

B

FEDERAL RESERVE BANK  
CHICAGO ECONOMIC  
PERSPECTIVES

A review from  
the Federal Reserve Bank  
of Chicago

JULY/AUGUST 1987

The new dollar indexes are  
no different from the old ones

Global banking, financial integration  
major conference themes

Standby letters of credit

## ECONOMIC PERSPECTIVES

July/August 1987

Volume XI, Issue 4

Karl A. Scheld, *senior vice president  
and director of research*

### Editorial direction

Edward G. Nash, *editor*

Herbert Baer, *financial structure  
and regulation*

Steven Strongin, *monetary policy*

Anne Weaver, *administration*

### Production

Roger Thryselius, *graphics*

Nancy Ahlstrom, *typesetting*

Rita Molloy, *typesetter*

Gloria Hull, *editorial assistant*

**Economic Perspectives** is published by the Research Department of the Federal Reserve Bank of Chicago. The views expressed are the authors' and do not necessarily reflect the views of the management of the Federal Reserve Bank.

Single-copy subscriptions are available free of charge. Please send requests for single- and multiple-copy subscriptions, back issues, and address changes to Public Information Center, Federal Reserve Bank of Chicago, P.O. Box 834, Chicago, Illinois 60690, or telephone (312) 322-5111.

Articles may be reprinted provided source is credited and The Public Information Center is provided with a copy of the published material.

ISSN 0164-0682

## Contents

### The new dollar indexes are no different from the old ones 3

Jack L. Hervey and William A. Strauss

*The aggregate measures of the dollar against foreign currencies produce remarkably similar information; new work should look at trade-sector and industry-group measures of the dollar.*

### Global banking, financial integration 23 major conference themes

Theresa Ford

*Bankers, regulators, academics, and others examine major banking concerns at the 23rd Conference on Bank Structure and Competition.*

### Standby letters of credit 28

G. D. Koppenhaver

*Bankers are moving more of their business off the balance sheet; proposed risk-based capital regulation may not slow the growth of such off balance sheet items as standby letters of credit.*

# The new dollar indexes are no different from the old ones

*Jack L. Hervey and William A. Strauss*

The continued deterioration in the international trade balance of the United States, despite the dramatic decline in the foreign exchange value of the dollar during the past two years, has prompted analysts to reexamine the traditional aggregate measures of the international value of the dollar. As a result, a number of new aggregate exchange rate indexes have been developed in the hope of providing insight into the changes in the international competitive position of the United States. The expectation was that such insight would shed light on why the trade account has not to date turned around.

We too joined the fray. But early on in our analysis, it began to appear that the question of the relative value of the various trade-weighted dollar indexes was, in some ways, trivial. Certainly, there are conceptual differences between the indexes, but from a practical perspective the differences appear to be minor. In those cases where a marked departure from the norm occurs, the departure largely seems to be explained by what we consider to be flaws in the index.

In this paper we discuss the background of aggregate indexes and the key conceptual issues in the construction of such indexes. In addition, we examine 12 of the indexes available in the literature. Those included are: the Federal Reserve Board's trade-weighted dollar indexes (nominal and real), the Morgan Guaranty 15-country (nominal and real) and 40-country (real) indexes, the OECD's (Organization for Economic Cooperation and Development) effective exchange rate index, the IMF's (International Monetary Fund) Multilateral Exchange Rate Model-based effective exchange rate index, the Atlanta Fed index, the Dallas Fed indexes (nominal and real), and the Chicago Fed indexes (nominal and real). In addition, as a part of our analysis we construct nominal and real "minimal" five-currency indexes that are used as benchmarks in the analysis of the other indexes.

The analysis covers the period 1971:Q1 through 1986:Q4. Composition of the exam-

ined indexes spans considerable breadth. The number of countries included range from 10 to 131. Trade-weighting schemes range from simple bilateral export-plus-import trade of the United States with the index countries to complexly derived trade weights based on a structural model of world trade. The base periods for the trade weights range from fixed values set in the mid-1970s to a 12-quarter moving average of bilateral U.S. trade updated each quarter. Seven indexes are nominal and five are real, incorporating an adjustment for change in relative prices. Three of the real indexes use relative consumer prices as the real adjustment deflator, and two use relative wholesale/producer prices for manufactured goods (excluding food and fuels). There is, in sum, considerable conceptual variation in the construction of the 12 indexes.

The analysis is based primarily on exploring the degree of correlation between the indexes—both in levels and growth rates. How much difference does the variation in the number of countries included in an index, the variation in weighting schemes, and the selection of different base periods make? Not much! The indexes, with modest exception, show a remarkable consistency in behavior.

We sympathize with the arguments which hold that in the construction of an aggregate exchange rate index it is analytically preferable to 1) use a large number of countries in the base in order to obtain as broad a measure of the trade relationship as is possible; 2) adopt a trade-weighting scheme that takes into account third-country relationships; and 3) select a base period that takes into account structural changes in international relationships. However, these factors appear to be of little practical significance.

Has then all the energy spent on the aggregate dollar indexes been misspent? We

---

Jack L. Hervey is a senior economist and William A. Strauss an economist at the Federal Reserve Bank of Chicago. The authors would like to thank Jeffrey Rosensweig and Steve Strongin for helpful comments and suggestions.

think not. To date, the work has provided analysts with a better understanding of the issues involved. We suggest, however, that as far as the aggregate (world-wide) indexes are concerned, it is time to move on to potentially more productive concerns.

Our specific conclusions are:

1) The major distinguishing characteristic of the indexes is whether they incorporate a "real" or relative price adjustment. Indexes that take relative price movement into account, including the broad indexes, are remarkably similar. While the absolute levels of the indexes vary substantially, other measures—such as "recovery ratios," which measure the decline in the dollar index since 1985-Q1 against the increase recorded since the early 1980s, and high correlations between index levels and growth rates—indicate that for the most part there is relatively little to distinguish between them.

2) The one index that departs markedly from the norm is the Dallas X-131, a nominal index. Its inclusion of countries with high rates of inflation, without adjustment for that fact, produces changes in the series that have little to do with competitiveness and risks an interpretation of the international value of the dollar that is inconsistent with the economic consequences of developments in those countries vis-à-vis those in the United States.

## Background

The emergence of floating exchange rates in 1973 following the breakdown of the Bretton Woods Agreement and the long-standing regime of fixed exchange rates opened a new era of inquiry into the components of international competition. In a span of less than two years—from August 1971 when the United States officially abandoned its gold-for-dollars convertibility to the abandonment of fixed exchange rates in March 1973—the world economy shifted from an environment of rigid price controls on relative currency values to one of market-determined values for relative currency values (albeit market-determined within a framework dictated by the economic policies pursued by the various governments).

Following the dollar float, two major aggregate exchange-rate indexes were developed and routinely published—one by the Morgan Guaranty Trust Company of New York and one by the Board of Governors of the Federal Reserve System.<sup>1</sup> These indexes were later followed by a plethora of other aggregate exchange rate indexes, including, among others, published series developed by the IMF, the OECD, additional and more detailed indexes by Morgan Guaranty, and several indexes from the regional Federal Reserve Banks, including Atlanta, Dallas, and Chicago.

Intensified interest in aggregate exchange rate indexes emerged in the mid-1980s. After four years of appreciation against major currencies the dollar peaked in the first quarter of 1985. Thereafter it declined against many of the major currencies. Still, during 1985 and 1986 U.S. international trade continued to deteriorate.

The current account balance, which on average was in surplus by about \$300 million during the 12 years 1970-1981 and recorded a \$6 billion surplus as recently as 1981, deteriorated rapidly as the exchange value of the dollar rose during the first half of the 1980s. By 1984 the current account recorded a deficit of \$106 billion. Despite the turnaround in the exchange value of the dollar in early 1985 the current account balance continued to deteriorate, recording deficits of \$118 billion in 1985 and \$140 billion in 1986.

Observers impatient to see a reduction in the current account deficit during 1985-1986, given what appeared to be a substantial depreciation in the exchange value of the dollar, began to question whether the aggregate indexes of the dollar's value were providing an accurate and appropriate measure of its international value.<sup>2</sup>

## Aggregate measure of a currency's value: The rationale

Exploratory work during the development of an aggregate exchange rate index at the Chicago Fed in early 1986 indicated that different constructions of aggregate indexes showed more similarities than differences. Given the many indexes that have been developed, and the criticism leveled against some of them, it seemed appropriate to examine several key issues relating to the construction of such

indexes. First of all: What is the rationale for the construction of such indexes and what are the general strengths and weaknesses of the components undergirding such indexes. Secondly, the issue alluded to above: Are the various aggregate indexes really that different? Do the numerous variations in weighting schemes, country inclusion, and adjustment for relative prices make a difference? To these issues we now turn.

International transactions make up a broad matrix of relationships among countries. When a currency appreciates or depreciates within a floating exchange rate regime it does so against numerous currencies, with varying rates of change against those currencies. Thus, a change in a bilateral exchange rate is of only limited use in exploring the consequences of a currency-value change on international competitiveness. It was this limitation that led analysts to form an aggregation of exchange rates in the form of an index that incorporates changes in the relative values of specified currencies against a base currency over some relevant time period—an aggregate exchange rate index, e.g., the “trade-weighted dollar.”

The intention implicit in the development and construction of an aggregate currency index is that the resulting index should provide a reliable measure of the change in the “international value” of the base currency (in effect, a measure of relative competitiveness) against the rest of the world—a change that is attributable to movements in exchange rates.

### **Index construction issues**

The worth of any index depends upon the appropriateness of its construction and the trustworthiness-of-measure of its individual components. In the case of an aggregate exchange rate index we are concerned with three primary issues:

- 1) The number and selection of currencies that should be included in order to obtain a reliable index.
- 2) The weighting scheme, that is, the relative importance to be attributed to each currency in the index. Integral issues include the selection of the economic variables that are most appropriate to determine the relative importance of the individual currencies, the

methodology for applying those weights, and the base period on which those weights rest.

- 3) The impact on the index of relative changes in inflation between the countries included in the weighting scheme and the index-defined currency, that is, the difference between a nominal or a real index.

### **Countries/currencies—a broad range of choice**

With respect to the number of currencies included in an index there is a diversity of view among researchers that is nearly as broad as the number of aggregate indexes that have been developed. For the most part the differences are relatively minor, with the sample of currencies included in the index typically ranging between 10 and 22 in number. The value of U.S. merchandise trade accounted for by the countries included in these indexes ranges from about one-half to more than four-fifths. Several expanded-base indexes have also been developed (ranging up to 131 currencies) that include the currencies of countries that account for nearly all of U.S. merchandise trade.

The argument for the inclusion of additional countries in an aggregate index rests on the premise that the broader the coverage the more accurately the weighting scheme will represent the importance of the various countries in the international activities of the base country. In part, it is argued that the relative values of numerous countries' currencies that were excluded from the indexes formulated during the mid-to-late 1970s, especially the currencies of the newly industrializing countries of the Far East and Latin America, have changed with respect to the U.S. dollar in a pattern that is different from that observed with most of the currencies included in those earlier indexes. It is also argued that the exclusion of even a few of these countries from an index ignores a substantial, and over time, an increasingly important portion of U.S. trade (see Table 1, column 3).

Some of the currencies that are typically excluded from the exchange rate indexes have been closely tied to the U.S. dollar and as a result have not experienced the variability against the dollar that has been observed in the European currencies, for example. Other cur-

**Table 1**  
**Inflation and U.S. trade with the 22 largest trading partners**  
**of the United States<sup>1</sup>**

Country <i>(arranged by geographic area)</i>	Export/import rank in 1986	Total U.S. trade by country <i>(bil. \$)</i>	Percent of total U.S. trade <i>(1986 trade)</i>	Rate of inflation by country and by area	
				1971-1980 <i>(average annual % change in CPI)</i>	1981-1986
Canada	1	114.0	18.9	9.0	6.9
Europe					
Germany	3	36.7	6.1	5.1	3.2
United Kingdom	5	27.4	4.5	14.3	6.6
France	8	17.8	3.0	10.2	8.4
Italy	9	16.1	2.7	15.0	12.5
Netherlands	11	12.2	2.0	7.3	3.6
Bel-Lux	13	9.6	1.6	7.7	6.1
Switzerland	16	8.4	1.4	4.8	3.7
Sweden	20	6.5	1.1	13.9	8.2
Spain	21	5.6	0.9	14.2	11.7
(Area total)		(140.3)	(23.3)	(9.8) <sup>2</sup>	(6.4) <sup>2</sup>
Latin America					
Mexico	4	30.0	5.0	18.0	66.4
Brazil	12	11.2	1.9	38.3	152.3
Venezuela	15	8.5	1.4	9.6	11.0
(Area total)		(49.7)	(8.3)	(21.1) <sup>2</sup>	(76.3) <sup>2</sup>
Japan	2	112.4	18.6	9.4	2.9
Pacific rim					
Taiwan	6	26.8	4.4	12.0	4.1
South Korea	7	19.9	3.3	16.8	6.5
Hong Kong	10	12.5	2.1	9.5	7.8
Singapore	17	8.3	1.4	7.2	2.5
Malaysia	22	4.2	0.7	6.5	4.0
(Area total)		(71.7)	(11.9)	(12.1) <sup>2</sup>	(5.2) <sup>2</sup>
Australia	14	8.5	1.4	10.9	8.5
China	18	8.3	1.4	—	—
Saudi Arabia	19	7.5	1.2	13.7	-1.0
22-country total <sup>3</sup>		512.4	84.8	(11.0) <sup>2</sup>	(12.4) <sup>2</sup>
United States		604.1	100.0	8.3	4.9

<sup>1</sup>Inclusion is based on the trading partners' ranking within the top 25 countries for U.S. exports-to and imports-from. A total of 22 countries met both criteria in 1986.

<sup>2</sup>The average rate of inflation for the geographic area total is weighted by U.S.-area trade contributions by country to the total area trade with the United States.

<sup>3</sup>China is not used in the 22-country CPI weighting scheme because of an incomplete CPI series.

rencies not included in the indexes depreciated relative to the U.S. dollar throughout the 1980s, even during the 1985-1986 period when most major currencies recorded substantial appreciation against the U.S. dollar.

As the relative importance of the newly industrializing countries in the international environment increased during the 1980s, the continued exclusion of their currencies from an aggregate measure of the dollar might be ex-

pected to result in an increasingly distorted picture of the international value of the dollar. It is primarily this development that during the last two years has brought about the renewed interest among economists in aggregate measures of the international value of the dollar. It has also resulted in the inclusion of additional countries/currencies in the more recently developed indexes. (Table 2 provides a summary of the characteristics of the various indexes examined in this paper.)

### **The relative importance of different currencies**

Determination of which currencies can be appropriately included in any particular index must be followed with a determination of how the relative importance of each currency is to be assigned within the index. Generally, measures of economic interaction rely on measures of international trade, in most cases merchandise trade. Several indexes adjust the value of trade to include only manufactured goods or to exclude certain types of trade that are deemed to be insensitive to exchange rate changes. Table 3 sets out the trade weights, by major geographic area, for the individual indexes.

The simplest procedure for incorporating international trade as an index weight is to assign currency weights based on the value of the bilateral trade—exports plus imports—between the index base country (in this case the United States) and the other countries included in the index.<sup>3</sup> This in fact is the manner in which most of the published indexes assign trade weights.

