

Economic Review

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Wesday, March 23, 1992.		Strike	Call-Sell
-AGRICULTURAL-		Price	May-C-J
bu, Cents per bu		10	1.24
C-Settle		21	10
1/2c, Sep-c	May-p	22	04
23 1/2	22 1/2	23	04
3 1/2	10 1/4	24	04
10	13 1/4	25	04
5 1/2	9 1/4	26	04
9 1/2	12 1/4	27	04
20 1/2	18	28	04
5 vol e-35 calls	1,812 puts	29	04
2,587 calls	45,558 puts	30	04
2,000 bu, Cents per bu		31	04
5-Settle		32	04
1/2c, Aug-c	Put-s Settle	33	04
60 1/2	1/2c, Sep-c	34	04
45	5 1/2c, Aug-p	35	04
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Steven P. Feinstein and Peter A. Abken

The large debt burden carried by many developing nations not only has hampered these countries' economic development but has also threatened their commercial bank lenders. Economic austerity measures aimed at reducing this debt have severely limited the funds less developed countries have available for domestic investment, further retarding their economic growth. The authors' proposal—that LDCs sell long-term, high strike price call options on their chief export commodities—would allow LDCs to generate revenue without renegotiating existing debts or giving up ownership of productive resources.

of debt relief is not a physical commodity but rather a type of financial asset—namely long-term, high strike price call options on their chief export commodities.

The proposal in this article offers interested parties such as commodity users or speculators the opportunity to bid on the right to purchase a certain quantity of a chief export commodity for

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a prespecified price on a given future date. In making these call options available, LDCs would in effect be selling commodity price insurance—insurance that pays off if the commodity price rises beyond some high level. For example, a bidder might purchase the right (but not the obligation) to buy Mexican oil at \$27 a barrel on a given date five years hence, even though the price of oil at the time of bidding is only \$17.25. Should the prevailing market price remain below the “strike” level of \$27, the option owner would simply elect not to carry out the transaction.¹ Should oil rise to \$30 a barrel by the agreed-upon expiration date, though, the bidder could purchase the oil at \$3 below prevailing prices. Although the LDC must then relinquish goods for less than the going rate, revenue from the earlier option sales would have ameliorated matters during a period of low prices. The loss of potential profits would come at a time of high prices when the selling country could best afford it.

Using call options in meeting debt obligations is not an entirely new idea. Numerous articles in academic journals have suggested construction of financial instruments that tie a borrower’s liabilities to a commodity price, and the recent Mexican loan restructuring (described below) includes such a feature.² In other plans, however, options have been bundled together with bonds. By selling options separately, as proposed here for the first time, an LDC can generate substantial revenue without renegotiating all its outstanding debts.

Such an “unbundled” approach is possible with this proposal because it calls for selecting a strike price high enough to ensure that the debtor will face the future obligation only when fulfillment of all other obligations is relatively easy. This feature would obviate the need to gain the endorsement of existing creditors prior to selling the options. Keeping the options separate from debt instruments also affords the LDC greater flexibility in the management of its revenue flow and debt. A program of selling options when commodity prices are low and redeeming them when prices are high can help an LDC smooth revenue across periods of high and low commodity prices. A further advantage is that the market for the unbundled option is likely to be wider than the market for options coupled with debt.

The World Debt Problem—A Review

Since 1982 the high indebtedness of many developing nations has placed a severe strain on both the LDCs and the world banking community. According to the most recent accounting, LDCs owe \$1.3 trillion to foreign banks, governments, and international agencies.³ Not only have LDCs struggled to service this debt, but exposure to these troubled loans has threatened the strength of commercial banks.

The roots of the problem can be traced to the volatility of commodity prices and interest rates over the last two decades. The oil price increases of 1973 and 1979 led to a massive redistribution of wealth from oil importers to oil exporters, primarily those in the Middle East. These “petrodollars” accumulated in commercial banks around the world as surplus funds awaiting investment opportunities. Because of their apparent excellent potential to develop rapidly, Latin American economies were deemed to be excellent credit risks. As a result, these countries received enormous loans from commercial banks.

