–34, 336–39; for the broadcasting industry, Wilke, et al (1985) and Saddler.

Table 1

Value of Merger and Acquisition Transactions by Industry, 1981–84 (dollar figures in millions)

Industry	1981	1982	1983	1984	1981-84	Percent of total	Cumulative percentage
Oil and Gas	$22,921.6	$ 9,165.5	$12,075.8	$ 42,981.8	$ 87,144.7	26.3%	26.3%
Banking, Finance and Real Estate	4,204.4	5,605.3	13,628.3	5,846.3	29,284.3	8.8	35.1
Insurance	7,862.5	5,717.8	2,966.1	3,005.9	19,552.3	5.9	41.0
Food Processing	3,800.0	3,075.2	1,163.6	7,094.8	15,133.6	4.6	45.6
Conglomerate	809.4	3,973.6	2,745.1	6,982.9	14,511.0	4.4	49.9
Mining and Minerals	10,850.6	355.2	2,946.2	346.7	14,498.7	4.4	54.3
Retail	1,844.4	1,948.1	1,489.0	6,673.2	11,954.7	3.6	57.9
Transportation	475.3	1,074.4	5,254.6	1,251.8	8,056.1	2.4	60.3
Leisure and Entertainment	2,150.4	1,082.1	1,797.4	2,580.7	7,610.6	2.3	62.6
Broadcasting	1,060.1	787.2	3,747.1	1,917.9	7,512.3	2.3	64.9
Other	26,638.9	20,970.1	25,267.3	43,541.7	116,418.0	35.1	100.0
Total	$82,617.6	$53,754.5	$73,080.5	$122,223.7	$331,676.3	100.0%	

SOURCE: Simic, Tomislava, ed. *Mergerstat Review*, (W.T. Grim and Company, 1984), p. 41.

ing, finance, insurance, transportation, brokerage and investment] accounted for about 25 percent of all merger and acquisition activity between 1981 and 1983."[14] Table 1 shows that deregulated industries continued to dominate the merger and acquisition totals through 1984. Moreover, divestiture sales by conglomerates reflect a general move away from diversification and toward specialization, a consequence of relaxed antitrust constraints.[15] Thus, eight of the 10 industrial groupings in table 1 reflect some form of deregulation. During 1981–84, these industries accounted for 58.2 percent of the value of all reported mergers and acquisitions.

OBJECTIONS TO MERGERS AND ACQUISITIONS

The recent objections to corporate mergers and acquisitions encompass three fundamental complaints. Some have claimed that mergers are "totally nonproductive."[16] Others have claimed that stockholders are harmed.[17] Still others have argued that there are significant third-party effects — such as employment losses, higher interest rates or reduced research activity.[18]

Are Mergers and Takeovers Unproductive?

Mergers and takeovers are simply a change in the corporation's ownership. Because these transactions are voluntary, they occur only if the buyer and the seller expect to profit from the transaction. The buyer believes that the firm's assets can be used to generate a greater return than they are producing under the current owners. Consequently, the buyer will offer to

[14]Council of Economic Advisers (1985), pp. 194–95.

[15]In particular, sales of divisions by conglomerate corporations first rose to prominence in 1982, then doubled in 1984, the two years of significant antitrust changes discussed above. For more detail regarding the divestiture side of recent mergers and acquisitions, see Toy; also Council of Economic Advisers, p. 195.

[16]Lipton; see also Werner, and Sloan. Jensen (1984) quotes the New York investment banker Felix Rohatyn as asserting: "All this frenzy may be good for investment bankers now, but it's not good for the country or investment bankers in the long run."

[17]For examples, see Lipton, Minard (1985), p. 41, and Sloan, p. 137. Sloan provides evidence that purports to show that a target's shareholders are often better off when takeovers are unsuccessful (p. 139):

> We studied 39 cases in which companies successfully resisted hostile tenders. In 17 cases, the value of the target's stock at year-end 1984 exceeded what a shareholder would have if the offer had succeeded and the proceeds had been reinvested in the S&P's 500 Index. (Where a company defeated one offer but was later bought, our calculations run through the acquisition date.)

However, if the corporations that were taken over in subsequent attempts (28 of the 39) are excluded from the analysis, the average annual yield to stockholders of the 11 resisting corporations was negative, −3.2 percent.

[18]See Lipton and "Talking Takeovers."

purchase the firm at a price high enough to induce the current owners to sell (the seller's reservation price), but low enough not to exceed the expected value of the firm to the buyer under his ownership (the buyer's reservation price).[19]

Buyers and sellers value the firm differently (have different reservation prices) because they have different expectations about the stream of earnings that can be produced with the corporate assets. In part, these expectations depend upon the information that people have about current opportunities as well as forthcoming events that will affect the demand for the corporations' product or its cost of production.

Such information is neither uniformly distributed across individuals nor weighted with the same subjective likelihood about its validity or usefulness. Consequently, people will have different reservation prices for the same firm. In fact, if everyone had the same reservation price, there would be no inducement to trade.

Thus, information is the key to understanding merger or takeover activity.[20] In some cases, this information may concern the "crown jewel," that is, a particular asset of the firm that the bidder believes could be employed more profitably in some other use. The bidder may plan to gain control of the firm and strip off (liquidate) the asset.[21] On the other hand, this information may be a plan to reduce the firm's cost of production or to change its product line.[22]

Capitalizing on the bidder's information requires a plan to reorganize the corporation. Only in this way can the bidder obtain the expected increase in the value of the firm. In essence, the bidder's information can be thought of as a way to make the firm more productive or efficient.[23] The increase in productivity or efficiency can arise from one of three sources. First, the reorganization may permit greater output from the existing resources with no change in output prices. Second, the reorganization may exploit a change in regulatory constraints in the form of production or permitted market share. Third, the reorganization may permit a greater value of output because the current management has not responded appropriately to a change in relative prices. Each of these is discussed more formally in the appendix.

Whichever the source, the fact that the bidder offers to purchase the firm at a price attractive to the current owners can be explained by an increase in the target firm's profitability under the planned reorganization. Moreover, by observing the movements of stock prices during and after takeover attempts, the hypothesis of expected increased profitability under reorganization can be tested. If it is valid, there should be significant differences between the price movements of firms that are taken over and those that successfully resist takeovers.

Table 2 is a summary of a number of individual studies that examine the effect of takeovers on stock prices. The data are abnormal percentage changes in stock prices for both targets and bidders involved in corporate takeovers. Abnormal changes are those that exceed general movements in stock prices. The data are broken down by the type of takeover technique employed (tender offer, merger, proxy contest) and by the success of the takeover attempt.

The individual studies summarized differ in terms of the period over which the returns are measured. For

---

[19]A reservation price is the capitalized value of the future stream of earnings that the buyer (seller) *expects* the firm to generate. Generally, the capitalized value of an expected future receipt is calculated by dividing the expected future receipt by the discount factor $(1+r)^t$, where r is the market annual rate of interest and t is the number of years in the future until the income will be received. In the case of an asset that generates a stream of receipts, summing all such discounted future receipts gives the present value of the asset, V:

$$V = \frac{S_1}{(1+r)} + \frac{S_2}{(1+r)^2} + \frac{S_3}{(1+r)^3} + \frac{S_4}{(1+r)^4} + \frac{S_5}{(1+r)^5} + \ldots\ldots + \frac{S_n}{(1+r)^n} + \ldots\ldots$$

If the annual receipt is expected to be constant and perpetual, the above equation reduces to $V = s/r$.