Economic interaction between two countries does not exist in a vacuum, however; it has an impact on third-country relationships. Consequently, changes in relative exchange rates between two countries will result in changes in their economic/trade relationships with third countries in accordance with the cross-elasticities of demand for the relevant markets.

There is diversity of view among economists as to the importance of these third-country effects and whether they should be somehow accounted for in the weighting scheme. Indeed, the diversity is not so much whether third-country effects should be accounted for but rather whether the statistical

gain from the inclusion of third-country effects is sufficiently great to offset the increased cost and complexity associated with their inclusion. Nevertheless, several indexes have undertaken approaches that attempt to take into account third-country effects.

Conceptually, an ideal methodology to take into account third-country relationships would be through a structural model of the world economy from which one could determine the relative weights to be applied to each currency—an undertaking of considerable magnitude. The International Monetary Fund utilizes this complex approach in its Multilateral Exchange Rate Model.

Another approach to the interaction of third-country relationships is characterized by multilateral trade weights such as those used in the Federal Reserve Board's trade-weighted dollar. This aggregate exchange rate index incorporates multilateral international trade weights based on the relative importance of total world trade of the countries in the index. As compared with the structural model this approach has the appealing empirical advantage of being more simply executed.

At the same time, multilateral trade weights in this form have the disadvantageous characteristic of applying extraordinarily heavy weights to geographical regions within which a great deal of intercountry trade takes place. This is especially true of those countries which in many respects function as an economic unit but which are political entities with individual currencies—such as, the European Economic Community and its European Free Trade Association neighbors.

Trade among these Western European countries is substantial. Consequently, several of these countries weigh relatively heavily in total world trade. As a result, they carry substantial weight in a multilateral index (see for example, Table 3, FRB-TWD). At the same time they may be considerably less important in terms of their bilateral trade with the United States than are Canada or Japan (see Table 1, column 3). Such distortions presumably could be corrected by aggregating the intraregional trade of these countries—the European Community's trade with the rest of the world—and using some common *numeraire*, such as the European Currency Unit, to obtain the foreign currency/dollar relationship. In effect, our minimal index, which is used in the analy-

**Table 2**  
**Summary characteristics of selected aggregate exchange rate indexes for the U.S. dollar**

Index name	Index characteristics			
	Number of currencies	Weighting scheme		Relative price adjustment (nominal or real)
		Trade-weight period	Multilateral/bilateral	
Federal Reserve Board (FRB-TWD)	10	1972-1976	Multilateral	Nominal
Morgan Guaranty (M-G15n)	15	1980	Bilateral (trade in manufacturers)	Nominal
Chicago Fed (7-Gn)	16	Moving average, 12 quarters	Bilateral	Nominal
IMF effective (IMF)	17	1972 (years through 1974); 1977 (years 1975 on)	Multilateral (Multilateral Exchange Rate Model)	Nominal
Atlanta Fed (ATLANTA)	18	1984	Bilateral	Nominal
OECD effective (OECD)	22	Moving average, annual	Bilateral (double-weighted, based on manufactured goods production and trade)	Nominal
Dallas Fed (X-131)	131	Moving average, annual	Bilateral	Nominal
Federal Reserve Board (FRB-TWDr)	10	1972-1976	Multilateral	Real, CPI-based
Morgan Guaranty (M-G15r)	15	1980	Bilateral (trade in manufacturers)	Real, wholesale prices of manufactured goods, excluding food and fuels
Chicago Fed (7-Gr)	16	Moving average, 12 quarters	Bilateral	Real, CPI-based
Morgan Guaranty (M-G40)	40	1980	Bilateral (modified to take into account U.S. competitiveness in foreign markets for trade in manufacturers)	Real wholesale prices of manufactured goods, excluding food and fuels
Dallas Fed (RX-101)	101	Moving average, annual	Bilateral	Real, CPI-based
-----				
Minimal (MIN <sub>n</sub> )	5	Moving average, 12 quarters	Bilateral	Nominal
Minimal (MIN <sub>r<sub>c</sub></sub> )	5	Moving average, 12 quarters	Bilateral	Real, CPI-based
Minimal (MIN <sub>r<sub>w</sub></sub> )	5	Moving average, 12 quarters	Bilateral	Real, wholesale prices of manufactured goods excluding food and fuels

sis presented later, uses a regional grouping technique although it retains bilateral trade weights.

Morgan Guaranty and the OECD have recently adopted a modified approach to the

bilateral weighting scheme that attempts to take into account third-country interactions. In effect, they use a double weight, first determining a measure of the competitiveness of the dollar against other major competitors in each



**Table 3**  
**Trade weights by index**

<u>Index name<sup>1</sup></u> <i>(trade-weight period)</i>	<u>Canada</u>	<u>Japan</u>	<u>Western Europe</u>	<u>Pacific rim developing countries<sup>2</sup></u>	<u>Other</u>	<u>Total</u>
FRB-TWD nominal and real (1972-76)	0.091	0.136	0.773	—	—	1.000
M-G15 nominal and real (1980)	0.303	0.232	0.441	—	0.024	1.000
7-G <sup>3</sup> nominal and real (1985)	0.298	0.215	0.322	0.144	0.021	1.000
IMF nominal (1977)	0.203	0.213	0.535	—	0.049	1.000
ATLANTA nominal (1984)	0.288	0.213	0.298	0.157	0.044	1.000
OECD <sup>3</sup> nominal (1985)	0.287	0.337	0.363	—	0.013	1.000
M-G40 real (1980)	0.207	0.185	0.381	0.089	0.138	1.000
RX-101 <sup>3</sup> real (1985)	0.210	0.171	0.253	0.142	0.224	1.000
X-131 <sup>3</sup> nominal (1985)	0.207	0.168	0.252	0.137	0.236	1.000
-----						
MIN <sup>3</sup> nominal and real (1985)	0.305	0.219	0.328	0.148	—	1.000

<sup>1</sup>The published indexes are ordered by the number of countries (low to high) included in the index.

<sup>2</sup>Includes one or more of the following countries: Taiwan, South Korea, Hong Kong, China, Singapore, Indonesia, Malaysia, Thailand.

<sup>3</sup>The trade weights for these indexes change over time. The weights shown are for 1985.

specific foreign market in the index and then averaging these weights in proportion to U.S. bilateral trade with those markets. Morgan Guaranty uses this procedure with its 40-country real index.<sup>4</sup>

### **The structure of world trade is constantly changing**

Another factor that must be taken into account in the weighting scheme is the selection of an appropriate base period upon which the index weights are set. The worrisome nature

of this issue centers on the perennial index number problem of the reliability of an index if the economic structure underlying the index is changing while the weighting mechanism is fixed in time.<sup>5</sup> Nonetheless, most of the aggregate dollar indexes in the literature utilize fixed-weight bases. For some of the indexes the bases are periodically updated so as to utilize recent weights that more accurately reflect the current trade structure. Still these suffer from the structural change distortions imposed by longer-term analysis.

Indexes developed at the OECD and more recently at the Federal Reserve Banks of Chicago and Dallas have approached this issue by adopting moving weights, but not without some cost. While an accounting of the influence of structural change on exchange rates over time is realized, a moving weight makes it more difficult to interpret period-to-period changes. The analytical advantage of a constant and known frame of reference is lost.

### A nominal or a real index

The third major hurdle that confronts the construction of an aggregate exchange rate index is the issue of relative changes in price levels between countries. An exchange rate is a measure of the nominal “price” of one currency in terms of another. In the short term a change in the relative price between two currencies does not necessarily reflect an equivalent divergence in the economic relationships between those countries. When the price relationship between currencies is changing, the relationships between other economic variables—real and nominal—are also changing, but not necessarily in tandem. Consequently, an understanding of the real economic impact of a change in exchange rates also requires an understanding of what is happening in the real sectors.

During any given period of time it is only by coincidence that the relative change in inflation for any two countries changes in proportion to the observed change in the nominal exchange rate. Thus, a measure of the “real” economic consequences of a relative change in an exchange rate requires that the nominal exchange rate be adjusted to take into account the divergence in real developments.

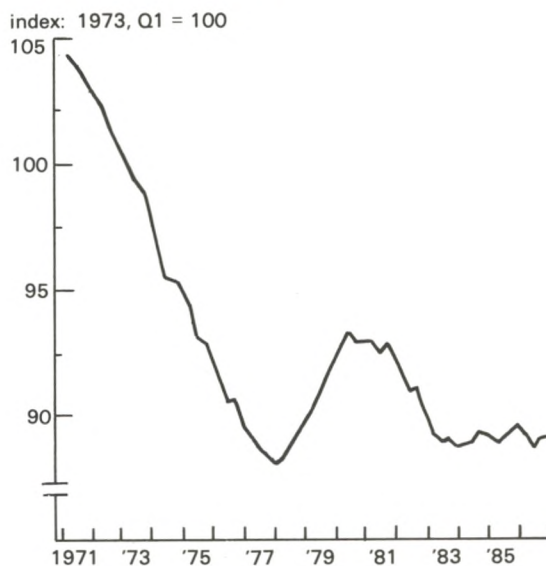
Those aggregate exchange rate indexes that have incorporated real adjustments have typically used relative price levels between countries as the adjustment factor. A real adjustment factor based on the relative change in prices has several advantages, not the least of which is the availability of data. In a market economy prices incorporate, albeit indirectly, a broad spectrum of real and nominal economic forces. To the extent that components related to price change (due to advances in productivity, quality change, inflation, and so forth) can be isolated to accurately identify the non-real influences on the economy, a country’s

price index is a useful tool in the measurement of the progression of relative economic developments between countries.

Consider what relative price adjustments mean in terms of the impact on exchange rates. If U.S. prices are declining relative to prices abroad (exchange rates remaining the same) foreign buyers will be able to buy more U.S. goods for a fixed amount of foreign currency. Furthermore, because U.S. goods are less expensive relative to foreign goods U.S. buyers will tend to substitute U.S. goods for foreign goods. In this sense, the relative decline in U.S. prices is equivalent in its effect to a depreciation of the dollar. The real economic impact during a period when exchange rates are moving depends on more than just the nominal change in exchange rates.

In an environment where the dollar is depreciating relative to other currencies and at the same time U.S. prices are falling relative to prices abroad—a pattern observed during 1971-1977 (see Figure 1)—the nominal depreciation understates the real depreciation. In an exchange rate/inflation relationship that economists think of as more “normal,” such as during 1978-1980, the dollar was continuing to

Figure 1  
U.S. consumer prices relative to 16 foreign countries<sup>1</sup>



<sup>1</sup> Australia, Belgium-Luxembourg, Canada, France, Hong Kong, Italy, Japan, Netherlands, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, United Kingdom, and West Germany.

depreciate, but U.S. price levels were moving up, relative to price levels abroad. In this case the increase in the U.S. relative price level was sufficient to offset the nominal depreciation in the dollar. Thus, the real value of the dollar was appreciating.<sup>6</sup>

In sum then, a nominal measure of the change in an exchange rate may not provide the whole story, indeed possibly not even an accurate story. Under conditions where there is a divergence in price performance between countries the failure to adjust nominal exchange rates for the divergence leads to a distortion of the aggregate index. Clearly, however, so long as the relative price conditions between economies remain stable, whether the index is nominal or real doesn't make any difference. Under such conditions a nominal index is a satisfactory proxy for a real index.

### **All price measures are not the same**

What is the appropriate price index? In our view the answer depends as much on the question being asked as the specifics of the price index. We contend that questions dealing with the macroeconomic relationships of the exchange rate as they relate to broad scale competitive factors, such as the relative cost of doing business in one economy as compared with another, might appropriately lean toward the use of a general price indicator. A general index, such as a GNP deflator or consumer price index (which we use in the 7-Gr index), that reflects overall price performance can fulfill this requirement.

On the other hand, questions that are strictly concerned with merchandise trade patterns might best be addressed using a price measure that is more closely aligned with internationally traded goods and that does not include a services component, such as the wholesale/producer price measures or export/import prices. (Morgan Guaranty argues for the use of wholesale/producer prices—excluding the volatile foods and fuels categories—as the appropriate deflator.) From a practical point of view, price data are most readily available by country for the consumer price index. Indeed, as the number of countries included in an index increases, one is forced toward the use of the CPI.

Apart from the issue of which price index to use, price adjustments in general have other

difficulties. They face problems of comparability of coverage across countries as well as within countries. In addition to such measurement problems, we are faced with bias introduced by price/wage distortions resulting from government action—such as price controls and administered prices. Thus, real adjustments to the aggregate measures of the exchange rate must be interpreted with some caution.

This caveat applies in particular to those countries where the question of data reliability is a major concern and where inflation rates are comparatively high, as in much of Latin America. Measurement error potentially has serious implications under these conditions. A hypothetical measurement error of 10 percent, for example, may be acceptable from an empirical point of view for countries with similar and comparatively low rates of inflation, or where inflation rates hold reasonably stable.

The implications are quite different, however, if the same degree of measurement error is present and one country's prices are increasing at, say, a 5 percent rate while another country's prices are advancing at a 150 percent rate. The magnitude of the error, by itself, for the high inflator could swamp several times over the change in the rate of inflation for the low inflator.

In dealing with this issue economists are faced with an environment in which several important trading partners of the United States fall into this category of high inflation countries—Mexico and Brazil in particular among major U.S. trading partners. Mexico's average annual inflation rate rose 66 percent between 1980 and 1986 and Brazil's average annual inflation rate rose 152 percent during the same period. The comparable figures for the United States and the major trading countries of Western Europe were 5 percent and 6 percent, respectively (see Table 1, column 5).

Thus, the analyst faces a dilemma. Several high inflators are important trading partners of the United States. At the same time, the inclusion of high inflators in an aggregate exchange rate index may present serious analytical problems. In a nominal index one or two high inflators, even those with relatively small amounts of U.S. trade, exert considerable distortion on the movements of the index. Under such conditions a real adjustment is requisite. While the result of the adjustment

justment must be viewed with considerable caution, still, one must expect that the relative-price-adjusted index, though it might be flawed by measurement error, would be superior to the unadjusted nominal index.

### The indexes: Are they different with respect to the dollar's value?

The first step in our statistical analysis of the 12 indexes is based on the pair-wise correlation of the indexes—both on levels and on growth rates. Given the construction of the indexes we expected that the indexes would be highly correlated in terms of levels, but that in itself would not be very enlightening. On the other hand, a high degree of correlation between the indexes for both levels and growth rates would constitute a substantially stronger statement as to the similarity between the various indexes.

Of the 12 indexes included in this study, which we refer to generically as “actual” indexes, a first examination shows one index stands out from the others. The Dallas X-131, a nominal index, diverges from the pack early in the series (see Figure 2).