The loans were predominantly short-term, with interest rates tied to the London Interbank Offer Rate (LIBOR).⁴ By 1980 three-fourths of the debt owed by Latin American countries was set at variable rates; 40 percent was due for repayment within one year, and 70 percent within three years.⁵ From 1971 to 1980, LIBOR was on average 0.8 percent (80 basis points) less than the rate of U.S. wholesale price inflation; developing countries were effectively borrowing at very low or even negative real interest rates.⁶ Later, however, rates on LDC debt surged as the United States tightened monetary policy in an attempt to control inflation. LIBOR averaged 9.2 percent (920 basis points) above the U.S. inflation rate from 1981 to 1982.⁷ As rates rose, debt service obligations soared.

The worldwide recession that accompanied higher interest rates further hurt LDCs. Reduced

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demand for their exports and plummeting commodity prices compounded their misfortune. As the value of imports began to overwhelm that of exports, current account payment balances of the highly indebted countries turned sharply negative.⁸ By the end of 1982, 34 developing countries were unable to service their debt fully.⁹ As oil exporters, Mexico and Venezuela were special cases. As oil prices leveled off and then began to drop, however, these two countries also began to have difficulty making payments on the substantial debt they had accumulated against future oil revenues.

The predicament has taken a heavy toll on the LDCs. In net terms Latin America and the Caribbean *exported* capital in each of the last eight years; the 1989 net outflow amounted to \$24.6 billion (see Barbara Durr 1989). As a result, domestic investment and development have suffered. Growth over the last decade has slowed to a crawl, making repayment of the foreign debt even more difficult and less likely.¹⁰ Moreover, standards of living have declined. Between 1980 and 1987, per capita consumption in the LDCs fell nearly 12 percent (see Giancarlo Perasso 1989, 535). If the quality of life for the citizens of LDCs is to improve, many believe, capital must flow into these countries on net, not in the opposite direction.

Lenders have also suffered. In 1982 the sum of LDC loans on the books of U.S. banks was over 180 percent of the capital in those banks (Jeffrey Sachs 1989a). Since then, the market value of LDC loans has fallen sharply below book value. For example, by March 1990, Peruvian loans could be sold for only six cents on the dollar, and the market valued Mexican debt at 40 percent of face value.¹¹ Consequently, bank earnings have suffered, and bank stocks have reflected deteriorating loan portfolio values (Sachs 1989a).

Nonetheless, considerable progress has been made toward alleviating the crisis. Banks have reduced their LDC loan exposure and increased capital, thereby easing fears of bank insolvency. By 1988, aggregate exposure stood at less than 80 percent of capital (Sachs 1989a). This improvement afforded some breathing room and made it possible for banks to offer debt relief. Recently, U.S. Treasury Secretary Nicholas Brady's initiative to reduce LDCs' debt burden helped Mexico restructure its commercial bank

debt. Mexico received concessions on principal and interest, along with new loans (Peter Truelli 1990).

The LDC debt problem, however, is far from over. No single approach is likely to work across the board, and in most cases debt reduction will probably be part of future financial arrangements. Yet developing countries that rely solely on debt reduction may find it difficult to borrow in the future. Nor is rescheduling old loans and securing new loans a satisfactory long-term solution. Many experts now agree that the problem is one of solvency rather than a lack of liquidity available to the LDCs (Anna J. Schwartz 1989). In other words, these nations' economic prospects are sufficiently bleak that markets doubt LDCs can make good on their past financial obligations. Consequently, as long as stretching payments out over longer horizons preserves the net present value of LDCs' liabilities, such a tactic will not end the crisis.