[20]Indeed, Kinsley quotes James Tobin as offering this explanation: "Takeover mania is testimony to the failure of the market on this fundamental-valuation criterion. . . . Takeovers serve a useful function if they bring prices closer to fundamental values." The market price in an efficient market incorporates all publicly available (and some private) information; Tobin's indictment notwithstanding, the market's nonincorporation of all private information (prior to someone revealing it) cannot be classified as failure.

[21]For example, Crown Zellerbach's timber holdings appeared to be the "jewel" in James Goldsmith's plan for the firm. In the case of Trans World Airlines, it was the PARS reservation system and the overseas air routes.

[22]An example of reduced production cost is Carl Icahn's renegotiation of TWA's labor contracts. It is estimated that, had these renegotiated contracts been in place during the past year, TWA would have reported a $70 million profit rather than a $56 million loss; see Burrough and Zieman (1985).

[23]The analysis in this paper assumes that the rise in the value is not due to obtaining monopoly power through merger. All mergers of publicly traded corporations are subject to Justice Department review to determine possible anticompetitive effects; mergers found to imply anticompetitive conditions are either enjoined or the corporations are compelled to divest those subsidiaries resulting in the anticompetitive condition. Conversely, research into recent mergers blocked by the Justice Department suggests that, if anything, antitrust review has been too strict, not too lax; see Stillman.

Table 2

Abnormal Percentage Stock Price Changes Associated with Attempted Corporate Takeovers

Takeover technique	Successful		Unsuccessful	
	Target	Bidders	Target	Bidders
Tender offers	30%	4%	−3%	−1%
Mergers	20	0	−3	−5
Proxy contests	8	N.A.	8	N.A.

SOURCE: Jensen, Michael, and Richard S. Ruback, *Journal of Financial Economics*, (April 1983), pp. 7–8.

NOTE: Abnormal price changes are price changes adjusted to eliminate the effects of marketwide price changes.

successful tender offers, the period was roughly one month before to one month after the offer. For successful mergers, the price change was measured from about one month before the offer to the offer date. For unsuccessful takeovers, the measurement period runs from about one month before the offer through the announcement that the offer had been terminated.

The data indicate a statistically significant increase in the stock prices of targets when the takeover was successful.[24] The above discussion suggests that the rise in capital value can be explained by an increase in the firm's future stream of profits that investors expect to result from its reorganization by the bidder. Rudely stated, the rise in value is *not* simply the result of a speculative craze induced by the knowledge that an outside bidder is attempting to gain control of the firm. The latter explanation is lurking in Kinsley's critique.

Fortunately, there is some evidence that helps discriminate between the two alternative explanations. First, in a proxy contest, there is no outside bidder to start a "speculative" snowball. Rather, a proxy contest is an internal takeover attempt by some of the existing stockholders. An alternative slate of directors is proposed and its proponents attempt to oust the existing board. Yet successful proxy contests result in a statistically significant abnormal return for the firm (see table 2).[25] Second, in contrast to unsuccessful mergers and tender offers, which leave the stock prices of targets statistically unchanged, unsuccessful proxy contests result in statistically significant positive abnormal returns.

These contrasting results are important because they illuminate the role played by information in changing the stock price. In the case of an outside takeover attempt, the bidder has every incentive to keep his special information or reorganization plan secret so that he may acquire the stock cheaply. Consequently, if the target is not taken over (either initially or in subsequent attempts), the price of the stock returns to its original level since other investors have learned nothing in the process (see footnote 24). In contrast, in a proxy contest, the cost to the instigators of revealing their special information is lower. Since they own substantial shares of the firm they are less likely to be concerned about acquiring additional shares and revealing their plan may aid in obtaining support from other stockholders. Thus, the special information is more likely to be revealed in proxy contests, and it is this information that raises the firm's present value even though the contest may not have succeeded in ousting the existing board.

Are Stockholders Harmed by Mergers and Takeovers?

The evidence reviewed above shows that the values of target firms rise in takeover attempts, implying that owners of targeted firms experience wealth gains in the event of a successful takeover. On these grounds, it

[24]Each of the individual studies summarized in table 2 found statistically significant positive abnormal returns. See Jensen and Ruback (1983), pp. 7–16. Furthermore, Bradley, Desai, and Kim (1983), one of the studies summarized in table 2, conduct a detailed study of unsuccessful tender offers, segmented into those targets that did and did not receive offers during the subsequent five years. They found that the cumulative average abnormal return for the targets that received subsequent offers is 57.19% (t = 10.39). In contrast, the average abnormal return over the same period for targets that did not receive subsequent offers is an insignificant −3.53% (t = −0.36); this return includes the announcement effects.

[25]See Jensen and Ruback, p. 8.

is difficult to claim, as some have, that existing owners are harmed by successful takeovers. Nor does it appear to be the case that the owners of targeted firms are harmed by unsuccessful takeovers (the small negative abnormal returns earned by targets in unsuccessful tender offers and mergers are not statistically significant). Targets of unsuccessful proxy contests earn significantly positive abnormal returns. While this evidence is inconsistent with shareholder harm, some have criticized takeovers on other grounds. These are considered below.

Two-tier offers. Since mergers and takeover attempts are aimed at acquiring corporate control, the bidder frequently offers a higher price, in cash, for shares necessary to obtain a majority holding, then a lower price, in securities, for the remaining shares. Some allege that this two-tier offer is an attempt to frighten shareholders into tendering their shares rather than holding on for a possibly higher-valued offer later. Yet, even if this were true, the value of the stock will rise relative to its pre-takeover level so the issue is the distribution of the gain among shareholders, not of harm.[26]

Management Self-Interest and Golden Parachutes. Management will seek the highest bid for the firm's shares if their wealth depends heavily on this effort. Generally this is the case; most of top management's compensation is in equity terms, not cash salary.[27] Moreover, the so-called golden parachute may be thought of as a guarantee that management will be rewarded for obtaining a high bid (one that is acceptable to the owners). Its purpose is to assure that management will not impede the auction.