The X-131 bottomed out in 1973, shortly after the dollar floated, in contrast with the other 11 indexes where the dollar trough occurred during the 1978-1980 period. Based on

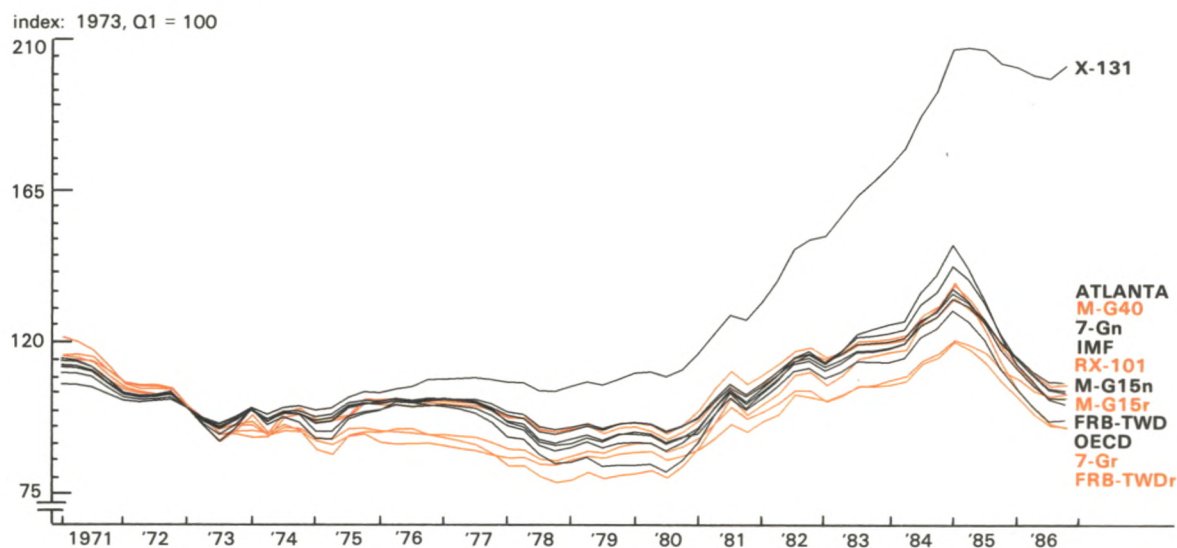
this index, the deterioration in the competitive position i.e., the rise, of the dollar began in the third quarter of 1973, not the late 1970s-early-1980s, and extended to the first quarter of 1985 when the dollar peaked for all 12 of the indexes. Following the 1985 peak the X-131 showed only a slight decline as compared with substantial declines recorded by the other indexes.

The difference in the pattern traced by the X-131 index also shows up in the correlations between the various indexes. The correlations between the X-131 and the other 11 indexes, in both levels and growth rates, are relatively low (see Tables 4 and 5).

This pattern is not unique to the X-131 but rather is common to those indexes that include the currencies of countries with high and divergent rates of inflation, and for which no adjustment is made for relative rates of inflation. Morgan Guaranty Trust reports in its November/December 1986 issue of *World Financial Markets* that its nominal 40-country broad index (not published), which serves as the base for its real 40-country broad index, suffers from the same inflation-induced distortions that we outlined earlier in the sections on nominal/real indexes and price measures.

Indeed, we found the patterns traced by the X-131 and the Morgan Guaranty 40-country nominal (not formally included in

Figure 2  
Trade-weighted dollar indexes  
(real indexes in color)



this analysis) indexes to be similar, with correlation coefficients for index levels and growth rates at 0.996 and 0.975, respectively. With respect to the number of countries included in a nominal index, Morgan Guaranty notes that "... the currency list could be slashed to the top 20 U.S. trade partners, including LDCs, and still provide much the same reading on the dollar." On this point they conclude: "Once these high-inflation developing-country exchange rates are included in a dollar index, a purely nominal construct loses all utility for gauging U.S. trade competitiveness."<sup>7</sup> We concur. At best, we do not know how to interpret such an index; at worst, it is misleading.

### **The minimal index: A base for analysis**

As noted above, simple correlations between the various indexes indicate a high degree of similarity of the indexes, one with another. From Tables 4 and 5 we see that the coefficients between the levels of the various nominal indexes (excluding X-131) are 0.960 and above. Importantly, in this connection, the correlations in terms of growth rates are also high—0.952 or higher. Even the relationships between the nominal and real indexes tend to be respectable. Interestingly, the correlations between the real indexes are less uniformly high, a fact that seems to be related to the form of the deflators—a point we will discuss in more detail later.

The indexes we are now dealing with range in size, in terms of countries in the base, from 10 to 22 for the nominal indexes and 10 to 101 for the real indexes. It appears that the number of countries might not be a major factor in the performance of the index, in so far as how closely they are related one to another.

This raises an interesting question. How much information, in terms of the correlation between indexes, would we lose by constructing a "minimal" index incorporating, say, only five currencies? Would such an index be able to account for most of the variation observed in the more detailed indexes during the past 15 years?

The selection of five countries is not an arbitrary number for the construction of a minimal index. Indeed, the results of the previous work suggests that the source of the variability in the indexes is localized in a few

geographical regions—Europe, the Pacific rim, and Canada. Thus, we contend that a five-country minimal index (which we refer to as the MIN<sub>n</sub> [nominal], the MIN<sub>r<sub>c</sub></sub> [real, consumer price-adjusted] and the MIN<sub>r<sub>w</sub></sub> [real, wholesale price-adjusted—constructed to explore in more detail the Morgan Guaranty real indexes]), actually has reasonably strong theoretical underpinnings.

Eight Western European currencies have been closely tied to each other in the European Monetary System (EMS) for much of the 1971-1986 period. One major currency out of this area could reasonably be expected to represent the general currency movements of the region. Because of the importance of the German mark as an international currency we selected it as the representative currency for continental Europe, with the trade weights applicable to the sum of U.S. bilateral trade with the eight Western European countries included in the 7-G indexes (Belgium-Luxembourg, Germany, France, Italy, the Netherlands, Spain, Sweden, and Switzerland—not all are members of the EMS).

The four remaining currencies included in the minimal index are the U.K. pound (a major international currency and the fifth largest trade partner of the United States), the Canadian dollar (the largest trade partner of the United States), the Japanese yen (a major international currency and the second largest trade partner of the United States), and the Korean won (the seventh largest trade partner of the United States). The won is included to represent the changing composition of U.S. trade with the Pacific rim countries. The trade weight applicable to the won is based on the sum of U.S. bilateral trade with South Korea, Taiwan, Hong Kong, and Singapore. (The five countries that make up the minimal index accounted for 51 percent of the dollar value of U.S. merchandise trade in 1986.)

The mechanics of the nominal minimal index construction are the same as for the Chicago Fed's 7-G<sub>n</sub> index. The real consumer price-adjusted index uses the CPI of the United States relative to the CPIs of the five minimal index countries as the deflators. The real wholesale price-adjusted index uses the WPI (excluding food and fuel) of the United States relative to the WPIs (excluding food and fuel) of the five minimal index countries as its deflator.

The six actual nominal indexes were compared with the nominal minimal index. As indicated in Table 6 the actual indexes recorded correlations with the minimal index that were all above 0.977 in levels and 0.958 in growth rates.

Not surprisingly, the five real indexes were not as strongly correlated with the nominal minimal index, having values above 0.917 in levels and 0.881 in growth rates. However, when the minimal index was adjusted for relative price changes, using consumer prices or wholesale prices, the correlations improved. The correlations between the real indexes (three CPI-based and two WPI-based) against the corresponding real minimal indexes (CPI-

or WPI-based, respectively) are above 0.969 in levels and 0.937 in growth rates.

Thus, the actual indexes are highly correlated with the similarly based minimal index. Correlation analysis indicates the strength of the linear relationship between the two series. A way of graphically displaying the difference between the minimal and actual series, above and beyond a linear relationship as noted above, is to modify one of the series using a linear transformation. Graphically displaying the minimal series against the transformed series will highlight whether there is any difference beyond this simple linear transformation. We chose to transform the actual trade-weighted dollar series using the slope and in-

**Table 4**  
Correlation coefficients between the indexes—levels

	Nominal indexes							Real indexes				
	FRB-TWD	M-G15n	7-Gn	IMF	ATLANTA	OECD	X-131	FRB-TWDr	M-G15r	7-Gr	M-G40	RX-101
FRB-TWD	—											
M-G15n	0.9953	—										
7-Gn	0.9795	0.9889	—									
IMF	0.9952	0.9975	0.9915	—								
ATLANTA	0.9845	0.9935	0.9965	0.9951	—							
OECD	0.9833	0.9866	0.9602	0.9769	0.9682	—						
X-131	0.7632	0.7796	0.8417	0.8037	0.8918	0.6737	—					
FRB-TWDr	0.9606	0.9520	0.9136	0.9527	0.9637	0.9576	0.6366	—				
M-G15r	0.9701	0.9801	0.9790	0.9792	0.9812	0.9689	0.7562	0.9440	—			
7-Gr	0.9109	0.9087	0.8641	0.9083	0.9607	0.9198	0.5795	0.9851	0.9117	—		
M-G40	0.9707	0.9793	0.9795	0.9814	0.9903	0.9576	0.7962	0.9398	0.9906	0.9112	—	
RX-101	0.9067	0.9016	0.8701	0.9116	0.9460	0.8782	0.7060	0.9567	0.8844	0.9656	0.9129	—

**Table 5**  
Correlation coefficients between the indexes—growth rates

	Nominal indexes							Real indexes				
	FRB-TWD	M-G15n	7-Gn	IMF	ATLANTA	OECD	X-131	FRB-TWDr	M-G15r	7-Gr	M-G40	RX-101
FRB-TWD	—											
M-G15n	0.9732	—										
7-Gn	0.9676	0.9955	—									
IMF	0.9867	0.9902	0.9858	—								
ATLANTA	0.9576	0.9966	0.9943	0.9816	—							
OECD	0.9518	0.9878	0.9861	0.9761	0.9884	—						
X-131	0.8832	0.9074	0.9033	0.9025	0.9126	0.8779	—					
FRB-TWDr	0.9854	0.9651	0.9597	0.9777	0.9509	0.9441	0.8837	—				
M-G15r	0.8876	0.9198	0.9192	0.9101	0.9133	0.9093	0.8358	0.8910	—			
7-Gr	0.9297	0.9696	0.9729	0.9563	0.9725	0.9610	0.9007	0.9580	0.9112	—		
M-G40	0.8507	0.8878	0.8904	0.8745	0.8866	0.8811	0.8448	0.8513	0.9849	0.8829	—	
RX-101	0.8688	0.9084	0.9054	0.8967	0.9072	0.8924	0.9343	0.9060	0.8588	0.9488	0.8633	—

**Table 6**  
**Correlation coefficients between the actual indexes**  
**and the minimal indexes**

	Nominal indexes						Real indexes				
	FRB-TWD	M-G15n	7-Gn	IMF	ATLANTA	OECD	FRB-TWDr	M-G15r	7-Gr	M-G40	RX-101
<b>Levels</b>											
MINn	0.9903	0.9948	0.9857	0.9943	0.9934	0.9771	0.9583	0.9812	0.9215	0.9809	0.9173
MIN <sub>C</sub> CPI-adjusted	—	—	—	—	—	—	0.9880	—	0.9943	—	0.9687
MIN <sub>w</sub> Wholesale/producer price-adjusted	—	—	—	—	—	—	—	0.9918	—	0.9911	—
<b>Growth rates</b>											
MINn	0.9580	0.9787	0.9834	0.9664	0.9791	0.9675	0.9581	0.9121	0.9701	0.8812	0.9035
MIN <sub>C</sub> CPI-adjusted	—	—	—	—	—	—	0.9499	—	0.9875	—	0.9371
MIN <sub>w</sub> Wholesale/producer price-adjusted	—	—	—	—	—	—	—	0.9529	—	0.9495	—

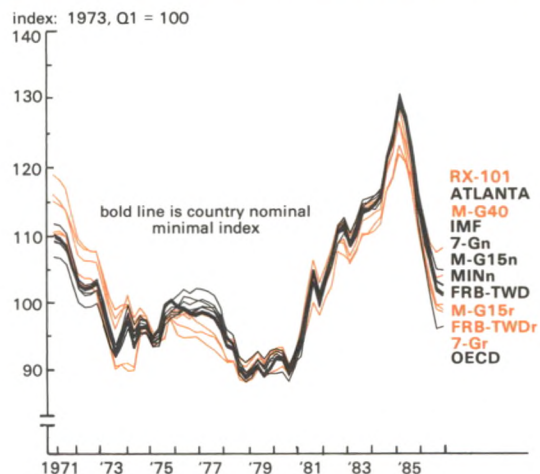
tercept coefficients generated by least squares regression analysis.

We used the nominal and real minimal indexes as dependent series and regressed pairwise the respective nominal and real indexes being examined. We then plotted on the same graph the minimal index and the transformed actual series using the regression coefficients to perform the transformation. The results of this exercise are presented in Figures 3 to 7. In each of these graphs the bold line represents one of the minimal indexes. If the hypothesis that there is no substantial difference between the indexes holds, one would expect the indexes to trace similar and tight patterns over time. To the degree the transformed values of the actual indexes differ from the minimal index this suggests that the series are different. In Figure 3 the nominal minimal index, along with the transformed values of the actual indexes, both real and nominal, seem to track one another fairly well. Some of the real indexes tended to be either the furthest above (1971-1973) or below (1973-1974, 1976-1978, 1983-1985) the nominal minimal index.

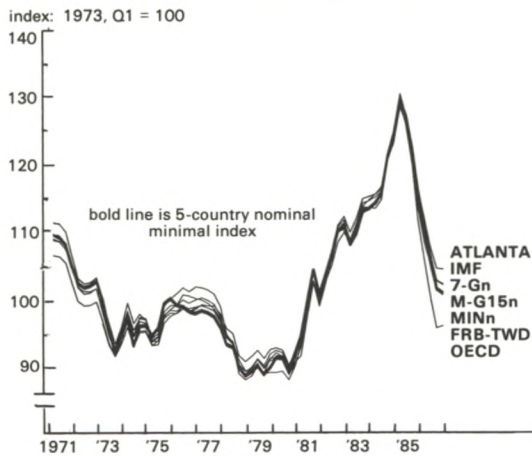
The distinction between the real and nominal indexes is clearly indicated in Figures 4 and 5. These figures graphically illustrate the close relationship between the nominal minimal index and the transformed values of the actual nominal indexes (Figure 4) and the somewhat different path of the nominal minimal and the real indexes (Figure 5). The lower correlation of the Morgan indexes with the

other real indexes is borne out in Figures 5 and 6 as these indexes, somewhat surprisingly, tend to stay with the nominal minimal index during the 1970s (Figure 5) and depart from the real consumer price-adjusted minimal index (Figure 6). Figure 7 plots the relatively close path followed by the consumer price-adjusted real minimal index and the transformed values of the three real indexes that use the CPI as an adjustment factor—FRB-TWDr, 7-Gr, and RX-101. As indicated in Table 6, lines 2 and 5, in general the correlations between these

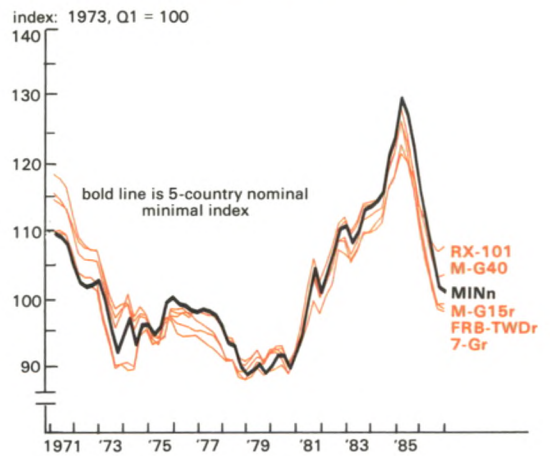
**Figure 3**  
**Nominal minimal index and the linear transformation of the nominal and real indexes**