Highly indebted countries must therefore search for ways to restore their solvency. Essentially, in order to pay off their huge debts, they must raise more revenue. Better economic planning and measures to stem domestic capital flight are the sorts of actions that will have lasting positive effects (A. Schwartz 1989 and Rudiger Dornbusch 1987). Some policymakers and analysts advocate debt-equity swaps as means by which LDCs can pay off loans without incurring new liabilities; however, these transactions represent permanent sales of an LDC's productive resources (such as forests, mines, and factories) and so cannot provide revenue on a continuing basis. Consequently, such swaps serve only as temporary palliatives. Furthermore, the manner in which debt-equity swaps are executed usually results in money supply expansion in the LDC, thus fueling inflationary pressures.¹²

A New Proposal

Selling high strike price call options on export commodities is one way LDCs could generate revenue without selling their productive resources or renegotiating existing debt. Thus commodity price volatility, which contributed to the debt crises in the first place, could provide a

partial key to its solution. It is precisely the volatility of LDC export prices that makes high strike price call options valuable today, just as uncertainty makes various forms of insurance more desirable.

Because a call option affords the buyer the right, but not the obligation, to buy at a given price on a given date, investors find it profitable to exercise the option only in the event that the commodity's market price rises above the strike price. Thus, an LDC that sells high strike options incurs an obligation that needs to be fulfilled only if commodity prices increase substantially—a circumstance in which fulfillment of all obligations would be easier for the LDC.

Selecting a high strike price for the call options enhances the instrument's marketability. High strike price call options need not be designated as "senior" obligations (those that must be met in advance of existing debt) in order to attract buyers. Although call option transactions entail some risk of default, the option's value remains high, even when default risk and junior designation are taken into consideration, because the chance of default is small when the commodity reaches the high strike price. (See the example of option pricing in the box on page 10.) As junior obligations, option sales would not require approval by existing creditors—an obstacle that frequently blocks additional loans to highly indebted countries.

Since LDCs would be issuing call options on their own export commodities, the countries would bear little financial risk in meeting their obligations. When calls are covered, the issuer simply sells the available commodity to the option holder for the strike price. When call options are not covered, that is, when the underlying commodity is not in the possession of the issuing party, the issuer takes the chance of having to purchase quantities of the commodity at high prices to fulfill the contract.

LDCs could either sell covered calls to new investors or swap them for a portion of outstanding debt. To ensure a fair price to the LDC for the calls, the sale and distribution could be conducted via a closed-bid auction in a manner similar to the Morgan Guaranty Mexican debt-swap of February 1988. LDCs could set a minimum acceptable price in advance, or they could retain the right to reject low bids.

The covered call is a simple use of options. Additional flexibility could be achieved through use of combinations of options, which would, for example, keep an LDC from sacrificing all of the additional revenue forgone if prices rose above the strike price. A more elaborate use of options could tailor the payoff contingencies to better suit the LDC and potential investors.

One such strategy is the call option spread, which would provide a cap on the payout in the event of a very high commodity price. A spread is conceptually equivalent to the LDC's selling a call at a given strike price and simultaneously buying a call at a higher strike price.¹³ This combination entitles the investor to an increasing payout as the commodity price rises in the range between the two strike prices. If the commodity price rises further, though, the cap comes into play. LDC governments might prefer this arrangement for political reasons. Setting a cap on the contingent liability would also be advantageous in the case of agricultural commodities, for which quantity risks caused by uncertain harvests are significant.

Supporting Theory

As is now clear, the LDC is not the only party to bear commodity price risk; the LDC's creditors share that risk. While periods of high prices are characterized by large capital inflows and rapid growth, low prices strain LDC economies and often result in debt crises as the revenue needed to service outstanding debt dries up. At the same time debt held by the LDC's creditors fluctuates in value according to the LDC's creditworthiness, which in turn depends on the commodity price. If the risk of price fluctuation subjects both the LDC and the creditor to the specter of default during low-price times, and if default is costly to the two parties, then some sort of revenue smoothing is advantageous to both parties. One way to smooth revenue across high- and low-price periods is for the LDC to sell "claims" on the high-price period. High strike price options are exactly such a claim. They allow the LDC to transfer money from potential high-price periods into an immediate low-price period.