Corporate Charter Changes — Shark Repellants. If takeover attempts were harmful to shareholder interests, changes in corporate charters that make takeovers more difficult should raise the share prices of firms passing these amendments. A recent study by the Securities and Exchange Commission, however, finds a statistically significant 3.0 percent decline in the average price of 162 corporations passing certain kinds of antitakeover amendments.[28]

Role of Institutions and Other Fiduciaries. A final piece of evidence suggesting that takeovers do not harm shareholders is the voting behavior of institutional holders and other trustees. The SEC study just cited found that "institutional stockholdings are lower on average for firms proposing the most harmful amendments." That is, the institutional holdings of stock were smaller in corporations proposing antitakeover restrictions than in corporations that had not proposed such restrictions.[29]

Recently, administrators of pension fund investments have begun to favor rather than oppose the auction process entailed in a takeover attempt. In particular, California's state treasurer, Jesse Unruh, has formed a Council of Institutional Investors (CII) to combat antitakeover abuses, which he views as depriving the institutional funds of profitable opportunities.[30] As CII co-chairman Harrison Goldin, New York City comptroller, put it, "Should Mr. Pickens, Mr. Icahn, the Bass brothers or others care to hold an open auction for any of the stocks held by my pension funds, I would not want to restrain them."[31]

Furthermore, fiduciaries opposing takeover bids have been held liable for the loss of stock value:

> . . . a judge ruled that trustees who helped Grumman Corp. frustrate a takeover bid by LTV Corp. in 1981

---

[26]Council of Economic Advisers (1985), pp. 204–05:

> In addition, two-tier tender offers can be desirable for target stockholders and managements. SEC data show that two-tier offers are used in friendly takeovers about as often as they are used in hostile takeover attempts. There are at least two reasons that target stockholders could prefer a two-tier bid. If a two-tier offer is properly structured, target stockholders who accept securities in the back end of the transaction may be able to defer tax due on the appreciated value of their shares. In addition, the acquirer may find that it is easier to finance the transaction by issuing securities for the back end than by borrowing funds from banks or through other financing mechanisms. If these savings induce the bidder to offer a higher blended premium, then the two-tier offer can also be beneficial for the target's stockholders.

[27]Lewellen (1971) found that after-tax executive compensation for large U.S. manufacturing firms for both chief executives and the top five executives was primarily from (1) stock-based remuneration, (2) dividend income, and (3) capital gains, with (4) fixed dollar remuneration being relatively minor in comparison. In particular, over the period 1954–63 the average annual ratio of [(1) + (2) + (3)]/(4) ranged from 2.123 to 7.973 for chief executives and from 1.753 to 8.669 for the top five executives in large U.S. manufacturing corporations (Lewellen, pp. 89–90). Moreover, these executives, on average, had large stock holdings in their own corporations — $341,437 to $3,033,896 during 1954–63 — and were not active sellers (Lewellen, p. 79).

[28]Jarrell, Poulsen, and Davidson (1985). The study distinguishes between "fair price amendments" (requiring super majority shareholder approval in the case of a two-tier offer) and other shark repellants — classified boards, authorization of blank-check preferred stock, and super majority amendments for approval of *any* merger or tender offer regardless of whether it is a two-tier offer. The fair price amendments had no effect on stock prices while the others lowered stock prices significantly.

[29]Jarrell, Poulsen, and Davidson (1985), pp. 44–46.

[30]Smith (1984).

[31]Makin (1985), p. 212.

were personally liable for damages because they didn't act in the best interests of family beneficiaries for whom they held Grumman stock in trust.[32]

Third-Party Effects

Critics of the recent wave of mergers and takeovers frequently allege that they have "third-party" effects that damage the economy, individuals or regions in ways not measured by changes in corporate value or stockholder returns.[33] To a certain extent, this is true but such costs typically accompany innovations:

> For example, innovations that increase standards of living in the long run initially produce changes that reduce the welfare of some individuals, at least in the short run. The development of efficient truck and air transport harmed the railroads and their workers; the rise of television hurt the radio industry. New and more efficient production, distribution, or organizational technology often imposes similar short-term costs.
>
> The adoption of new technologies following takeovers enhances the overall real standard of living but reduces the wealth of those individuals with large investments in older technologies. Not surprisingly, such individuals and companies, their unions, communities, and political representatives will lobby to limit or prohibit takeovers that might result in new technologies. When successful, such politics reduce the nation's standard of living and its standing in international competition.[34]

Labor Displacement. The argument that employment is lowered by mergers and takeovers appears to be based on the belief that plant closings and consolidations inevitably follow and that labor demand must therefore decline.[35] However, if output expands as a result of the reorganization, wages as well as the number of jobs may increase. Even when employment cutbacks are associated with mergers and takeovers, such effects apparently have been overcome by other forces: Payroll employment growth during the current expansion has been at a 3.68 percent rate (November 1982–October 1985) compared with a 3.39 percent rate during economic expansions over the 1970–81 period.[36]

Adverse Effects on Capital Markets. One allegation frequently made about the impact of takeovers on capital markets is that the extra demand for credit to finance takeovers raises interest rates and crowds out productive investment. This critique is specious. Takeovers and mergers are productive (in that asset values rise). Any crowding out that occurs is of less productive investment. Moreover, the funds obtained by the bidders are transferred to the sellers who can reinvest them. Consequently, there is no reason to expect interest rates to change.[37]

Neglect of Long-Term Planning. Several critics have argued that takeover threats force management to concentrate on projects that raise earnings in the near term at the cost of long-range planning, in particular, research and development. For example, the chairman of Carter-Hawley-Hale department stores said that takeover activity causes management to "take the short-term view and to neglect what builds long-term values."[38] This implies a serious inefficiency in capital markets, since capital values are expected *future* returns discounted to the present.

This short-term focus is said to be imposed by institutional shareholders who view current earnings as more important than capital appreciation; evidence, however, demonstrates the opposite. Jarrell and Lehn of the SEC found that institutional investors tended to prefer higher rather than lower research and investment expenditures. More to the point, they found that, of the 217 firms that were takeover targets during 1981–84, 160 reported that research and development expenditures were "not material," while the remaining 57 had research and development expenditure rates less than half the averages in their respective industries.

Finally, Jarrell and Lehn also found significant announcement effects attending new research and development projects:

> Our study examined the net-of-market stock price reaction to 62 *Wall Street Journal* announcements

[32]Stewart and Waldholz (1985), p. 13.

[33]The "lost jobs" argument has been raised by Rep. Leach; in "Talking Takeovers"; the "financial destabilizing" argument by Rohatyn (1985), Domenici, Lipton, and President Hartley of Unocal Corp in Minard (1985); the "shortened planning horizon" by Lipton (1985), Hartley, and Leach.

[34]Jensen (1984), p. 114.

[35]In some cases, wage, salary and benefit schedules exceeding labor productivity may be the cause of low corporate value. The potential for reorganization through a takeover and an increase in efficiency would then entail either a reduction in wages or a reduction in labor use. In the TWA takeover, it was the former (see footnote 22); in the AMF takeover by Minstar Corp., it was the latter. See Ehrlich (1985).

[36]Payroll employment growth rates during each of the preceding economic expansions of the 1970–81 period were as follows: 3.48 percent during November 1970–November 1973; 3.62 percent during March 1975–January 1980; 2.00 percent during July 1980–July 1981.

[37]See Martin, p. 2.