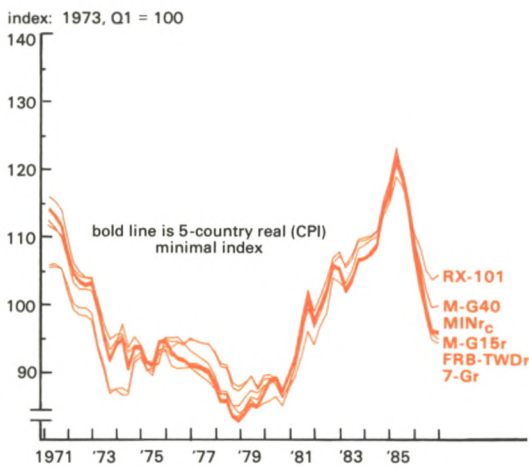
**Figure 4**  
Nominal minimal index and the linear transformation of the nominal indexes



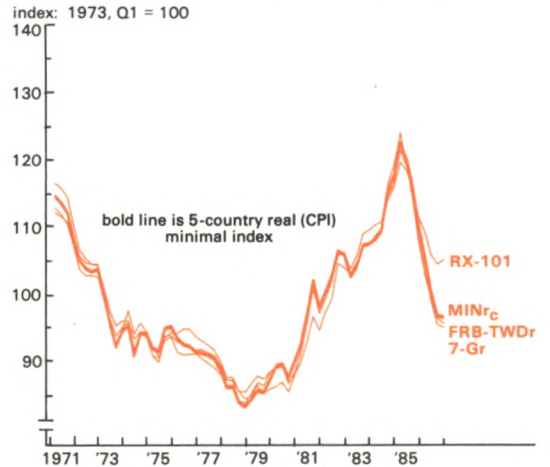
**Figure 5**  
Nominal minimal index and the linear transformation of the real indexes



**Figure 6**  
Real minimal index (CPI-adjusted) and the linear transformation of the real indexes



**Figure 7**  
Real minimal index (CPI-adjusted) and the linear transformation of the CPI-adjusted real indexes



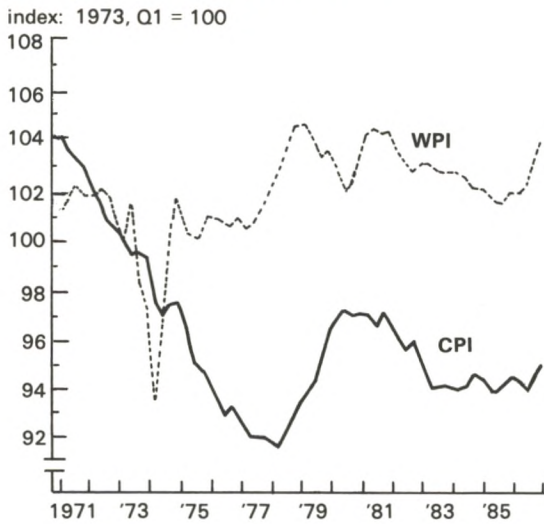
three indexes and the minimal index improved in both levels and growth rates when the minimal index was adjusted for consumer price changes. The diverging index during late 1985 and 1986 is the RX-101. In Figure 6 we see both broad indexes, the RX-101 and the M-G40, diverging from the pack during 1986.

We expected that in large part this difference with respect to the Morgan Guaranty

indexes might be due to the use of different deflators in the minimal index. Recall that Morgan uses relative wholesale/producer prices for manufactured goods, excluding food and fuels (for those countries for which those series are available and consumer prices for the others). Cursory examination of the paths traced by relative CPIs and WPIs (see Figure 8) during the 1971-1986 period indicates that some



**Figure 8**  
**U.S. consumer and wholesale prices**  
**relative to 5 foreign countries<sup>1</sup>**

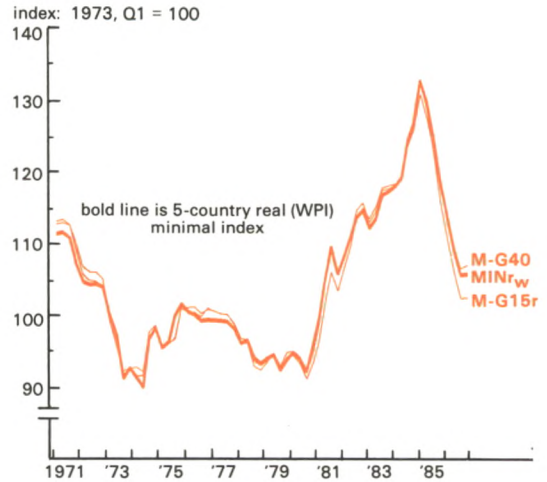


<sup>1</sup>Canada, Japan, South Korea, United Kingdom, and West Germany.

distinction should be expected between dollar indexes deflated by the two forms of deflator. During the period 1971-1977 U.S. consumer prices declined relative to those abroad. Relative U.S. prices trended upward in the late 1970s and early 1980s, but from 1983 through 1986 relative CPIs remained stable. Throughout this period, relative wholesale/producer prices appeared to vary around a constant level. Thus, one would expect that a wholesale price-adjusted index would perform similarly to a nominal index, that is, an index that was unadjusted or adjusted using a multiplicative factor of one.

To test this supposition we reformulated the deflator of the real minimal index, replacing relative consumer prices with the relative wholesale prices used by Morgan (see Figure 9). The results of this modification, shown in Table 6 (lines 3 and 6), support our contention. The correlation coefficients between the relative price adjusted minimal indexes and the Morgan real indexes increase. The correlation between the index levels of the MIN<sub>n</sub> and the M-G15r and M-G40 were both 0.981, but increased to 0.992 and 0.991, respectively, when the MIN<sub>n</sub> was adjusted using relative wholesale prices (MIN<sub>r,w</sub>). A similar increase was also noted in the correlations between the growth rates of the indexes.

**Figure 9**  
**Real minimal index (WPI-adjusted) and the**  
**linear transformation of the WPI-adjusted**  
**real indexes**



### Recovery-ratios

Since the exchange value of the dollar peaked and began to decline in the first quarter of 1985 there has been considerable emphasis in the literature on the magnitude of that decline. The magnitude is typically expressed as a percentage decline in the value of the dollar against a specific currency or the percentage decline of a specific aggregate dollar exchange rate index. Percentage change measures of the dollar's decline from the first quarter of 1985 through the fourth quarter of 1986 result in substantially different answers, depending upon which index is used. These differences have been a major contributing factor in the recent interest in aggregate exchange rate indexes.

Of the large number of indexes we examined, all but two recorded percentage declines in a broad range of 20 percent to 38 percent (logarithmic basis) during the period 1985-Q1 to 1986-Q4. (Two indexes diverge from the others on the low end, with declines ranging from 2.4 percent to 14.3 percent for the X-131 and RX-101, respectively.)

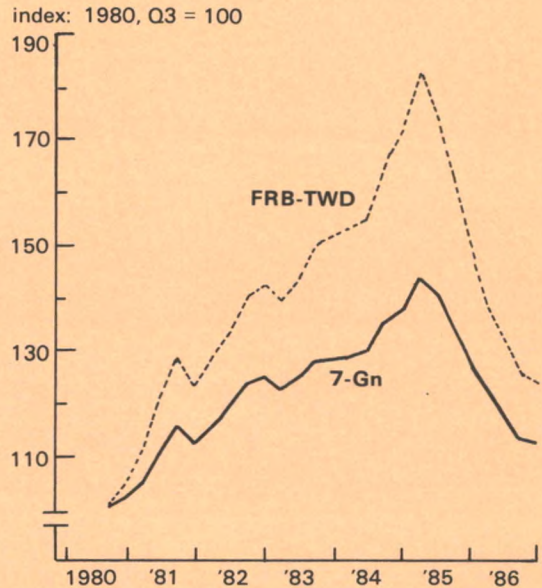
We contend that any comparison of these aggregate exchange rate indexes that looks only at the measured declines in percentage terms since the first quarter of 1985 offers an inade-

## Recovery-ratios

The recovery-ratio for any specific aggregate exchange-rate index is defined as the recorded decline in the index since the peak as a ratio of the previous recorded increase from the trough. The specific recovery-ratio we deal with is the change in an aggregate exchange-rate index during 1985-Q1 to 1986-Q4 as a ratio of the change in the index between 1980-Q3 and 1985-Q1. The difference in construction of the indexes contribute to differences in scale between the indexes. Over time the indexes will also show different degrees of variability. But as our linear transformation analysis indicated, a great deal of the apparent difference between the various indexes is little more than scale difference.

Thus, to note that one index declines, for example, by 38 percent while during the same period another index declines by 24 percent is a noninteresting tidbit of information if we do not know the historical track of the two indexes. During the previous five years had the first index increased 60 percent, or 37 percent, or not at all? By the same token, had the second index also increased 60 percent, or 37 percent, or not at all?

### Trade weighted dollar indexes



In fact, the indexes in this example, the FRD-TWD and the 7-Gn, respectively, (see figure), increased during the first half of the 1980s by 60 percent and 37 percent, respectively, and their subse-

quate, if not a distorted, view of recent exchange rate movements. While comparisons of such measures may be “interesting,” standing alone they are void of economic content. The magnitude of the decline for any specific index relative to another index, as a statement about international competitive developments, is relevant only in terms of the previous recorded increases for those two indexes. Otherwise, we are faced with a “scale” problem between indexes the importance of which we are unable to gauge.

We are convinced that if the issue is the international competitiveness of a currency, as reflected by an aggregate index, a longer term view is required in order to place the issue in proper perspective. Specifically, we suggest that the 1985-1986 depreciation of the dollar be viewed in relation to the 1980-1985

appreciation—a relationship we have called the “recovery-ratio” (see box).

Of the 15 aggregate dollar indexes (including the three minimal indexes), five nominal indexes and one real index (FRB-TWD, M-G15n, 7-Gn, IMF, MINn, and MINr<sub>w</sub>) recorded tight recovery-ratios, between 0.67 and 0.72 (see Table 7). Four of the real indexes recorded tight but somewhat higher recovery-ratios. The FRB-TWD<sub>r</sub>, M-G15<sub>r</sub>, 7-Gr, and MINr<sub>c</sub> were clustered at 0.74 and 0.76. The OECD's nominal index recorded a recovery-ratio of 0.82. This large value for the recovery ratio is probably explained by the OECD's significantly larger weight on the Japanese yen.<sup>8</sup> Two of the remaining four indexes, M-G40 and ATLANTA (real and nominal, respectively), recorded somewhat lower, but

quent declines during the past two years—38 percent and 24 percent, respectively—were such that their recovery-ratios (that is, the declines in the two indexes as ratios of their respective previous increases) are virtually identical—0.70 for the FRB-TWD and 0.69 for the 7-Gn. Clearly this result

would not have been expected from comparing only the post-1985-Q1 percentage declines for these two indexes. The table includes the typically reported percentage declines (column 4) as well as the recovery-ratios (column 5) for the twelve indexes plus the minimal indexes constructed for this paper.

Recovery-ratio of the indexes<sup>1</sup>

Index	Index level 1980, Q3	Index high 1985, Q1	Recent index value 1986, Q4	Percentage decline from 1985, Q1 to 1986, Q4 <sup>2</sup>	Recovery-ratio
FRB-TWD	81.52	149.33	102.13	-38.0	0.70
M-G15n	89.74	136.42	103.71	-27.4	0.70
7-Gn	93.24	134.97	106.10	-24.1	0.69
IMF	87.72	143.06	105.51	-30.4	0.68
ATLANTA	93.63	133.41	108.59	-20.6	0.62
OECD	90.22	129.92	97.27	-28.9	0.82
X-131	109.83	207.27	202.37	-2.4	0.05
MINn	89.99	129.99	101.40	-24.8	0.71
FRB-TWD <sub>r</sub>	78.97	137.74	94.40	-37.8	0.74
M-G15 <sub>r</sub>	92.00	136.98	103.21	-28.3	0.75
7-Gr	86.57	120.08	94.60	-23.8	0.76
M-G40	90.34	133.02	107.22	-21.6	0.60
RX-101	84.30	120.60	104.50	-14.3	0.44
MIN <sub>r<sub>c</sub></sub>	87.42	122.26	96.36	-23.8	0.74
MIN <sub>r<sub>w</sub></sub>	92.01	132.38	105.35	-22.8	0.67

<sup>1</sup>All indexes are normalized to 100.0 as of 1973, Q1.

<sup>2</sup>Logarithmic basis:  $100 \cdot \ln \left[ \frac{(\text{index value } 1986, \text{ Q4})}{(\text{index value } 1985, \text{ Q1})} \right]$

not out-of-range, recovery-ratios of 0.60 and 0.62, respectively.

Not surprisingly, the Dallas X-131 index recorded a ratio of only 0.05. The Dallas RX-101 index recorded a substantially higher recovery-ratio than did the nominal, but at 0.42 it remained well below that of the other indexes, indicating that, despite the rather high correlations noted earlier, this index is likely a somewhat different series than the other real indexes.

## Conclusion

In the wake of floating exchange rates, a broad spectrum of exchange rate relationships has unfolded. During the past 15 years the exchange value of the dollar has varied dramatically and in contrary fashion against some

currencies and has varied hardly at all against others. Numerous diverse attempts have been made by researchers intent on exploring what has "truly" happened to the international value of the dollar. If that measure can be accurately formulated then possibly we can more firmly grasp an understanding of the competitive impact on the U.S. economy of changes in the exchange value of the dollar. In this paper our exploration has been more modest. We examined 12 published indexes of the dollar's international value, asking a simple question. Are these indexes different?

The formulations of the indexes are indeed different. The number of countries included in the indexes and the schemes for determining how much importance should be placed on each currency vary widely. Five in-

**Table 7**  
**Recovery-ratio of the indexes**

Index	Recovery-ratio
FRB-TWD	0.70
M-G15n	0.70
7-Gn	0.69
IMF	0.68
ATLANTA	0.62
OECD	0.82
X-131	0.05
MINn	0.71
FRB-TWDr	0.74
M-G15r	0.75
7-Gr	0.76
M-G40	0.60
RX-101	0.44
MIN <sub>r<sub>c</sub></sub>	0.74
MIN <sub>r<sub>w</sub></sub>	0.67

dexes take into account relative rates of inflation. Seven do not.

But, do the indexes differ in their behavior? Not much. Indexes that include countries with large rates of inflation and where adequate adjustment for that inflation is not incorporated are indeed different from the pack. In our view that difference is based on flawed conceptual construction. Those broad indexes that do attempt to account for the inflation issue by incorporating a relative price adjustment track considerably closer to the pack, but we remain concerned about the measurement bias in the relative price statistics, particularly for the high-inflation countries and those where prices are administered. Apart from that difficulty the indexes are remarkably similar. The indexes are highly correlated in terms of levels and growth rates. Furthermore, in most cases their recovery-ratios during the 1980-1986 period are similar.

One further distinction needs to be drawn—that is, with respect to deflators used to adjust the nominal indexes. Our analysis suggests that serious consideration be given to the rationale for the selection of the deflator series, as some difference appears between the CPI and WPI (excluding food and fuel) series—total WPI (not reported in detail in this analysis) provides yet another pattern. As we noted earlier, we think that the appropriate deflator is dependent on the question of inter-

est; we do not believe that there is a “right” adjustment index for all purposes.