According to option pricing theory, the more volatile the commodity price is, the more such

Table 1.
Estimated Value of Vulnerable Oil Options
For Various Terms and Strike Prices

(Johnson-Stulz Pricing Method: Spot Oil Price = \$17.25;
Oil Price Volatility = 28 percent per year; Initial Pool Value = \$10.77 per option;
Pool Volatility = 42 percent per year; Correlation between Oil Price and
Pool Value = .5; Interest Rate = 8 percent per year)

Strike price per barrel	Years until expiration:					
	2	3	4	5	6	7
\$25	\$1.27	\$2.01	\$2.59	\$3.04	\$3.39	\$3.65
26	1.11	1.83	2.42	2.88	3.23	3.51
27	.96	1.67	2.25	2.72	3.09	3.38
28	.84	1.51	2.10	2.57	2.96	3.25
29	.73	1.44	1.95	2.43	2.84	3.13
30	.63	1.25	1.82	2.30	2.70	3.01
31	.55	1.14	1.69	2.17	2.57	2.89
32	.48	1.04	1.58	2.06	2.46	2.78

an option is worth. Consequently, the use of LDC covered calls is most feasible in exactly those cases where it is most necessary.

An Example of an LDC Covered Call

While the features and theoretical underpinnings of LDC covered calls are straightforward, a realistic example can clarify the features outlined. Mexico owes \$100.3 billion to foreign interests.¹⁴ Payment of principal and interest exceeded \$15 billion in 1988, an amount equal to 46 percent of export revenues.¹⁵ Yet Mexico consistently produces between 880 million and 1.1 trillion barrels of oil each year. Since 1982 over 470 million barrels per year have been exported.¹⁶ Proven reserves amount to 70 billion barrels. Thus, the supply and production of Mexican oil is reliable.

Under conditions prevailing in the second quarter of 1989, when the market price for Mexican oil stood at \$17.25 per barrel, an option to sell oil five years later at a price of \$27 would have been worth approximately \$2.72 (see Table 1).¹⁷ This figure is computed using Herb Johnson and René Stulz's (1987) pricing model, which is similar to the Black-Scholes model but

also accounts for default-risk.¹⁸ The box on page 10 describes the methodology and explains the assumptions and parameter values used.

With a price of \$2.72 for an option on one barrel of Mexican oil, a sale of call options on one year's quantity of oil exports could net Mexico \$1.28 billion in current revenue (Table 2). A sale of options on five years' exports would bring \$6.4 billion.¹⁹ This revenue would be sufficient to retire 6.37 percent of Mexico's foreign bank debt at face value, and more than 15.9 percent at current market discounts. By comparison, the recent Mexican financing package negotiated under the Brady plan framework extinguished \$7 billion in commercial bank debt. In addition, a fixed reduced interest rate was secured on over \$22 billion in claims. However, this debt relief was partially offset by new loans totaling nearly \$1.4 billion from banks and about \$5.75 billion from official sources to provide for principal repayments and guarantee interest (see Jorge C. Castaneda 1990 and Truell 1990). The Mexican government has expressed an interest in further reducing their commercial bank debt over time, and the revenue raised by the proposal presented here could allow such reductions without a drawdown in reserves.

The sale of options is not a sale of oil; it merely sets the highest price that Mexico can

Table 2.
Estimated Revenue to Mexico
For Issues of Options with Various Terms and Strike Prices
(billions of U.S. dollars)

(Based on Johnson-Stulz vulnerable option valuation; assumes options cover 470 million barrels, approximately one year's exports; all other assumptions are as given in Table 1)

Strike price per barrel	Years until expiration:					
	2	3	4	5	6	7
\$25	\$.60	\$.94	\$1.20	\$1.40	\$1.60	\$1.70
26	.52	.86	1.10	1.40	1.50	1.70
27	.45	.79	1.10	1.30	1.50	1.60
28	.39	.71	.99	1.20	1.40	1.50
29	.34	.68	.92	1.10	1.30	1.50
30	.30	.59	.86	1.10	1.30	1.40
31	.26	.54	.79	1.00	1.20	1.40
32	.23	.49	.74	.97	1.20	1.30

charge the option purchaser for oil during the expiration year. Should the price of oil remain low, Mexico would be free to sell oil in any manner it chooses. Only if the price rebounds and exceeds the \$27 strike price would Mexico be obliged to sell oil to the option holders for \$27 per barrel. At that price, though, the flow of revenue would be sizable, and Mexico's financial situation would be greatly improved. In either case, the sale of covered calls would provide Mexico with added revenue now, revenue that could be used to ease the current financial crisis.