[38]Work and Peterson (1985), p. 51; see also Drucker (1984), Lipton, Rohatyn, and Sloan.

between 1973–1983 that firms were embarking on new R&D projects. These tests show that, on average, the stock prices of these firms increased (1% to 2%) in the period immediately following the publication of these stories.[39]

Thus, the market appears to reward rather than punish the long-term view; takeovers are most frequent in firms that have ignored the long term. As Joseph observes: "If you take the best-run companies, they typically make long-term commitments, and they sell at decent multiples. IBM is not a target. ITT is a target, because it hasn't managed its businesses very well. So ITT is complaining that it can't plan long term because of the sharks."[40]

CONCLUSION

We have examined three criticisms of corporate takeovers: 1) that mergers and takeovers are unproductive, 2) that stockholders are harmed, 3) that third parties are harmed. Both theory and evidence suggest that resource values rise and, consequently, stockholders generally benefit from takeover activity. Both are consistent with the proposition that takeovers are expected to result in a more efficient use of the target's assets. As with any economic change, third-party effects probably exist. Negative employment effects, higher interest rates or neglect of long-term planning, however, do not seem to be caused by merger and takeover activity. These potential third-party effects do not appear to be important and do not establish a case for additional constraints on corporate ownership transfers. Since takeovers contribute to the efficient working of capital markets, policy or legislative initiatives to impede takeovers should bear the burden of proving the harm they propose to ameliorate.

REFERENCES

The Acquisition and Divestiture Weekly Report. Quality Services, October 7, 1985.

Bradley, Michael, Anand Desai, and E. Han Kim. "The Rationale Behind Interfirm Tender Offers: Information or Synergy?" *Journal of Financial Economics* (April 1983), pp. 183–206.

Burrough, Brian, and Mark Zieman. "Investor Icahn Lifts TWA Stake to 40.6% And Is Said to Be Purchasing More Shares," *Wall Street Journal,* August 7, 1985.

Council of Economic Advisers. *Economic Report of the President* (U.S. Government Printing Office, 1985), chapter 6.

Domenici, Pete V. "Fools and Their Takeover Bonds," *Wall Street Journal,* May 14, 1985.

Drucker, Peter F. "Taming the Corporate Takeover," *Wall Street Journal,* October 30, 1984.

Ehrlich, Elizabeth. "Behind the AMF Takeover: From Highflier to Sitting Duck," *Business Week* (August 12, 1985), p. 50–51.

Executive Order 12287, 1981, United States Code, Congressional and Administration News.

Fama, Eugene F., Larry Fisher, Michael C. Jensen, and Richard Roll. "The Adjustment of Stock Prices to New Information," *International Economic Review* (1969, No. 10), pp. 1–21.

Felgran, Steven D. "Banks As Insurance Agencies: Legal Constraints and Competitive Advances," *New England Economic Review* (September/October 1985), pp. 34–49.

Fischer, Thomas G., William H. Gram, George G. Kaufman, and Larry R. Mote. "The Securities Activities of Commercial Banks: A Legal and Economic Analysis," Federal Reserve Bank of Chicago, Staff Memoranda SM-85-2, 1985.

Garcia, Gilian. "Financial Deregulation: Historical Perspective and Impact of the Garn-St Germain Depository Institutions Act of 1982," Federal Reserve Bank of Chicago, Staff Study 83-2, 1983.

Greer, Douglas F. *Industrial Organization and Public Policy* (MacMillan Publishing Co., 1980).

Grossman, Harry I. Letter to Editor, *Wall Street Journal,* April 14, 1985.

Grotton, Martha V. *Congress and the Nation* (Congressional Quarterly, Inc., 1981), vol. 5.

Hirshleifer, Jack. Price Theory and Applications (Prentice Hall) 1976.

Jarrell, Gregg, and Kenneth Lehn. "Takeovers Don't Crimp Long-Term Planning," *Wall Street Journal,* May 1, 1985.

Jarrell, Gregg, Annette Poulsen, and Lynn Davidson. "Shark Repellants and Stock Prices: The Effects of Antitakeover Amendments Since 1980," Office of the Chief Economist, Securities and Exchange Commission, July 1985.

Jensen, Michael C., ed. "Symposium on the Market for Corporate Control: The Scientific Evidence," *Journal of Financial Economics* (April 1983).

_____ . "Takeover: Folklore vs. Science," *Harvard Business Review* (November-December 1984), pp. 109–21.

Jensen, Michael C. and Richard S. Ruback. "The Market for Corporate Control: The Scientific Evidence," *Journal of Financial Economics* (April 1983), pp. 5–50.

Kinsley, Michael. "You Won't Find An Efficient Market on Wall Street," *Wall Street Journal,* July 18, 1985.

Lewellen, Wilbur G. *The Ownership Income of Management* (Columbia University Press, 1971).

Lipton, Martin. "Takeover Abuses Mortgage the Future," *Wall Street Journal,* May 4, 1985.

Makin, Claire. "Is the Takeover Game Becoming Too One-Sided?", *Institutional Investor* (May 1985), pp. 207–22.

Martin, Preston. Statement to Subcommittee on Oversight and Select Revenue Measures of U.S. House Ways and Means Committee, April 16, 1985, (B.I.S. Press Review, No. 88).

Minard, Lawrence. "Millions for Defense Not One Cent for Tribute," *Forbes* (April 8, 1985), pp. 40–46.

Rohatyn, Felix G. "Junk Bonds and Other Securities Swill," *Wall Street Journal,* April 18, 1985.

Saddler, Jeanne. "Storer Dissidents' Bid for Board Control Clears Hurdle in 3–2 Decision by FCC," *Wall Street Journal,* December 4, 1985.

[39]Jarrell and Lehn (1985).

[40]Sloan, p. 139.

Simic, Tomislava, ed. *Mergerstat Review* (W.T. Grimm and Company, 1984).

Sloan, Allen. "Why Is No One Safe?" *Forbes* (March 11, 1985), pp. 134–40.

Smith, Randall. "California Official Moves to Organize Pension Funds to Combat Greenmail," *Wall Street Journal*, July 26, 1984.

Stewart, James B., and Michael Waldholz. "How Richardson-Vicks Fell Prey to Takeovers Despite Family's Grip," *Wall Street Journal*, October 30, 1985.

Stigler, George J. *The Organization of Industry* (Richard D. Irwin, Inc., 1968).

Stillman, Robert. "Examining Antitrust Policy Towards Horizontal Mergers," *Journal of Financial Economics* (April 1983), pp. 225–40.

"Talking Takeovers." *McNeil-Lehrer News Hour*, Transcript 2518 (May 22, 1985), pp. 3–8.

Toy, Stewart. "Splitting Up, the Other Side of Merger Mania," *Business Week* (July 1, 1985), pp. 50–55.

U.S. Securities and Exchange Commission. *Fiftieth Annual Report*, 1984 (GPO, 1984), p. 112.

Werner, Jesse. Letter to Editor, *Wall Street Journal*, April 16, 1985.

Wilke, John, Mark N. Vamos, and Mark Maremont. "Has the FCC Gone Too Far?" *Business Week* (August 5, 1985), pp. 48–54.

Work, Clemens P., and Sarah Peterson. "The Raider Barons: Boon or Bane for Business?" *U.S. News and World Report* (April 8, 1985), pp. 51–54.

APPENDIX
Bidder's Information, Productive Capacity, and Stock Values

There are three distinct cases in which the bidder's plan for reorganizing the corporation — based on the bidder's information — could increase the value of the corporation. These cases are: 1) using the corporation's physical capital more productively; 2) changing production techniques to reflect a change in regulatory constraints; 3) changing the output mix to one more profitable given changes in relative output prices.