In summary, with modest exception, the more recently constructed indexes of the dollar’s international value differ little from those constructed a decade ago. We suggest that if additional profitable research is to be done in this area it will likely be necessary to look at aggregate exchange-rate measures defined by trade sector (or industry grouping) by country.<sup>9</sup> In any case, the new aggregate exchange-rate indexes do not appear to provide measures of the international value of the dollar that shed much additional light on questions pertaining to *past* developments in the U.S. trade account.

<sup>1</sup> In fact, the basis for an aggregate dollar-value index existed prior to the dollar’s devaluation in 1971. The International Monetary Fund created a unique form of international reserve asset called Special Drawing Rights (SDRs), the first allocation of which was made in 1970. The SDR was initially valued in terms of gold. In July 1974 the IMF abandoned gold as the basis for valuation and adopted a weighted average of the currencies of 16 countries (including the United States) to define the SDR. In 1981 the number of country/currencies used to define the SDR was reduced to five (the French franc, German mark, Japanese yen, U.K. pound, and U.S. dollar). A problem with using the SDR as an aggregate index, apart from the shift in country composition, is that the U.S. dollar weighs heavily in the SDR’s composition.

<sup>2</sup> A point that should be obvious but one that has been too often forgotten or ignored: Until the depreciation in the exchange value of the dollar translates into increases in import prices, and consequently a depressant on the demand (as determined by the elasticity of demand in the relevant markets) for imports there is no reason to expect the decline in the exchange value of the dollar by itself to result in slower (or a reversal in) import growth. This translation—from a change in exchange rates, to a price change for goods, to a change in demand for goods—occurs with a substantial lag. The length of the lag is determined in large part by the conditions specified in previous contracts (the currency of the contract and the duration of the order) and the degree to which foreign producers and exporters and domestic importers and retailers are willing to cut profit margins in order to maintain market share, or the degree to which domestic producers choose to match the price increases of competing imports. A parallel argument can be drawn with respect to the foreign currency cost of

U.S. goods and services and the eventual impact on U.S. exports.

<sup>3</sup> An analytically more pleasing weighting scheme would weight bilateral exports and bilateral imports, by country, separately. This distinction might be of special interest where there is a large discrepancy between exports and imports.

<sup>4</sup> Work by Morgan Guaranty published in *World Financial Markets*, August 1983 outlines this methodology which accounts for third-country effects. They noted at that time that while they believed the procedure to be "conceptually preferable" to a straight bilateral weighting scheme they chose not to make that modification on their long-standing 15 country index. It is, however, incorporated in their 40-country index.

<sup>5</sup> Another index issue that we do not address in this article concerns the mathematical construction of the index—specifically the use of arithmetic or geometric averages. Most of the major indexes (all of those included in this analysis) use a geometric average. A primary exception to this approach among the published indexes is a broad-based index, which uses arithmetic averaging, reported in the *Treasury Bulletin* by the U.S. Department of the Treasury. For more detailed discussions of the geometric/arithmetic averaging issue see: the *Federal Reserve Bulletin*, August 1978, p. 700 and Michael T. Belongia, *Review* of the Federal Reserve Bank of St. Louis, January 1986, p.9.

<sup>6</sup> See Hervey and Strauss, *Economic Perspectives*, March/April 1987, pp. 29-31.

<sup>7</sup> See *World Financial Markets*, Morgan Guaranty Trust Company of New York, October/November 1986, pp. 14-19. These distortions, no doubt, were critical to Morgan Guaranty's decision not to publish their broad-based nominal index. In addition, both recovery-ratios (0.21 for the M-G40 nominal and 0.05 for X-131) are far smaller than for the other indexes and the minimal-index comparisons. Not surprisingly, we conclude that these two indexes are different from the minimal index.

<sup>8</sup> The larger weight on the yen became especially apparent during the post-1985-Q1 period when the U.S. dollar was depreciating rapidly against the yen. During the first half of the 1980s the dollar's appreciation against the yen was modest, by comparison with European currencies, thus the OECD index did not diverge appreciably from the other indexes during that period.

<sup>9</sup> Cox at the Dallas Fed and Rosensweig at the Atlanta Fed have looked at aggregate dollar indexes based on geographic classification (e.g., Western Europe, Pacific rim). Such categorization of the indexes may have significance for analysis of regional trade. Indexes based on specific trade sector/country trading partners would carry this approach a potentially informative one step further.

## References

- Artus, Jacques R. and Anne Kenny McGuirk, "A Revised Version of the Multilateral Exchange Rate Model," *International Monetary Fund, Staff Papers*, vol. 28, no. 2, (June 1981) pp. 275-309.
- Batten, Dallas S. and Michael T. Belongia, "Do the New Exchange Rate Indexes Answer Old Questions?" Unpublished paper presented at the Federal Reserve System Committee on International Economic Analysis, Washington D.C., April 23, 1987.
- Belongia, Michael T., "Estimating Exchange Rate Effects on Exports: A Cautionary Note," *Federal Reserve Bank of St. Louis, Review*, vol. 68, no. 1 (January 1986), pp. 5-16.
- Board of Governors of the Federal Reserve System, "Index of the Weighted-Average Exchange Value of the U.S. Dollar: Revision," *Federal Reserve Bulletin*, vol. 64 (August 1978), p. 700.
- Central Bank of China, *Financial Statistics*, Taiwan District, The Republic of China, selected issues.
- Cox, W. Michael, "A New Alternative Trade-Weighted Dollar Exchange Rate Index," *Federal Reserve Bank of Dallas, Economic Review*, September 1986, pp. 20-28.
- \_\_\_\_\_, "A Comprehensive New Real Dollar Exchange Rate Index." *Federal Reserve Bank of Dallas, Economic Review*, (March 1987), pp. 1-14.
- Durand, Martine, "Method of calculating Effective Exchange Rates and Indicators of Competitiveness," *Organization for Economic Cooperation and Development, Department of Economics and Statistics, Working Papers*, no. 29, (February 1986) and updated Annex 1-4 (provides data through the fourth quarter of 1986).
- Federal Reserve Bank of Atlanta, Historical data: Monthly average data on the Atlanta Fed Dollar Index—1973 (Jan.) to 1987 (Jan.).
- Federal Reserve Bank of Dallas, Statistical Release, *The Trade-Weighted Value of the Dollar*, selected issues.
- Hervey, Jack L. and William A. Strauss, "The International Value of the Dollar: An Inflation-Adjusted Index," *Federal Reserve*

- Bank of Chicago, *Economic Perspectives*, vol. XI, (January/February 1987), pp. 17-28.
- \_\_\_\_\_, "Technical Correction: The Inflation-Adjusted Index of the Dollar," Federal Reserve Bank of Chicago, *Economic Perspectives*, vol. XI, (March/April 1987), pp. 29-31.
- International Monetary Fund, *International Financial Statistics*, selected issues.
- \_\_\_\_\_, *International Financial Statistics, Supplement on Exchange Rates*, no. 9. (1985)
- Morgan Guaranty Trust Company of New York, *World Financial Markets*, Economics Department, "Effective Exchange Rates: Update and Refinement," August 1983.
- \_\_\_\_\_, *World Financial Markets*, Economics Department, "Dollar Index Confusion," October/November 1986.
- \_\_\_\_\_, *World Financial Markets*, Economics Department, Statistical appendix, January 1987.
- \_\_\_\_\_, Historical data on the published Morgan Guaranty 15-country nominal and real indexes, the 40-country real index, and unpublished data on the Morgan Guaranty 40-country nominal index.
- Organization for Economic Cooperation and Development, *Overall Trade by Countries (Series A)—Historical Data*, Selected years, (magnetic tape and selected issues).
- Rosensweig, Jeffrey A., "A New Dollar Index: Capturing a More Global Perspective," Federal Reserve Bank of Atlanta, *Economic Review*, vol. 71, no. 6 (June/July 1986), pp. 12-22.
- \_\_\_\_\_, "The Atlanta Fed Dollar Index and its Component Sub-indexes," Federal Reserve Bank of Atlanta, Working Paper 86-7, August 1986.
- The Commercial and Financial Chronicle, *Bank and Quotation Record*, National News Service, Arlington, MA selected issues.
- United Nations, *Monthly Bulletin of Statistics*, selected issues.
- \_\_\_\_\_, *Statistical Yearbook*, selected issues.
- United States Department of the Treasury, *Treasury Bulletin*, First Quarter Fiscal 1987 (Table IFS-4) and selected issues.

# Global banking, financial integration major conference themes

*Theresa Ford*

In the past few years, market forces and technological advances have accelerated the pace of change in the financial services industry. The communications revolution and financial innovations are yielding a stream of new computerized products that are radically altering the industry. On the domestic front, the boundaries demarcating banks from other financial institutions are becoming increasingly obscure. In the international field, both financial services suppliers and regulators are barely able to keep pace with developments in the highly charged and competitive environment of an emerging global financial system.

The expansion of bank powers and financial innovations were among the topics considered at the twenty-third annual Conference on Bank Structure and Competition, held in Chicago at the Westin Hotel from May 6 to May 8. The conference, sponsored by the Federal Reserve Bank of Chicago, drew a diverse audience of academicians, regulators, bankers, and others from both the domestic and foreign financial services industry.

The conference attendants discussed the opportunities and risks of expanded bank powers with representatives from Canada, Japan, the United Kingdom, and the United States. Participants from smaller community banks as well as the large commercial institutions, presented their views on the benefits of expanded bank powers. Frequent reference was made to the supplemental capital guidelines proposed by the United States and the United Kingdom on off balance sheet activities, and one session dealt specifically with interest rate swaps. Another topic that received broad attention was the current status of the thrift industry and the regulatory response to the industry's problems. More than 300 participants discussed these and other key issues facing the industry.

## **The Glass-Steagall debate**

The issues surrounding the trend toward the merging of commercial and investment banking activities focus on reform or repeal of

the Banking Act of 1933. The act, more commonly known as the Glass-Steagall Act, prohibits banks from underwriting securities and forces banks to choose between commercial banking and investment banking. Today, with their highest quality customers directly accessing the capital markets and bypassing the traditional bank role of intermediary, some money center banks are considering forfeiting their bank charters in order to engage more fully in profitable investment banking activities.

Although conference participants often disagreed about the type and degree of reform of the financial regulatory system, all seemed to agree that reform should yield fair competition and provide for the safety and soundness of the system. Alex Pollock, president and chief operating officer of Marine Bank, contended that Glass-Steagall has not succeeded in providing a low risk financial system or a low risk banking system in the 1980s.

"Securitization. Globalization. Integration. These are the hallmarks of the new finance," asserted Hans Angermueller, vice chairman of Citicorp. Twenty years ago, the forces of technology, the institutionalization and changing nature of household savings, and financial innovations began undermining the depression-inspired government regulation of compartmentalized finance, according to Angermueller. Although he conceded that recent reform in regulation has produced modest but important steps toward allowing financial firms to serve their customers, he advocated the reform proposal put forth by the Association of Reserve City Bankers as the preferred solution to the problem of meeting customers' needs. This proposal would allow the market to act as regulator for financial services holding companies and would allow any firm to own a bank.

Gerald Corrigan, president of the Federal Reserve Bank of New York, and author of a recent essay on financial reform that was

---

Theresa Ford is an associate economist at the Federal Reserve Bank of Chicago.

widely cited at the conference, proposed a more distinct line between those who could own a bank and those who could not. Under his proposal the separation of banking and commerce would be preserved. A manufacturing company would not be allowed to own and control an insured depository, but a financial holding company or a bank holding company would. Banks could engage in the securities business, and securities companies could enter the banking business. He emphasized that any reform should have the guiding principle of strengthening the safety and soundness of the system, in part by providing greater room for self discipline and market discipline and in part by enhancing the strength and flexibility of the supervisory process itself.

Martha Seger, a member of the Board of Governors of the Federal Reserve System, warned that regulation has been slow to change given the dynamic environment and that efforts to deregulate have generally followed change rather than initiated change. She, along with many of the speakers, agreed that the status quo also carries risk. She stated that while banks are looking for new products for their corporate customers, they are also searching for any legal loopholes to provide these new products and keep up with the competition. Furthermore, she noted that the competition from nonbank financial institutions and nonfinancial institutions is currently not considered in the market analysis casework done by the Federal Reserve System.

Jack Guttentag, professor of finance and banking at the Wharton School of the University of Pennsylvania, expressing concerns about attempts to lower the barriers between commercial banking and the rest of the financial industry in reference to the Federal Reserve's assistance to insolvent banks, remarked that, under the current system, "The lender of last resort door, which is supposed to open to a hospital, now leads to a funeral parlor." Guttentag proposed a dual banking system with two kinds of firms: the depository firm and the finance firm. He suggested that firms whose liabilities include transaction deposits should be authorized to hold only marketable assets. All liabilities of these depository firms would be insured. Supervision would be simplified by using mark-to-market accounting standards; when capital requirements fell below the regulatory minimum, the depository firm

would be terminated. Guttentag emphasized that no depository institution would be too large to fail. Finance firms would be able to hold nonmarketable assets only if they could finance themselves through the issuance of long term debt and equity. Liabilities for finance firms would not be insured but would be supervised.

In a session focusing on expansion of bank powers through regulatory reform, the benefits of expanding bank powers for community banks were discussed. Michael Laub, director of economic and policy research for the American Bankers Association, cited six forces affecting community bank profitability. These include economic volatility, technological changes, regulation, securitization, the crisis in the thrift industry, and interstate banking. O. J. Tomson, the chairman and chief executive officer of Citizens National Bank of Charles City, Iowa, added to that list the competition of community banks with insurance and real estate companies, local investment bankers, captive finance companies, savings and loans, and commercial firms such as Sears and K Mart.

Laub remarked that the key element of survival for community banks would be the expanded ability to offer new products and services. Tomson reiterated this idea by stating that expanded bank powers are necessary not only to survive but to prosper. He added that community banks must carve out a market niche for themselves, although this is difficult in a political environment which historically has chosen to deal with banking legislation on an ad hoc basis.

As the debate over reform of Glass-Steagall continues in the U.S., many large U.S. commercial banks have established operations overseas where investment activities of commercial banks are less tightly restricted. They compete directly with investment banks in activities such as underwriting Eurobonds, Eurocommercial paper, and international equity issues. William Ogden, chairman and chief executive officer of Continental Illinois National Bank and Trust Company, pointed out that the historical distrust by regulators of the economic power of banks in the U.S. is unique in the world and has lost much of its relevance because of changes in the global economy.



## **International perspectives on expanding bank powers**

The worldwide financial system is becoming more sophisticated and complex. Financial innovation has yielded a veritable zoo of new global financial products such as NIFs, RUFs, COLTS, CATS, TIGRs, LYONs, STAGS, ZEBRAS and others. John Heimann, the vice chairman of Merrill Lynch Capital Markets, asked, "How will many new products invented during a bull market and in an environment of declining interest rates behave during a period of inflation, rising interest rates, or recession?" He responded that no one could predict, because the markets are growing faster than the players and the regulators can understand them. The speed with which new products are being created and the push of market forces are compelling regulators in many countries to rethink their current policies of financial regulation.

Allan Popoff, the director of the Financial Institutions and Markets Division of the Canadian Department of Finance, explained that the two sources of pressure leading to regulatory reform in Canada are the erosion of the compartmentalized industry structure and the increasing links between the financial and commercial sectors. Canada's response to these pressures has resulted in a proposed policy of financial sector integration and financial and commercial segregation. Commercial banks would be allowed to enter fully into investment banking but commercial corporations would not be allowed to own banks. Thus, Canada's near banks, the trust and insurance companies, which currently undertake an extensive range of banking activities, would be prohibited from further integration.