Table 1 presents the Johnson-Stulz prices for vulnerable Mexican oil options—that is, those subject to default risk—using various combinations of strike prices and maturities. Table 3 presents Black-Scholes prices, which assume no default risk but correspond to the same parameter values. (These parameters are given in the box and in the tables.) The difference between the Black-Scholes and Johnson-Stulz prices is the credit spread, that is, the reduction in the value of the option that is due to the risk of default. As a percentage of the option price, the credit spread is lower for higher strike prices. The attractiveness of the option is that its contingent liability is paid only when funds are plentiful and thus effectively does not compete with existing debt for available funds.

Mexico is not the only example of a country that could benefit from selling call options on an export commodity. Brazil, for example, could sell options on soybeans and coffee. Chile and Peru might sell options on copper, Bolivia, tin options. Any commodity-exporting country could make use of a similar strategy. Table 4 lists several LDC candidates and their principal export commodities.

The Proposal from the LDCs' Perspective

A sale of high strike price covered calls would provide an LDC with much-needed revenue when revenue is otherwise scarce. Unlike a debt-equity swap—which involves permanent sale of productive resources, often at depressed prices—the LDC covered call entails no loss of control or ownership over productive resources. Sale of LDC covered calls, on the other hand, relinquishes only some potential profits for a fixed amount of time—that is, the difference between the market price of the commodity and the option's strike price (if the difference is positive) for a prespecified quantity of output.

The obligation would be "costly" to the LDC in high-price periods because the LDC would

Table 3.
Estimated Value of Default-Free Oil Options
For Various Terms and Strike Prices

(Black-Scholes Pricing Method: Spot Oil Price = \$17.25;
Oil Price Volatility = 28 percent per year; Interest Rate = 8 percent per year)

Strike price per barrel	Years until expiration:					
	2	3	4	5	6	7
\$25	\$1.41	\$2.45	\$3.47	\$4.43	\$5.33	\$6.18
26	1.23	2.23	3.22	4.17	5.08	5.93
27	1.06	2.02	2.99	3.93	4.83	5.69
28	.92	1.83	2.78	3.71	4.60	5.45
29	.80	1.66	2.58	3.49	4.38	5.23
30	.69	1.51	2.39	3.29	4.18	5.02
31	.60	1.37	2.22	3.11	3.98	4.82
32	.52	1.24	2.07	2.93	3.79	4.63

fulfill its obligation by selling at a lower-than-market price; however, that price would be much higher than the market price had been at the time the option was written. Thus, the transaction would still be profitable to the LDC and would further enhance its welfare, despite its obligatory nature. Furthermore, if the LDC had unused production capacity, exercise of the options would provide additional customers and greater total revenue.

Should the commodity price not rise above the strike price, the option would expire unexercised and the LDC would face no further encumbrance. In order to supplement income during the continued low-price state, the LDC might then wish to issue additional covered calls against another future period's production.

The Proposal from the Creditor's Perspective

Sales of covered calls by LDCs would benefit creditors for several reasons. The new instrument embodies some attractive investment features. LDCs' selling covered calls represents a feasible alternative to demanding new loans from creditors. The revenue covered calls provide LDCs would enhance the value of the other

LDC debt held by the creditors. Although covered calls require no servicing prior to expiration, unlike debt forgiveness, they have inherent value; thus the accounting treatment is more favorable to banks than is outright debt forgiveness.

Another advantageous feature of an LDC covered call is its ability to let the investor/creditor share more fully in the fortunes of the LDC during times of increasing commodity prices. A portfolio of loans to an LDC carries considerable exposure to commodity price risk, but offers limited reward should prices rise. LDC covered calls would grant creditors access to greater upside potential. Just as commodity prices are theoretically unbounded, the potential gain from owning an LDC covered call would be unlimited.