In each of the three cases, the corporation is assumed to produce two goods, X and Y, with a concave production function continuously differentiable in the two factors capital (K) and labor (L). Capital, which is e × 100 percent equity-financed and (1-e) × 100 percent debt-financed, is assumed to be fixed, but some capital, K_u, may be idle; labor is variable. Factor use is determined by wages, interest and product prices. The corporation is assumed to be a price taker in both factor and output markets.[1] Thus,

$$(1)\quad Q = [X,Y] = F(\bar{K},L)$$

$$(2)\quad \bar{K} = K_X + K_Y + K_u$$

$$(3)\quad \frac{\partial X}{\partial L} = \frac{W}{P_X}, \frac{\partial Y}{\partial L} = \frac{W}{P_Y}, \frac{\partial X}{\partial K} = \frac{r}{P_X}$$

$$\frac{\partial Y}{\partial K} = \frac{r}{P_Y}.$$

These factor-use equations, (3), for labor in X and Y or capital in X and Y production imply

$$(4)\quad \frac{dY}{dX} = -\frac{P_Y}{P_X},$$

and, combined with the fixed capital stock (2), allow us to represent the corporation's efficient production choice as in figure A1. The relationship shown is concave with respect to the origin. While our assumptions do not rule out a linear or convex relationship, these latter two configurations would imply corner solutions (the firm concentrates on one product). Most large corporations are multiproduct producers implying a concave production frontier.

The relative price line tangent at E_0 is also the isovalue line whose X-axis intercept $\hat{X}_0$ multiplied by P_X gives the value of output at E_0, $P_X\hat{X}_0$. At point E_0, production is $[X_0, Y_0]$ and corporate economic profit is

$$(5)\quad \pi_0 = P_Y Y_0 + P_X X_0 - WL_0 - r\bar{K} = P_X\hat{X}_0 - WL_0 - r\bar{K}.$$

Note that π_0 may be positive, zero or negative.

[1]The analysis ignores quirks in the tax code that may play a role in some takeovers. A uniform corporate income tax, however, has no qualitative effect on the results.

Figure A1

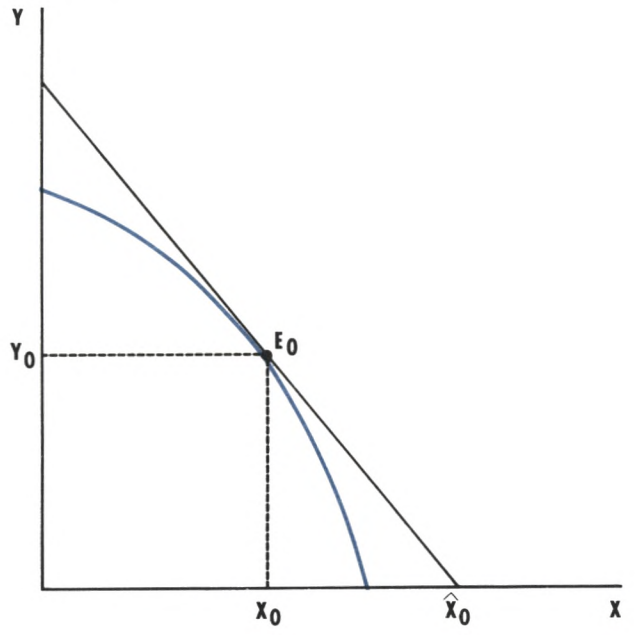
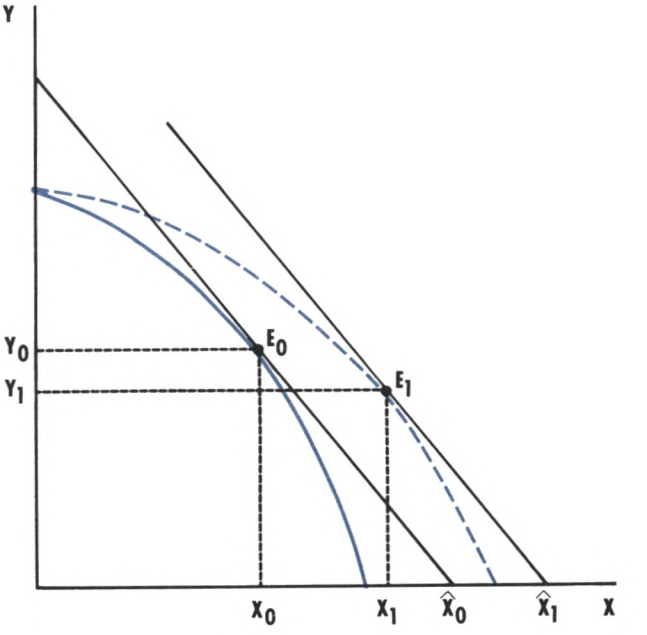


Figure A2



The corporation's equity is just

$$\bar{K} - (1\text{-}e)\,\bar{K} = e\bar{K},$$

and the shareholders receive earnings, dividends plus retained earnings,

$$(7)\quad s_0 = \pi_0 + re\bar{K}.$$

This implies a value (V) for the corporation of

$$(8)\quad V_0 = \frac{s_0}{r} = \frac{\pi_0}{r} + e\bar{K}.$$

A corporation with negative π_0 is a candidate for takeover.

For a more detailed presentation, see Hirshleifer (1976), chapter 7, and appendix A3.

AI. Bidder's Information: Reorganize Production to Increase Output

The reorganization increases the corporation's capacity to produce X relative to Y as shown in figure A2. The output mix shifts from $[X_0,Y_0]$ to $[X_1,Y_1]$ entailing a decline in Y production. Corporate economic profit rises from π_0 in (5) to π_1,

$$(9)\quad \pi_1 = P_Y Y_1 + P_X X_1 - WL_1 - r\bar{K}$$
$$= P_X\hat{X}_1 - WL_1 - r\bar{K},$$

and corporate value from V_0 to V_1,

$$(10)\quad V_1 = \frac{\pi_1}{r} + e\bar{K};$$

from (5), (8), (9) and (10) this is an increase of

$$(11)\Delta V = \frac{1}{r}[P_X(\hat{X}_1 - \hat{X}_0) - \bar{W}(L_1 - L_0)],$$

which by (3) and the assumption of concavity must be positive.

AII. Bidder's Information: Change Output Mix in Response to Deregulation

As shown in figure A3, deregulation — whether on input use or output mix — changes the production function from $F_R(\bar{K},L)$ to $F(\bar{K},L)$. That is, instead of being kinked at E_0, the function is now smooth as the regulatory constraint is lifted. The adjustment from E_0 to E_1 results from the same logic as in AI. Also, the rise in value is formally as in (11).