Not only are central bankers considering the safety and soundness of their own domestic banking systems, but also the competitive advantages or disadvantages of their commercial banks relative to other countries' financial institutions that result from regulatory differences across nations. This concern stems in part from the internationalization of markets and the growth of banks' off balance sheet activities. These financial obligations do not appear in the capital adequacy ratios currently used by the regulators.

A recent article in U.S. Banker magazine stated that the value of off balance sheet com-

mitments of U.S. money center banks now totals almost \$1 trillion dollars. Regulators in the U.S. and the U.K. have jointly proposed implementing capital requirements on some of these items. They realize the likely outcome of unilateral action would be to place their home banks at a competitive disadvantage.

Peter Cooke, associate director of the Bank of England, called for a leveling of the playing field by the international banking community. As an example of international regulatory convergence, he referred to the binding supranational banking laws of the EEC, effective in 1992, which cover half of the G10 countries. In his view, broader international agreement on capital adequacy and other supervisory measures for banks would improve the current situation. He stressed that some trends in global finance may require interventionist authority at the international level and emphasized functional regulation of financial institutions.

Yuko Oana, the managing director of the New York branch of Dai-Ichi Kangyo Bank of Japan, the largest bank in the world, argued that in formulating a policy of rules for the international market, one must take into account the long financial history, the different status of banks, and the differing accounting systems of the various countries. He also stated that the equivalent of the Glass-Steagall Act in Japan, Article 65 of the Securities Exchange Law, requires banks to choose between banking and securities activities. However, he noted, the universal banks of Europe are allowed to undertake both securities and banking activities. He stated that the Ministry of Finance in Japan was seriously considering this major disparity in banking powers.

## **The case of swaps**

The interest rate swap is one of the off balance sheet items on which the Federal Reserve Board and the Bank of England may soon impose reserve requirements. Mark Muffett, a mathematician at the Bank of England and a principal researcher on the proposal, presented the operational aspects that underlie the proposal, which focuses on credit or default risk in swap transactions. He outlined the methods for converting the principal of a swap into a balance sheet credit equivalent amount. The central features of the joint regulatory proposal

are a method for marking swaps to market and an estimation of future exposure over the lifetime of a swap.

A separate session of the conference was devoted to a discussion of the reasons for the growth in the swap market and the panelists' views on the proposed capital requirements. Gary Koppenhaver, a senior economist at the Chicago Fed, opened the session with the statement, "According to the International Swap Dealers Association, 1986 volume in the interest rate swap market was \$313 billion dollars, nearly double the 1985 volume and an increase from virtually zero in 1982." He explained that an interest rate swap is a variation of a currency swap, a financing tool developed in the late 1970s. Unlike the currency swap, in which two parties issue debt denominated in different currencies and then exchange obligations, the participants in an interest rate swap exchange interest obligations, not principal repayments.

Swaps may involve several participants. John Heimann of Merrill Lynch, in an earlier session, had cautioned that with a multitude of parties involved in a swap, the credit risk of the transaction was subject to the problems of its weakest participant and that if management did not know all the counter-parties, they could not fully determine this risk. However, Clifford Smith, a professor of finance at the University of Rochester, pointed out that swaps are very useful in hedging interest rate exposure and that default risk of swaps is dissimilar to that of loans.

Larry Wall, a senior financial economist with the Atlanta Fed, pointed out that much of the current literature on swaps claims that banks are saving interest expense by exploiting their comparative advantage in obtaining funds and by arbitraging the quality spread differential across markets. He noted that quality spreads could arise because of expected bankruptcy costs, contract provisions, agency costs, and the ability to force firms to reorganize, but that only the latter two may be exploitable. Furthermore, a quality spread differential due to a combination of these forces may be only partially exploitable.

Wall believes swaps are used and growing in use in order to manage interest rate risk, to exploit differences in regulatory and tax treatments across borders, to adjust a firm's debt, and to exploit information asymmetries. How-

ever, Linda Rudnick, a vice president at Harris Trust and Savings Bank, claimed that the quality spread differentials and comparative advantages were the reasons for her customers' participation in swaps. She remarked that Harris uses swaps as an asset/liability management tool; acting as an intermediary, the bank maintains a book of swaps for customer accommodation. She agreed with Wall and Smith that the current proposal by the regulators in the U.S. and U.K. grossly overestimates swap credit risk and therefore misspecifies the appropriate capital requirements.

### **Public policies toward failing institutions**

Problems of the thrift industry and the regulatory response to these problems were another topic of discussion at the annual conference. George Kaufman, professor of economics and finance at Loyola University, emphasized the questionable tactics of problem savings and loans (S&Ls) struggling to improve their earnings quickly. In some instances, S&Ls find themselves in a no-lose situation by taking on additional risky assets. In addition, he questioned the behavior of some S&L managers.

Eli Brewer, an economist at the Chicago Fed, reported on the current magnitude of the problem. Using current value accounting to calculate the market valuation of S&L net worth, he found that the S&L industry had a negative net worth of \$107 billion dollars at the end of 1982. Since 1983, S&Ls have suffered from poor asset quality, with credit risk replacing interest rate risk as a source of problems since the early 1980s. He found that of the 448 insolvent S&Ls at the end of September, 1986, 82 had also been insolvent as of September, 1982. Another problem affecting confidence in the industry was the spillover effects of the highly publicized cases of fraud in the industry. Many of the recent cases of S&Ls engaging in activities to defraud depositors, FSLIC, and taxpayers were illustrated by Brewer and Kaufman.

Gillian Garcia, a director of an economic analysis group at the General Accounting Office, cited six alternative regulatory actions taken by the Federal Home Loan Bank Board when faced with a problem institution. These actions include liquidating receiverships, conservatorships, placement in the management consignment program, and three types of

mergers. She found that the losers and gainers in all six types of actions were similar and that the losers of these actions, mainly the stockholders, managers, and unsound borrowers, were likely to gain in the short term through a policy of capital forbearance.

She remarked that if a policy of forbearance, which is politically popular in Congress, is used and completed quickly, then society might gain. But she warned that a prolonged policy of forbearance could result in great losses. According to Garcia, society would lose because of an inefficient distribution of resources and because of the resulting increased costs to marginally healthy institutions which might eventually be forced out of the industry. At the end of 1982, 145 institutions were insolvent to the extent of \$1.4 billion dollars. Four years later, eighty of these institutions remained insolvent to the extent of \$3.7 billion dollars. She reported that this figure, discounted back to 1982 at the one-year T-bill rate equalled \$2.7 billion dollars and concluded

that it was not clear that society had gained from a policy of capital forbearance.

### **Other conference topics**

Other topics discussed at the annual conference included the theory of financial intermediation, bank lending decisions and loan review policies, the structure-performance relationship in banking, bank equity markets, and asset sales.

During his welcoming address to the conference participants, Silas Keehn, the president of the Federal Reserve Bank of Chicago, referred to the many structural changes that were to be discussed: "We are no longer talking about the future as perhaps we were at the outset of our conference, but we really are, at this point, talking about the here and the now." This sense of urgency of 'the here and the now' was widely felt throughout this year's conference.

# Standby letters of credit

*G. D. Koppenhaver*

Banks exist because they perform many services valued by the overall economy. One of these services is the centralization of credit evaluation and monitoring, which produces information that cannot easily be made public by the borrower. This centralization exploits cost economies and, together with a diversified loan portfolio, lowers the price of credit. Another service provided by banks is access to the payments system and to a clearinghouse for transactions. Public policies to attain safe and sound banking have traditionally focused on methods to assure the continuous and efficient functioning of this transactions and payment mechanism. Finally, banks offer transformation services that convert claims issued by borrowers into instruments that investors are willing to hold. These claims may be transformed with respect to their maturity, liquidity, or credit risk.<sup>1</sup>

Due to financial and technological innovations in the 1970s and increased competition in the financial services industry, banks have come to realize that the traditional delivery system for these services—warehousing assets funded by deposit liabilities—could be broken down or unbundled into constituent parts. Depending on the specific bank customer, low value-added services (such as bearing interest-rate risk) could be deemphasized and high value-added services (such as underwriting the direct placement of debt) could be highlighted without impairing the provision of services to other bank customers. This unbundling is the primary force behind the significant growth in off balance sheet banking activities and fee income as a source of profitability, especially at the large institutions. Regulatory policy to control off balance sheet banking activities must be careful not to destroy the valuable services embodied therein.

Because off balance sheet activities are largely unregulated and have grown rapidly over the past decade, there is concern that imprudent issuance of these instruments could strain the stability of individual banks and the banking system as a whole. Unlike balance sheet assets, these potential obligations need not be funded and have not been consistently con-

sidered in determining a bank's capital requirement. Because bank guarantees are often used to enhance the credit quality of a customer seeking direct access to capital markets, they also serve to bind bank and nonbank participants in financial markets more closely together. This interdependence suggests that a default or problem in a nonfinancial market could threaten the stability of the banking system if many lines of credit were drawn down simultaneously.

This article focuses on one off balance sheet banking activity—standby letter of credit issuance—to understand its value as a banking service, its growth, and its market-related determinants. Empirical findings are presented that show: 1) the important variables in the decision to provide standby letters of credit; 2) the interaction of levels of standby activity and bank equity; and 3) the perception of the market in bank equities concerning the riskiness of issuing bank organizations. The conceptual and empirical analyses provide a basis for taking a look at the recently proposed supplemental capital guidelines for banks (so-called risk-based capital rules), which specifically include off balance sheet instruments such as standby letters of credit. While these supplemental capital requirements may help protect the solvency of the federal deposit insurance fund, it is argued that adoption of these guidelines may have little effect on bank issuance of standby letters of credit.

## **Institutional aspects**

Off balance sheet activities and the services they provide can be loosely categorized into two types: lending-related activities, and derivative market activities. Lending-related activities involve a commitment to extend credit to a beneficiary and, generally, result in a loan to the bank customer if the commitment is exercised. These activities include standby and commercial letters of credit, loan commitments, and interest rate or currency swaps

---

G. D. Koppenhaver is a senior economist at the Federal Reserve Bank of Chicago.

where the issuing bank acts merely as an intermediary and guarantor. Derivative market activities are commitments or rights to buy or sell financial assets at a predetermined price for a specific time period. They may be traded on an exchange or over-the-counter. Activities included in this category are: forward, futures, and options contracts, and interest rate or currency swaps when the bank issues them for its own account.

Standby letters of credit, the focus of this paper, guarantee funds availability to the instrument holder and so enhance the credit quality of the borrower. In issuing this off balance sheet instrument, the bank acts as a third party in a commercial transaction, substituting the bank's creditworthiness for that of its customer to facilitate exchange. The bank makes an irrevocable commitment to pay the beneficiary the credit amount when the beneficiary presents certain documents to the bank. These documents must offer evidence that the bank's customer failed to fulfill the obligations of the underlying contract. If the customer does not default, the credit expires unused and the bank retains the initial fee required to open the pledge. Standby letters of credit are used as credit enhancement facilities for municipal borrowers and issuers of commercial paper and as liquidity backstops that require the bank to buy bonds put to them.

Table 1 shows the year-end levels of outstanding standby letters of credit and the average relative to primary book capital of issuing banks since 1973, the first year that the Federal Reserve System requested this data on the Report of Condition and Income. Table 1 also breaks the data down by bank asset size, frequency of use, and market share within the banking industry. We can conclude from Table 1 that outstanding standby letters of credit have grown substantially over the past 14 years and that, despite their widespread utilization, large banks issue the vast majority of the dollar values outstanding.

### **The economics of credit enhancement**

Financial intermediaries owe their existence primarily to a world of imperfect markets. It follows that the role a financial intermediary performs in the financial system depends on the type of market imperfection that gives rise to its existence.<sup>2</sup> In a world of transaction costs,

Benston and Smith [1976] argue, financial intermediaries achieve economies of scale through specialization in documentation, information collection, and monitoring. In a world of imperfect information, the desire of borrowers to retain the property rights to proprietary information can create a role for intermediaries as credit monitors without disclosure (Campbell [1979]). Leland and Pyle [1977] maintain that ex ante informational asymmetries between borrowers and lenders lead to the existence of intermediaries. By retaining an interest in a particular project at a cost lower than that incurred by individual borrowers, the bank can signal the quality of borrower-specific information more efficiently. Ex ante informational asymmetries arise when the borrower cannot costlessly reveal to the investor the exact *prospects* of his portfolio of potential projects.

Both Diamond [1984] and Ramakrishnan and Thakor [1984] argue that intermediaries are useful for resolving ex post informational asymmetries between borrowers and lenders because intermediary diversification lowers the cost of information production. Ex post informational asymmetries arise when the borrower cannot costlessly reveal to the investor the exact *outcome* of his portfolio of projects. Finally, Campbell and Kracaw [1980] suggest that intermediaries exist because the production of information, the provision of transaction services, and the protection of confidentiality are complementary activities.

Although none of these articles explicitly consider standby letters of credit as financial instruments, these theories of financial intermediation readily encompass credit enhancement as a natural bank activity.<sup>3</sup> When a standby letter of credit is issued, the risk exposure of the bank is similar to that incurred in matching the duration of an asset with its funding source. The bank retains responsibility for the borrower's credit risk, but interest rate (market) risk is transferred to the bank's customer and the guarantee beneficiary. By guaranteeing funds availability (writing a put option on the bank customer's indebtedness), the intermediary has an incentive to efficiently monitor borrowers, produce information and signal its credibility, and specialize in credit evaluation. Because guarantee issuance and outright loans or investments represent substitute methods for allocating credit with

**Table 1**  
**Gross standby letters of credit issued by U.S. commercial banks**

Year-end	Outstanding (in billions \$)	All banks		Assets > \$500 million			Assets > \$10 billion		
		Percent reporting	Ratio to equity*	Percent reporting	Ratio to equity	Market share**	Percent reporting	Ratio to equity	Market share
1973	5.0	7.7% (1095)†	8.4%	80.0% (155)	15.9%	91%	72.7% (8)	23.8%	38%
1974	10.6	12.8 (1851)	6.8	92.6 (200)	13.8	94	100 (12)	39.2	68
1975	11.7	14.3 (2092)	6.4	91.4 (201)	13.4	94	100 (12)	41.9	69
1976	15.1	20.1 (2942)	6.5	95.8 (226)	13.5	93	100 (13)	48.2	73
1977	19.7	24.1 (3529)	6.9	95.6 (258)	15.7	94	100 (15)	54.6	74
1978	25.7	29.3 (4286)	7.8	96.1 (297)	20.4	94	100 (17)	61.2	76
1979	34.7	33.7 (4891)	7.9	96.1 (317)	23.0	94	100 (17)	79.5	76
1980	46.9	37.6 (5507)	8.9	96.6 (344)	27.9	94	100 (19)	92.4	75
1981	71.5	43.3 (6297)	10.4	96.7 (385)	33.9	95	100 (22)	125.5	77
1982	100.3	48.1 (7011)	12.6	97.6 (403)	63.1	95	100 (23)	166.8	77
1983	119.6	54.3 (7849)	11.8	98.7 (444)	43.9	96	100 (23)	183.1	77
1984	145.6	47.8 (6920)	12.9	92.8 (450)	48.1	96	100 (24)	194.1	76
1985	175.0	52.5 (7556)	12.7	91.5 (483)	52.2	97	100 (28)	191.2	76
1986	169.5	55.6 (7859)	11.7	93.9 (523)	46.2	97	100 (33)	155.9	76

\*Average ratio for issuing banks only.

\*\*Standbys issued relative to total amount outstanding.

†Numbers in parentheses are the number of reporting banks.

complementarities in production, there should be a relationship between standby letters of credit used to back-up a municipal bond issue and municipal bond portfolio holdings. Depending on the risk-return tradeoff between selling information services and warehousing assets, a bank will divide its business between both balance sheet and off balance sheet financial activities.

On the demand side of the market, an individual bank's issuance of standby letters of credit depends on the market's perception of the bank's quality. A bank may not be asked to issue an off balance sheet guarantee unless the quality of the guarantee is made credible to the beneficiary. In this sense, the market filters out those banks that are perceived as questionable guarantors; banks that can issue guarantees are perceived as superior quality institutions by the market. The point is that bank lending, investment, and credit analysis decisions will have an effect on the bank's ability to participate in the standby letter of

credit market. A bank may signal the quality of its information by increasing its capital-to-asset ratio, but loan diversification, interest-rate risk exposure, and ready access to purchased funds may also serve as quality signals. In sum, a market in credible off balance sheet guarantees would exist even in the absence of bank regulations, to accommodate the needs of bank customers and to profit from the value of bank information services.<sup>4</sup>

Next, consider the potential effects of bank regulation. Benston and Smith [1976] argue that bank regulations reduce the transaction cost advantage that banks have over direct financing. The arguments behind the recently proposed risk-based capital guidelines emphasize that existing capital policies provide incentives to avoid low-yield activities in favor of high-yield activities. The current capital adequacy guidelines may provide an incentive for off balance sheet underwriting because they require holding costly capital against balance sheet assets regardless of the riskiness of those

assets. Off balance sheet activities also generate fees that can bolster current profitability without tying up capital. (Essentially, this is the argument made by Giddy [1985].) A binding regulatory capital constraint provides a motivation for standby letter of credit issuance as well as other risky activities.

However, Laub [1985] and Pyle [1985] maintain that a binding capital constraint in conjunction with risk-independent deposit insurance premiums generate the real motivation for off balance sheet banking. This interaction between capital adequacy and deposit insurance premiums is also suggested by Buser *et al.* [1982], although not in the context of off balance sheet banking. Regulatory standards for capital adequacy determine the net value of deposit insurance to stockholders as a function of bank leverage. Because flat-rate deposit insurance premiums do not penalize a bank for undertaking risky activities and insured depositors have no incentive to monitor bank riskiness, stockholders prefer risky bank activities to increase the value of their investment. Off balance sheet banking is an effective way to avoid binding minimum capital standards, but if deposit insurance premiums were properly priced, regulatory discipline would be exerted on a bank's off balance sheet risk-taking by the deposit insurer.

Another regulatory tax designed to buffer asset quality decisions is related to the bank's allocation for loan losses. This is a balance sheet item, a portion of which appears on the bank's income statement as a deduction from net income (called provision for loan losses) as loans are charged off and losses realized. Banks are often unwilling to add to loan loss allocations voluntarily. In an effort to maintain bank profitability in the face of loan charge-offs, the fees earned from issuing off balance guarantees may be attractive since the amortization of fees over the life of the guarantee is not required. Hence, the greater the burden of asset reclassification, the greater the motivation for off balance sheet banking.

Regulatory taxes also appear when a balance sheet asset is funded. Reserves must be held against deposit liabilities such as transaction accounts, nonpersonal time deposits, and Eurodollar deposits. Because required reserves bear no interest, they represent a significant cost of redistributing funds through the banking system. The incidence of this tax may fall

on either the borrowers or the depositors, depending on the bank's funding source (see Fama [1985]). To circumvent such a cost, banks may issue credit enhancement instruments such as standby letters of credit to allow their customers direct access to financial markets. Alternatively, one could view the reserve burden as forcing the bank to hold more riskless assets than it desires. To achieve a target risk-return tradeoff, it will then acquire other risky assets to compensate for required reserves. Off balance sheet guarantee issuance could be part of this riskier portfolio or it could allow the bank to avoid holding undesired riskless assets from the very start.

The discussion so far indicates that a bank's activity in the market for off balance sheet credit enhancement is a function of its willingness to accommodate the needs of its customers, the market's perception of bank quality as reflected in balance sheet decisions, and the incentives provided by regulators. How does this guarantee market perform and what does this imply about the riskiness of banking organizations that issue guarantees?

To answer these questions, one needs to focus on the pricing and credit analysis decisions underlying guarantee issuance. Note that all fees charged to the bank's customers to open the credit line can be thought of as a premium on an insurance policy; this premium should compensate the bank for the risk that the credit may be activated. To make the guarantee attractive to its customers, these fees can be no greater than the present value of all default risk premium payments that the direct financing market would charge in the absence of a guarantee. The initial fees can be less than the market's default risk premium to the extent that: 1) the bank perceives an offsetting long-term gain from a strong bank-client relationship; 2) the bank has better information than the market about the quality of its customers; or 3) the regulatory taxes mentioned above reduce the effective cost of bearing the risk. In the first and second cases, the risk borne by the bank's shareholders depends on the accuracy with which the bank is able to evaluate its customers. The more accurate the evaluation, the less the risk to shareholders due to guarantee mispricing and the smaller the required rate of return.

However, if standby letter of credit fees fall because banks save on the regulatory taxes

associated with warehousing assets, both shareholders and regulators have cause for concern. As long as fees fall less than the regulatory tax savings, shareholders gain through greater bank profitability. With a perfectly elastic supply of guarantees, competition among guarantee issuers will cause the fee structure to fall to where the sum of the fees and regulatory tax savings equal the fees that would exist in the absence of regulation-induced supply effects. In a competitive guarantee market with heterogeneous banks, the fee structure will fall by the representative bank's regulatory tax saving. Those institutions facing below average regulatory taxes can only maintain guarantee market share by relaxing their credit standards. The net effect would be to reduce issuance costs and to accept high risk customers. In this case, default risk is being redistributed from the direct-financing investors to the shareholders of the bank and the FDIC. The rate of return required by shareholders will then rise to compensate for the increased risk associated with guarantee issuance.

The price and credit analysis decisions discussed above implicitly assume a given demand for guarantees. But recall that the demand for standby letters of credit will depend on the guarantee market's perception of issuing bank quality. Market discipline is imposed on those banks that are viewed as poor quality guarantors. A bank whose guarantees are not credible will be forced to issue guarantees at fees below the effective market price, if it can issue them at all. Given two banks with the same business mix and customer quality but with different perceptions of soundness by the guarantee market, the low-quality bank will, therefore, have a smaller presence in the market than the high-quality bank. The asset quality and risk management decisions of the bank will be affected by the demand side of the guarantee market, much like the effect that uninsured depositors have on bank decisions. The imposition of demand-side market discipline would then help insulate the bank's shareholders from the risk of guarantee mispricing. If this effect is sufficiently strong, the required rate of return on equity for banks that are able to issue guarantees will be less than for nonissuing banks.

Finally, the link between guarantee issuance and systematic risk must be spelled out. The previous discussion is couched in terms of

bank-specific risk due to a possible mispricing of the initial fees on guarantee issuance. If these risk are diversifiable, shareholders of issuing banks would not price these risks in their investment decisions. But it has been shown through an application of the Option Pricing Model that a firm's liabilities have systematic risk that varies in direct proportion to the systematic risk of the firm's assets.<sup>5</sup> Recall that guarantees are a contingent liability; alternatively, the bank writes a put option for the standby beneficiary that conveys the right to sell the borrower's indebtedness to the bank over the life of the commitment. Therefore, if bank liabilities are options with systematic risk related to the value of the bank, standby letters of credit also have systematic risk related to the value of the bank.<sup>6</sup> The Capital Asset Pricing Model can then be used to test the contribution of guarantee issuance to the risk premium required by bank shareholders in the equity market.

### **Empirical Evidence**

Three different sets of empirical results deal directly with the decision to issue a standby letter of credit.<sup>7</sup> Two of the empirical models use cross-sectional data from the quarterly Report of Condition and Income for June 1985; the third combines this information source with banking firm equity prices over time. Given the importance of large institutions in the standby letter of credit market, the results presented here only consider banks with total assets in excess of \$500 million.

**Determinants of Participation.** Because commercial banks are required to report their outstanding standby letters of credit to the Federal Reserve whether or not they participate in such activities, the estimation problem at hand involves an analysis of survey data.<sup>8</sup> The behavioral responses of commercial banks in the sample are taken to be qualitative; either a bank engages in standby letter of credit activity or it does not. Therefore, the dependent variable (standby letters of credit outstanding) in the linear regression model reflects a binary choice on the part of the bank. A binary-choice model assumes that an individual bank is faced with two alternatives and the choice it makes depends on the characteristics of the institution. Given information on bank attributes and the off balance sheet choices they make,



the problem is to estimate an equation which predicts the likelihood that a bank with given characteristics will issue standby letters of credit. The predicted dependent variable from the regression equation is simply the logarithm of the odds that a bank will issue standby letters of credit.

The selection of explanatory variables for the estimation are based on the economics of credit enhancement services as presented in the last section. Three broad categories of variables are expected to influence a bank's presence in the standby letter of credit market: bank credibility variables, customer accommodation variables, and regulatory incentive variables. Table 2 presents descriptions and summary statistics on the selected explanatory variables. Variables 2 through 7 proxy bank credibility, the next four variables proxy regulatory incentives, and variables 12, 13, and 14 proxy customer accommodation. In general, variables that reveal superior bank quality and guarantee credibility, greater regulatory incentives, or a greater willingness to accommodate customers should increase the likelihood of standby letter of credit issuance.

Table 3 presents the estimated results for this model of the determinants of bank participation in the standby letter of credit market.<sup>9</sup> The variable with the single largest significant effect on participation is *required reserves*, a regulatory incentive variable. A one percent increase in the ratio of required reserves to assets increases the likelihood of standby letter of credit issuance by almost four percentage points. Therefore, the regulatory burden of funding balance sheet assets with reservable deposits appears to be a powerful incentive to participate in the standby letter of credit market. Other variables also influence this decision, however. The greater a bank's absolute size or the more diversified is its loan portfolio, the greater its credibility as a guarantor and the more likely it is to issue standbys. The significant coefficient on CR3 implies that the greater the concentration of the bank's deposit market, the less likely it is to issue standby letters of credit to accommodate the needs of its customers. Surprisingly, this model also suggests that banks with a binding minimum capital constraint are less likely to be a participant in the standby letter of credit market.

#### **Joint capital and standby decisions.**

In the above model of the determinants of

standby letter of credit issuance, the level of primary capital was assumed exogenous and found to be insignificant in predicting the likelihood of market participation. Another viewpoint suggests that a simple uni-directional relationship may not fully capture the interaction between standby letters of credit and bank capital.

On the one hand, the risks of credit issuance may be fully recognized by those banks that issue these guarantees and they may choose to increase their capital position as they increase standby issuance. The bank might raise their capital position because of an internal assessment of increased credit, interest rate, or liquidity risk or because of market discipline imposed by demanders of guarantees. A bank with greater equity is perceived as being more sound by the guarantee market, and hence, it can issue more standby letters of credit. In this view, capital and standby letters of credit are then complementary decisions.

On the other hand, the ability to issue standby letters of credit may depend on other aspects of the bank's overall safety and soundness besides equity capital, such as asset quality, liability mix, and absolute size. A bank will not need to hold as much capital if it is viewed as sufficiently sound to issue standby letters of credit. Thus, the relationship between outstanding standby letters of credit and capital could be negative. If this is the true relationship, it runs contrary to the proposal by the Federal Reserve that banks should hold additional capital against their standby letters of credit.

This section examines the evidence on whether or not banks explicitly increase their primary capital to reflect the potential risk exposure from standby letter of credit activity. To accurately estimate the interrelationship, Koppenhaver and Stover [1987] developed a simultaneous equation model to capture the joint decision process for bank standby letter of credit issuance and primary capital. Starting with the data set utilized above, all banks that did not issue standby letters of credit were dropped, leaving 459 institutions. The standby letter of credit equation in the simultaneous system employs the same explanatory variables as in Table 3. The primary capital equation uses a subset of these variables plus the ratio of cash to total assets (a liquidity measure), the ratio of U.S. Treasury securities held to total

**Table 2**  
**Summary statistics and definitions of variables for banks**  
**with assets greater than \$500 million\***  
**(N=459)**

Variables	Mean	Standard deviation	Expected sign	Definitions
1. STANDBY	0.0285	0.0303	na	Net standbys outstanding/Total assets
2. CAPITAL	0.0714	0.0179	?	Primary capital/Total assets
3. SIZE	7.4182	1.0273	+	Logarithm of total assets/1,000,000
4. INDEX	0.3033	0.0854	-	Sum of squared shares of ten loan categories
5. GAP	-0.0149	0.0944	+	One year maturity gap/Total assets
6. BHC	0.9412	0.2356	+	= 1 if affiliated, = 0 otherwise
7. PURCH	0.2435	0.1377	+	Short-term borrowings, foreign deposits, and large CDs/Total assets
8. RESERVES	0.0404	0.0078	+	Required reserves/Total assets
9. LLOSS	0.0079	0.0030	+	Loan loss reserves/Total assets
10. BINDING	0.0588	0.2356	+	= 1 if CAPITAL < 5.5%, = 0 otherwise
11. FDIC	0.0149	0.0747	+	Insured deposits/Total assets if CAPITAL < 5.5%. = 0 otherwise
12. CR3	0.7437	0.1894	-	Three-firm share of total deposits in county
13. CNSTR	0.0395	0.0421	?	Construction loans/Total assets
14. MUNI	0.0830	0.0437	?	Municipal loans and securities/Total assets

\*For those banks that reported outstanding standby letters of credit.  
 SOURCE: Report of Condition and Income, June 1985.

assets (a measure of the riskiness of the investment portfolio), and the return on assets (a measure affecting necessary capital levels).

The estimated results reveal that large banks, especially those that are affiliated with bank holding companies and/or operating in competitive deposit markets, tend to issue more standby letters of credit and hold less capital than small, independent banks with highly concentrated deposit markets. Relative to the results in Table 3, the level of standby letter of credit issuance is found to be inversely related to the required reserves held by the bank. While required reserves may be an important factor in the decision to enter the standby letter of credit market, the volume of outstanding standbys does not increase with the reserve requirement burden. Increased loan loss reserves, holdings of U.S. government securities,

and return on assets are also associated with higher capital ratios, on average.

Most importantly, the results for the endogenous variables (STANDBY and CAPITAL in Table 2) suggest that bank capital is recognized in the standby letter of credit market as an indicator of bank quality, and that a significant and direct determinant of primary capital is the level of outstanding standby letters of credit. A one-standard-deviation increase in the mean capital ratio, for this sample of banks, increases the ratio of standbys outstanding to assets by 0.012. On the other hand, a one-standard-deviation increase in the mean ratio of standbys to assets increases the capital ratio by 0.02. This latter result has implications for the public policy debate surrounding bank off balance sheet activities and the risks they embody, as discussed below.