AIII. Bidder's Information: Change in Output Mix in Response to Change in Relative Output Prices

As shown in figure A4, a change in relative output

Figure A3

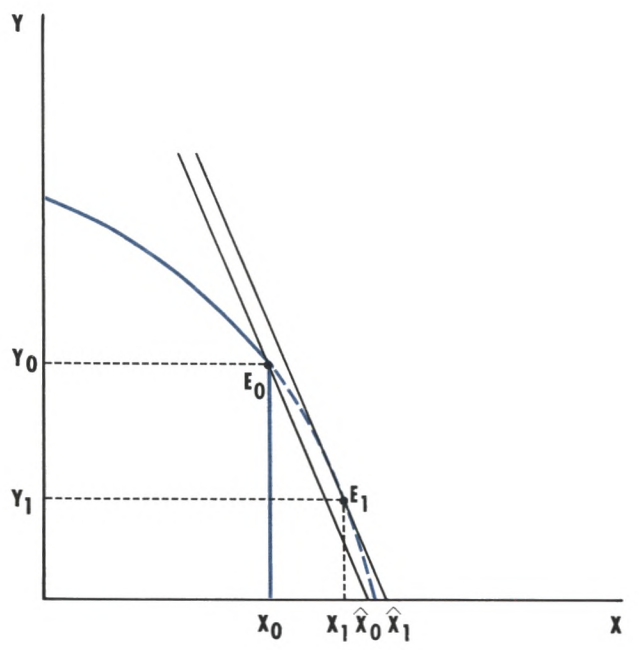
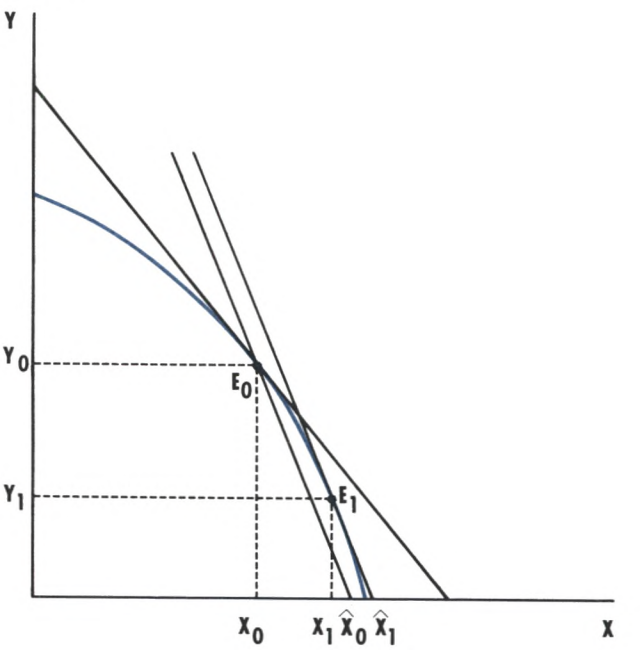


Figure A4



prices, where X rises in value relative to Y, should induce a shift in production and corporate organization from E_0 to E_1. The adjustment from E_0 to E_1 follows the same logic as in AI and corporate value again rises according to (11). Note that this comparison is of production mixes *after* the price change. Thus, the value of output at E_0 is not as large as E_1 under the new prices; the value at E_0 at the old prices was greater than at E_1 at the old prices. Consequently, the rise in corporate value in reorganizing from E_0 to E_1 is due to E_0 not being a maximal value mix under the new prices and by existing management's failure to recognize it.

New Seasonal Factors for the Adjusted Monetary Base

R. Alton Gilbert

THE February 1984 adoption of contemporaneous reserve requirements (CRR), which changed the timing between deposit liabilities and required reserves, has altered the seasonal patterns in the adjusted monetary base (AMB).[1] Weekly variability in the AMB has been substantially higher since that date, which suggests that seasonal factors based on past data do not reflect the seasonal patterns in the AMB under CRR.[2] This article describes a new method of deriving seasonal factors for the AMB that reflects the timing of reserve accounting under CRR.[3]

THE CALCULATION OF THE ADJUSTED MONETARY BASE

The AMB is designed to be a single measure of all Federal Reserve actions, including changes in reserve requirements, that influence the money stock. It is equal to the source base plus a reserve adjustment magnitude (RAM) that accounts for changes in reserve requirements by the Federal Reserve.[4]

RAM is the difference between the reserves that would be required (given current deposit liabilities) if the base period's reserve requirements were in effect and the reserves that are actually required given current reserve requirements. Adding RAM to the source base produces a series that shows what the source base would have been in each period if reserve requirement ratios had been those of the base period.[5] This procedure converts the impact of reserve requirement changes into equivalent changes in the source base, holding reserve requirements constant.[6]

R. Alton Gilbert is an assistant vice president at the Federal Reserve Bank of St. Louis. Paul G. Christopher provided research assistance.

[1]A general description of CRR appears in Gilbert and Trebing (1982).

[2]The average absolute value of weekly changes in the AMB from January 1982 through January 1984 was $492 million. This measure of weekly variability was $1,723 million for the period February 1984 through December 1985, more than three times larger than in the earlier period.

[3]An earlier paper by Farley (1984) presents a different method of deriving seasonal factors that reflect the timing of reserve accounting under CRR.

[4]The following articles describe and explain the AMB in greater detail: Gilbert (1980, 1983 and 1984) and Tatom (1980).

[5]The source base equals the reserve balances of depository institutions with Federal Reserve Banks, which excludes their required clearing balances and balances held to compensate for float, plus total currency in circulation, whether held by depository institutions or the public. It is derived from the combined balance sheets of the Federal Reserve Banks and the U.S. Treasury.

[6]The base period for calculating RAM is January 1976 through August 1980. Base period reserve requirements are the average reserve requirements over that period for two categories of deposit liabilities: transaction deposits and total time and savings deposits. For member banks, the average required reserve ratio was 12.664 percent on transaction deposits and 3.1964 percent on total time and savings deposits. For nonmember institutions, base period reserve requirements were zero, since they were not subject to reserve requirements of the Federal Reserve in the base period. Thus, RAM is calculated as the current transaction deposits of member banks multiplied by 0.12664, plus the current total time and savings deposits of member banks multiplied by 0.031964, minus the current required reserves of all depository institutions.

Under the Prior System of Lagged Reserve Requirements

Calculation of the AMB under lagged reserve requirements (LRR) is illustrated in equations 1 through 3. Definitions of the terms in these equations are presented in table 1. Equation 1 shows how RAM is calculated for each reserve maintenance period under LRR.

$$(1)\quad RAM_t = BRTR\,(TR_{t-14}) + BRTS\,(TS_{t-14}) - RR_t$$

The source base is equal to total currency outstanding (that held by the public and in the vaults of depository institutions) plus the reserve balances of depository institutions. Under LRR, the items that could be used to meet required reserves in the current maintenance period were reserve balances held in the current period (RB_t) plus vault cash held in the week ending 14 days earlier (V_{t-14}). This sum is thus equal to required reserves (RR_t) plus excess reserves (E_t). Consequently, the source base can be expressed as shown in equation 2.

$$(2)\quad \begin{aligned} SB_t &= CP_t + V_t + RB_t \\ &= CP_t + V_t + RR_t + E_t - V_{t-14} \end{aligned}$$

Thus, the AMB under LRR is shown in equation 3.

$$(3)\quad \begin{aligned} AMB_t &= SB_t + RAM_t \\ &= CP_t + E_t + V_t - V_{t-14} + BRTR\,(TR_{t-14}) \\ &\quad + BRTS\,(TS_{t-14}) \end{aligned}$$

Under the Current System of Contemporaneous Reserve Requirements (CRR)

The reserve maintenance periods, during which average reserves must equal or exceed required reserves, have been lengthened under CRR to two-week periods ending every other Wednesday. Required reserves on transaction deposits for the current two-week maintenance period are based on daily average transaction deposits for the 14-day period ending two days before the end of the current maintenance period. In contrast, required reserves on time and savings deposits are based on daily average deposits over a 14-day period ending 30 days before the end of the current maintenance period. The assets of depository institutions that count toward meeting their reserves in the current maintenance period are their reserve balances in the current maintenance period plus average vault cash over the 14-day period ending 30 days before the end of the current maintenance period. Equation 4 illustrates the calculation of the AMB under CRR.

Table 1

Definitions of Terms Used in Specifying the Adjusted Monetary Base

SB_t	— the source base over the maintenance period ending on day t
RAM_t	— reserve adjustment magnitude for the maintenance period ending on day t
BRTR	— base period required reserve ratio on the transaction deposits of member banks
TR_{t-14}	— transaction deposits of member banks in the week ending 14 days before day t
BRTS	— base period required reserve ratio on the time and savings deposits of member banks
TS_{t-14}	— time and savings deposits of member banks in the week ending 14 days before day t
RR_t	— required reserves of all depository institutions in the maintenance period ending on day t
RB_t	— balances of depository institutions in their reserve accounts at Federal Reserve Banks in the maintenance period ending on day t
V_t	— vault cash of depository institutions in the maintenance period ending on day t
V_{t-14}	— vault cash of depository institutions in the week ending 14 days before the end of the current maintenance period.
E_t	— excess reserves in the maintenance period ending on day t; prior to the imposition of reserve requirements of the Federal Reserve on all depository institutions in 1980, it includes the vault cash of nonmember institutions, held in the week ending 14 days earlier
CP_t	— currency held by the public in the maintenance period ending on day t
TR_{t-2}	— transaction deposits of member banks over the 14 days ending two days before the end of the current maintenance period
TS_{t-30}	— time and savings deposits of member banks over the 14 days ending 30 days before the end of the current maintenance period
V_{t-30}	— vault cash over the 14 days ending 30 days before the end of the current maintenance period

$$(4)\quad \begin{aligned} AMB_t &= SB_t + RAM_t \\ &= CP_t + E_t + V_t - V_{t-30} \\ &\quad + BRTR\,(TR_{t-2}) + BRTS\,(TS_{t-30}) \end{aligned}$$

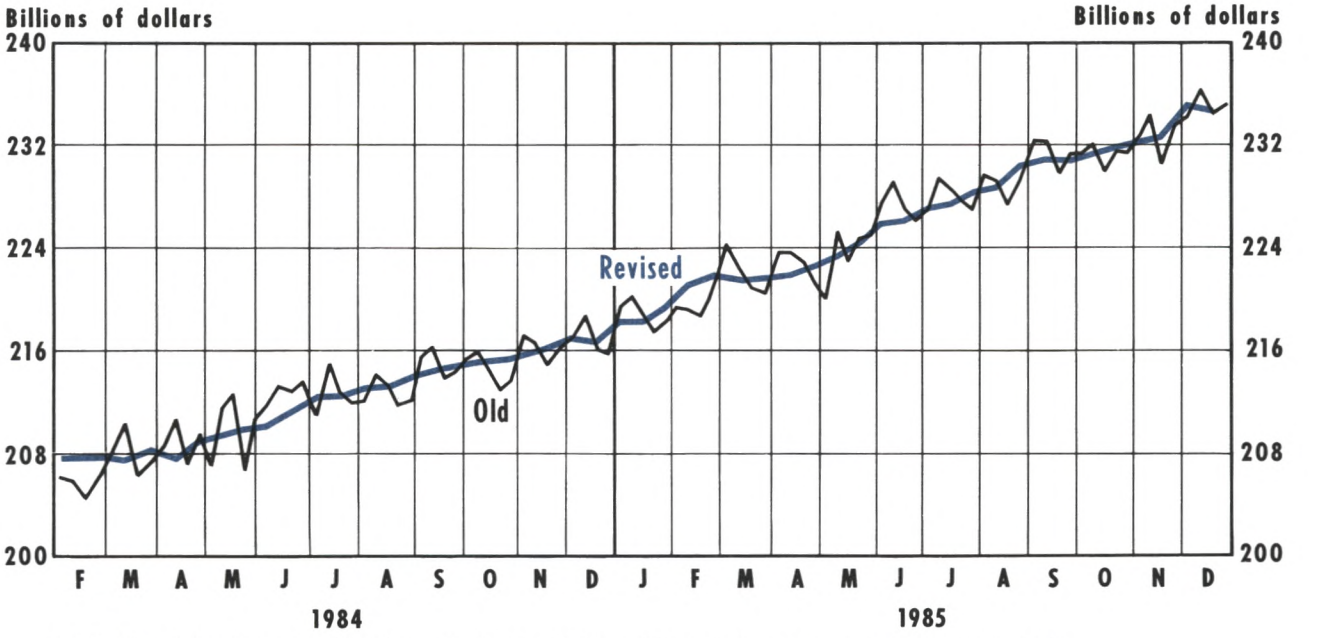
EFFECTS OF CRR ON SEASONAL PATTERNS IN THE AMB

If the seasonal patterns of transaction deposits and time and savings deposits are not changed by the

Chart 1

Seasonally Adjusted Monetary Base

Old and Revised Series



NOTE: The old series is weekly; the revised series is biweekly, covering reserve maintenance periods.

switch from LRR to CRR, seasonal movements in the AMB will be different under CRR. For example, an increase in transaction deposits will lead to a rise in the AMB about two weeks earlier under CRR than under LRR. In contrast, a rise in time and savings deposits will lead to a rise in the AMB about two weeks later under CRR than under LRR.

Through 1985, seasonal factors for the AMB were derived by applying the X-11 seasonal adjustment program to past AMB data, the bulk of which were for the period prior to February 1984.[7] Thus, these data are generally inappropriate in calculating seasonal factors for the period since February 1984.

Alternative seasonal factors for the period since February 1984, however, can be derived by a simple procedure. The procedure requires the calculation of a counterfactual AMB series for several years prior to February 1984 that reflects what the AMB's seasonal patterns would have been if CRR had been in effect during the earlier period. The counterfactual AMB series is derived by adding to the AMB (as calculated before February 1984) the adjustments necessary to convert the timing of reserve accounting to that under CRR. Equation 5 shows how this counterfactual AMB series is derived. Note that equation 5 reduces directly to equation 4 when components with opposite signs are cancelled.

$$(5)\quad AMB_t = CP_t + E_t + (V_t - V_{t-14}) + BRTR\,(TR_{t-14}) + BRTS\,(TS_{t-14}) + (V_{t-14} - V_{t-30}) + BRTR\,(TR_{t-2} - TR_{t-14}) + BRTS\,(TS_{t-30} - TS_{t-14})$$