**Table 3**  
**Participation in the standby**  
**letter of credit market**  
**(N=490)**

Independent variable	Estimate	STD error	Marginal effect
SIZE	1.563*	0.401	0.093
CAPITAL	3.880	11.497	0.230
INDEX	-4.434*	2.250	-0.263
GAP	2.593	1.641	0.154
BHC	0.720	0.592	0.043
PURCH	2.454	1.924	0.146
RESERVES	61.937**	32.729	3.672
BINDING	-3.486*	1.411	-0.207
FDIC	2.594	3.003	0.154
LLOSS	-14.886	61.007	-0.883
CR3	-2.628*	1.275	-0.156
CNSTR	3.627	7.758	0.215
MUNI	-4.152	4.737	-0.246
CONSTANT	-7.813*	3.309	-0.463
R-squared	0.153		

\*Significantly different from zero at the 5% level.

\*\*Significantly different from zero at the 10% level.

### Bank equity markets and standbys.

As yet another way of investigating the effect that credit enhancement services have on the riskiness of banking organizations, this section reports some results of research on how bank equity investors view the issuance of standby letters of credit. Brewer *et al.* [1986] use a method of analysis based on a version of the Capital Asset Pricing Model (CAPM) that estimates the systematic risk associated with various components of a bank's income statement, balance sheet, and off balance sheet activities. In particular, a time-series, cross-sectional model is formulated to capture the relationship between banking organization returns, market risk measures, and the characteristics of a banking firm's balance sheet and off balance sheet activities. They also investigate a multi-factor version of the CAPM in which the second factor is a bank industry returns measure. By holding the overall stock market returns constant, the systematic risk associated with the banking industry alone is estimated.<sup>10</sup>

The technique used assumes that risk premiums on bank stocks are a linear function of the overall market risk premium and the industry risk premium. To incorporate the bal-

ance sheet and off balance sheet characteristics of the banking organizations, the market and industry risk measures are further assumed to depend on balance sheet, off balance sheet, and income statement items. Therefore, banking organization sensitivity to variations in market and industry returns can vary with cross-sectional differences in assets and liabilities, off balance sheet guarantee issuance, and income sources. Brewer *et al.* not only investigates standby letters of credit, as an off balance sheet item, but also loan commitments and commercial letters of credit.

The financial data used in this study comes from the semiannual Y-6 and Y-9 reports filed with the Federal Reserve System by large bank holding companies for the 1983-1984 period. They provide both balance sheet and income statement items on a consolidated firm basis, as well as for the parent company only. The off balance sheet items were derived from the Reports of Condition by aggregating the off balance sheet items for all banks owned by each of 63 holding companies as of the semi-annual dates. The stock market portfolio employed in this study was a value-weighted market index containing all stocks traded on the New York Stock Exchange, the American Stock Exchange, and the over-the-counter market. To construct a banking industry stock market index, 68 bank holding companies were used and the aggregate market value of each bank holding company stock was computed each day by multiplying the dividend-adjusted share price by the number of common stock shares outstanding.

The results of the ordinary least squares regression on the complete model yield two interesting insights. First, standby letters of credit are a significant determinant of the market risk premium and are viewed favorably by well-diversified investors. For example, it is estimated that a one percent increase in the ratio of standby letters of credit to total assets lowers the average required risk premium on bank equities by 3 basis points. Second, the estimated signs of the balance sheet and off balance sheet items, when interacting with the bank industry index, are roughly consistent with the idea that bank assets and off balance sheet guarantees increase risk and bank liabilities decrease risk. A bank regulator, or an investor concerned about risk-taking and holding a portfolio of bank stocks only, might then fa-

vor the recently proposed risk-based capital rule because it is strictly asset-based and explicitly taxes off balance sheet guarantees. Unfortunately, those holding a more diversified portfolio of assets would tend to oppose such a regulation, given the overall marginal effect of standbys on the required risk premium.

## Conclusion

The purpose of this article has been to investigate a credit enhancement facility offered by banks—the issuance of standby letters of credit. It was argued that such activities have value as a banking service, even in the absence of regulation, and have grown rapidly in response to customer needs and bank willingness to supply these services. Drawing on empirical research from three different sources it was argued that 1) the decision to participate in the standby letter of credit market depends primarily on the regulatory incentives to engage in off balance sheet activities, especially funding balance sheet assets with reserveable deposits; 2) on average, banks hold more primary capital when outstanding standby letters of credit increase; and 3) the issuance of standby letters of credit is priced as a risk-reducing bank activity by well-diversified investors, although not by those investors who hold bank stock-only portfolios.

Public policy concerning bank risk management should be based on an understanding of how bank risk is related to off balance sheet decisions. Recently, the Federal Reserve has proposed risk-based capital guidelines in which banks must hold a minimum level of capital (roughly six percent) against a proportion of their outstanding standby letters of credit.<sup>11</sup> The assumption underlying this proposal is: Because the current minimum capital standards exclude off balance sheet items, bank capital decisions do not offer a prudent buffer for an organization's off balance sheet risk exposure. Federal banking agencies are concerned that banks are bolstering profits and taking risks by shifting out of liquid assets and secondary reserves and increasing their off balance sheet activity. The ability to earn non-interest income while avoiding capital requirements makes standby letters of credit an attractive alternative to booking balance sheet assets.

Will a risk-based capital rule that includes off balance sheet guarantees, as recently proposed, have a significant effect on standby letter of credit decisions? The results presented here suggest it may not. This article shows that other regulatory-based incentives are more important than binding capital requirements in determining the supply of off balance sheet guarantees. It also suggests that large banks may be already taking outstanding standby letters of credit into account when making capital decisions. Although the results here suggest that a binding capital constraint has very little effect on the decision to issue off balance sheet guarantees, the imposition of a binding risk-based capital standard would still be useful in protecting the solvency of the deposit insurance fund because it provides an additional buffer against the loss of market value. This justification is also borne out by the analysis of bank equity returns when one views the FDIC as an undiversified investor in the value of bank assets.

---

<sup>1</sup> See Diamond and Dybvig [1986] for further discussion of why banks exist.

<sup>2</sup> Fama [1980] and Black [1975] do not appeal to market imperfections to justify the existence of financial intermediaries. The argument is that banks exist as a passive response to borrower and lender demands for access to an accounting system of exchange and managed portfolios. Banks earn fees for their clearinghouse and management skills. An off balance sheet guarantee may be valuable to investors because it insures access to a clearinghouse in the event of borrower default.

<sup>3</sup> Given the existence of off balance sheet guarantees, several authors have investigated the determinants of the decision to seek or issue these instruments, theoretically. Loan commitments have been investigated by Campbell [1978], Deshmukh *et al.* [1982], Ricart I. Costa and Greenbaum [1983], Bartter and Rendleman [1979], Thakor [1982], and Thakor *et al.* [1981]. The first three articles examine the bank's loan commitment decision problem, while the last three articles focus on the customer's valuation problem. Greenbaum and Venezia [1985] examine the partial takedown of loan commitments in a model where the bank and borrower interact. They derive several determinants of the optimal takedown and show how commitment prices change in response to takedown behavior.

<sup>4</sup> Kareken [1987] argues that the rapid growth in off balance sheet guarantee issuance since 1973 is

due to technological advances that decrease the cost of acquiring and processing information and open the direct credit markets to a greater number of issuers. In the model here, this implies a greater need to accommodate bank customers and an enhanced value of bank guarantees.

<sup>5</sup> See Galai and Masulis [1976] and Weinstein [1983]. This idea has been used to show the relationship between systematic risk in corporate bonds and the characteristics of the bond, the issuer, and the capital markets.

<sup>6</sup> A guarantee could then be considered an option on an option, or a compound option. Another example of a compound option is a stock option because the stock share itself can be considered a call option on the value of the firm.

<sup>7</sup> In other studies Goldberg and Lloyd-Davies [1985] found an inconsistent relationship between capital and letter of credit activity; a positive relationship existed only for small banks. Benveniste and Berger [1986] estimate that banks with low capital ratios are more likely to issue standby letters of credit but, given that they do issue these instruments, capital ratios and standby letter of credit volume are positively related. See also Bennett [1986].

<sup>8</sup> See Koppenhaver [1987] for further elaboration.

<sup>9</sup> Because the predicted dependent variable is the logarithm of the odds of choice, not the actual probability, the marginal effect on the probability

due to a change in an independent variable will depend on the probability itself. For the logit model, the marginal effect of a change in the independent variable  $X_i$  on the probability of engaging in an off balance sheet activity  $P_j$  is given by  $\partial P_j / \partial X_i = P_j(1 - P_j)\beta_i$  for each continuous explanatory variable. The value of  $P_j$  chosen for the tables is the sample frequency of use, equal to the mean predicted probability.

<sup>10</sup> A two-factor model of asset returns can be justified on the grounds that the market portfolio does not capture all of the determinants of individual returns. That is, the single-factor model is misspecified. Yet another candidate for an explanatory variable is an interest rate factor that measures the change in investment opportunities over time. Since the time series aspects of the data set used here are not extensive, an interest rate factor was not used.

<sup>11</sup> On January 20, 1986, the Board of Governors of the Federal Reserve System proposed rules for implementing risk-based capital guidelines. In the guidelines, revised March 6, 1987, supplemental capital ratios are to be calculated that explicitly include standby and commercial letters of credit, and loan commitments. Standby letters of credit are either given a weighting of 50% or 100% depending on their reason for issuance. The weights determine the quantity of each item that are included in risk assets and then compared to primary capital.

## References

- Bartter, B. and R. Rendleman. "Fee-Based Pricing of Fixed-Rate Bank Loan Commitments." *Financial Management* 8(Spring 1979), pp. 13-20.
- Bennett, B. "Off Balance Sheet Risk in Banking: The Case of Standby Letters of Credit." *Economic Review*, Federal Reserve Bank of San Francisco (Winter 1986), pp. 19-29.
- Benston, G. and C. Smith. "A Transactions Cost Approach to the Theory of Financial Intermediation." *Journal of Finance* 31(May 1976), pp. 215-231.
- Berger, A. and L. Benveniste. "An Empirical Analysis of Standby Letters of Credit." *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago (1986), pp. 387-412.
- Black, F. "Bank Funds Management in an Efficient Market." *Journal of Financial Economics* 2(December 1975), pp. 323-339.
- Brewer, E., G. Koppenhaver, and D. Wilson. "The Market Perception of Bank Off Balance Sheet Activities." *Proceedings of a Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago (1986), pp. 413-436.
- Buser, S., A. Chen, and E. Kane. "Federal Deposit Insurance, Regulatory Policy, and Optimal Bank Capital." *Journal of Finance* 35(March 1981), pp. 51-60.
- Campbell, T. "A Model of the Market for Lines of Credit." *Journal of Finance* 33(March 1978), pp. 231-244.
- Campbell, T. "Optimal Investment Financing Decisions and the Value of Confidentiality." *Journal of Financial and Quantitative Analysis* 14(December 1979), pp. 913-924.
- Campbell, T. and W. Kracaw. "Information Production, Market Signalling, and the Theory of Financial Intermediation." *Journal of Finance* 35(September 1980), pp. 863-882.
- Deshmukh, S., S. Greenbaum, and G. Kanatas. "Bank Forward Lending in Alternative Funding Environments." *Journal of Finance* 37(September 1982), pp. 925-940.

- Diamond, D. "Financial Intermediation and Delegated Monitoring." *Review of Economic Studies* 51(July 1984), pp. 393-414.
- Diamond, D. and P. Dybvig. "Banking Theory, Deposit Insurance, and Banking Regulation." *Journal of Business* 59(1986), pp. 55-68.
- Fama, E. "Banking in the Theory of Finance." *Journal of Monetary Economics* 6(January 1980), pp. 39-57.
- Fama, E. "What's Different About Banks?" *Journal of Monetary Economics* 15(January 1985), pp. 29-39.
- Galai, D. and R. Masulis. "The Option Pricing Model and the Risk Factor of Stock." *Journal of Financial Economics* 3(January/March 1976), pp. 53-82.
- Giddy, I. "Regulation of Off-Balance Sheet Banking." *The Search for Financial Stability: The Past Fifty Years*, Federal Reserve Bank of San Francisco, 1985, pp. 165-177.
- Goldberg, M. and P. Lloyd-Davies. "Standby Letters of Credit: Are Banks Over-extending Themselves?" *Journal of Bank Research* 16(Spring 1985), pp. 28-35.
- Greenbaum, S. and I. Venezia. "Partial Exercise of Loan Commitments under Adaptive Pricing." *Journal of Financial Research* 8(Winter 1985), pp. 251-263.
- Houck, W. and A. Donner. "Wald's Test as Applied to Hypotheses in Logit Analysis." *Journal of the American Statistical Association* 72(December 1977), pp. 851-853.
- Kareken, J. "Contingent Commitment Banking: Risk and Regulation." Paper presented at a Conference on Asset Securitization and Off Balance Sheet Risks of Depository Institutions, Northwestern University, February 15-17, 1987.
- Koppenhaver, G. "The Effects of Regulation on Bank Participation in the Guarantee Market." *Staff Memoranda, No. SM-87-6*, Federal Reserve Bank of Chicago, February 1987.
- Koppenhaver, G. and R. Stover. "On the Relationship Between Standby Letters of Credit and Bank Capital." *Staff Memoranda No. SM-87-4*, Federal Reserve Bank of Chicago, April 1987.
- Laub, P. "Regulation of Off-Balance Sheet Banking: Discussion." *The Search for Financial Stability: The Past Fifty Years*, Federal Reserve Bank of San Francisco, 1985, pp. 179-183.
- Leland, H. and D. Pyle. "Information Asymmetries, Financial Structure, and Financial Intermediation." *Journal of Finance* 32(May 1977), pp. 371-387.
- Pyle, D. "Regulation of Off-Balance Sheet Banking: Discussion." *The Search for Financial Stability: The Past Fifty Years*, Federal Reserve Bank of San Francisco, 1985, pp. 185-189.
- Ramakrishnan, R. and A. Thakor. "Information Reliability and a Theory of Financial Intermediation." *Review of Economic Studies* 51(July 1985), pp. 415-432.
- Ricart I. Costa, J. and S. Greenbaum. "Bank Forward Lending: A Note." *Journal of Finance* 38(September 1983), pp. 1315-1322.
- Thakor, A. "Toward a Theory of Bank Loan Commitments." *Journal of Banking and Finance* 6(March 1982), pp. 55-83.
- Thakor, A., H. Hong, and S. Greenbaum. "Bank Loan Commitments and Interest Rate Volatility." *Journal of Banking and Finance* 5(December 1981), pp. 497-510.
- Weinstein, M. "Bond Systematic Risk and the Option Pricing Model." *Journal of Finance* 38(December 1983), pp. 1415-1429.
- Wolkowitz, B., P. Lloyd-Davies, B. Gendreau, G. Hanweck, and M. Goldberg. "Below the Bottom Line: The Use of Contingencies and Commitments by Commercial Banks." *Staff Studies #113*, Board of Governors of the Federal Reserve System, January 1982.

**FRB**  
**CHICAGO ECONOMIC**  
**PERSPECTIVES**

Public Information Center  
Federal Reserve Bank  
of Chicago  
P.O. Box 834  
Chicago, Illinois 60690

Do Not Forward  
Address Correction Requested  
Return Postage Guaranteed

BULK RATE  
U.S. POSTAGE  
PAID  
CHICAGO, ILLINOIS  
PERMIT NO. 1942