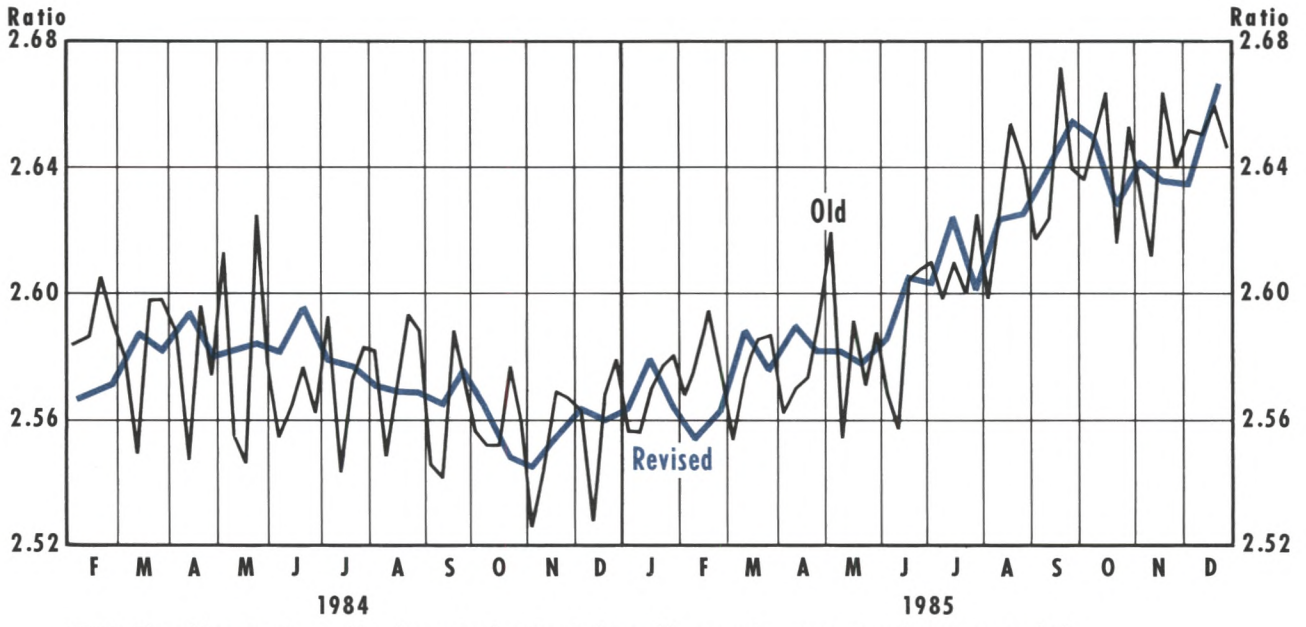
The counterfactual AMB series for periods prior to February 1984 is calculated as shown in equation 5, with one modification. The modification involves an adjustment for the change in the timing of reserve accounting on vault cash $(V_{t-14} - V_{t-30})$. The term V_{t-14} is for weeks ending on Wednesdays, whereas V_{t-30} is for weeks ending on Mondays. The time series currently maintained on weekly vault cash is for weeks ending on Mondays, which is available back to 1975. An approximation to $(V_{t-14} - V_{t-30})$ in equation 5 is derived as $(V_{t-16} - V_{t-30})$, using data on the vault cash of all commercial banks from 1975. The counterfactual series on the

[7]The weekly seasonal factors for the AMB are derived from a version of the X-11 program that has been modified by the staff of the Federal Reserve Board to derive weekly seasonal factors from monthly seasonal factors.

Chart 2

M1 Multiplier

Old and Revised Series



NOTE: The old series is weekly; the revised series is biweekly, covering reserve maintenance periods.

AMB does not include an adjustment for the change in the timing of reserve accounting for vault cash in the years 1969 through 1974. The counterfactual AMB series for several years prior to February 1984 is combined with the AMB as calculated since February 1984. Seasonal factors are derived from this series and applied to the AMB, not seasonally adjusted, since February 1984.[8]

Much of the increase in short-run variability in the AMB since February 1984 is eliminated by using seasonal factors based on the counterfactual series. Furthermore, AMB data for the two-week reserve maintenance periods are less variable than in the weekly data. Chart 1 shows the difference between weekly data on the AMB as published through 1985 and the biweekly series with the new seasonal factors based on the counterfactual method. Chart 2 presents a similar contrast between the alternative M1 multipliers. Table 2 indicates a lower incidence of large changes with the alternative seasonals, especially for the biweekly series.

CONCLUSIONS

The weekly adjusted monetary base has been more variable since the Federal Reserve adopted contemporaneous reserve requirements in February 1984. The increase in its weekly variability appears to reflect problems with estimating the seasonal patterns in the AMB using data prior to February 1984. New seasonal

[8]The counterfactual observations for the AMB in periods prior to February 1984 are calculated for weekly periods. For the purpose of calculating seasonal factors, observations on the AMB since February 1984 are calculated for each week (seven-day periods ending on Wednesdays), by adding the source base for the week to the biweekly observation for RAM that includes that week. The X-11 program is used to derive weekly seasonal factors from this weekly series. The weekly seasonal factors are used for calculating the biweekly observations for the AMB, seasonally adjusted, since February 1984.

Data on the transaction deposits and on time and savings deposits of member banks are available for weeks ending on Mondays since 1979. Data from 1979 through 1985 provide enough weekly observations for the calculation of the weekly seasonals, but monthly data are needed over a longer period to get meaningful results from the X-11 program. Monthly average observations for the counterfactual series on the AMB for the years 1969 through 1978 are derived by using data on deposits for weeks ending on Wednesdays as approximations for observations on deposits for weeks ending on Mondays.

Table 2

Incidence of Large Changes in the Adjusted Monetary Base Series with Two Sets of Seasonal Factors

Percentage of periods in which the absolute value of the changes exceeded:	Weekly Series (98 periods)		Biweekly Series (48 periods)	
	With old seasonal factors	With revised seasonal factors	With old seasonal factors	With revised seasonal factors
$1 billion	64.3%	48.9%	75.0%	14.6%
2 billion	35.7	23.4	25.0	2.1
3 billion	14.3	7.1	10.4	0

factors have been derived from a counterfactual AMB series designed to reflect the timing of reserve accounting under CRR. Short-run variability in the AMB is reduced substantially by averaging the AMB over the two-week reserve maintenance periods in effect since February 1984 and by using seasonal factors derived from the counterfactual AMB series.

REFERENCES

Farley, Dennis E. "Alternative Measures of the Monetary Base," paper presented at the Federal Reserve System Committee on Financial Analysis meeting, Federal Reserve Bank of Kansas City, October 15, 1984.

Gilbert, R. Alton. "Calculating the Adjusted Monetary Base under Contemporaneous Reserve Requirements," this *Review* (February 1984), pp. 27–32.

_____. "Two Measures of Reserves: Why Are They Different?" this Review (June/July 1983), pp. 16–25.

_____. "Revision of the St. Louis Federal Reserve's Adjusted Monetary Base," this Review (December 1980), pp. 3–10.

_____, and Michael E. Trebing. "The New System of Contemporaneous Reserve Requirements," this Review (December 1982), pp. 3–7.

Tatom, John A. "Issues in Measuring an Adjusted Monetary Base," this *Review* (December 1980), pp. 11–29.

FEDERAL RESERVE BANK OF ST. LOUIS *REVIEW* INDEX 1985