Although the option would expire worthless should commodity prices not recover, the same could be said of LDC debt. Nonperformance on loans is quite possible during the low-price periods in which an option would expire out of the money. Thus, LDC debt and LDC covered calls have certain downside features in common. Certainly there are price scenarios in which LDC debt would perform better than LDC covered calls; nevertheless, some creditors/investors might prefer the different risk-return profile of the option.

Another potentially attractive feature of LDC covered calls could be their greater liquidity relative to LDC bank debt and equity stakes. As a standardized security, LDC covered calls should be easier to sell than bank debt and equity holdings. Indeed, an active market for LDC covered calls might develop in response to their availability. Banks would then have an avenue to reduce their LDC exposure, should they wish to, by swapping bank debt for calls and then selling those calls in the market.

The proposal should also appeal to creditors because of the effect it would have on the entire portfolio of LDC investments. The options would only pay off when LDC funds are plentiful, and the initial sale or swap of the options would reduce the LDC's debt burden. Hence, the LDC could better service all of its obligations regardless of the behavior of commodity prices. The LDC would potentially have more funds for development and thus face enhanced future financial prospects. Accordingly, the value of all the LDC's outstanding debt could appreciate.

Clearly, purchase of LDC covered calls is preferable to debt forgiveness from the creditors' point of view. Like debt forgiveness, selling LDC covered calls would relieve the debtor of some debt service obligations and make service of remaining debt more manageable. This change would enhance the value of remaining debt, just as debt forgiveness does. By receiving LDC covered calls, however, creditors would maintain a claim on LDC funds that might become available at a later date. Furthermore, whereas banks must write off debt that is forgiven, receipt of calls would preserve some capital since LDC covered calls are a valuable asset.

The Market for LDC Covered Calls

Users of the LDC's export commodity face price risk exactly opposite of that borne by the LDC: users suffer when prices are high and prosper when prices are low. Purchase of an LDC covered call would be a form of insurance against excessive price hikes. It would insulate the user against severe fluctuations in the commodity price, thereby facilitating investment planning and marketing decisions. Should the price remain low, the option would expire

Table 4.
Selected Heavily Indebted
Countries and Their Chief
Export Commodities

Country	Commodity	Export Revenue from Commodity as a Percent of Total Exports, 1982-88
Argentina	Wheat	10.8
	Corn	7.8
Bolivia	Natural Gas	49.3
	Tin	25.1
Brazil	Soybeans	9.5
	Coffee	8.4
Chile	Copper	45.4
Colombia	Coffee	39.8
	Fuel Oil	13.4
Ecuador	Crude Oil	54.7
	Bananas	9.4
Côte d'Ivoire	Cocoa Beans	29.7
	Coffee	18.3
Mexico	Petroleum	57.0
Morocco	Phosphates	18.5
Peru	Copper	16.8
	Zinc	9.5
Philippines	Coconut Products	10.8
Uruguay	Wool	19.7
Venezuela	Petroleum	86.0

Source: International Monetary Fund.

worthless, much in the same way an accident insurance policy returns nothing when no accident occurs. During low-price periods, however, the option owner would continue to enjoy the low price of the essential commodity.

Processors and distributors of oil products, along with the U.S. Department of Energy, which purchases oil to supply the nation's strategic reserves, might be potential buyers of LDC covered calls on oil. Agents who wish to speculate on the price of oil might also be interested, and they would add liquidity to the market. Investment managers could use LDC covered calls to hedge over the long term against the adverse effects commodity price shocks can

exert on investment portfolios. Currently, few instruments are available that allow agents to speculate or hedge prices over the long term.

Potential Problems

This plan is subject to criticism in several areas, and certain details would have to be worked out. For example, creditors and investors might fear that an LDC would renege on its obligation should the price of oil rise substantially above the option strike price. This behavior is unlikely, however, since it would be akin to default on a loan. An LDC's initial sale of LDC covered calls in order to retire debt would exhibit a willingness to honor international financial agreements. For countries striving to do so during hard times, reneging during easier circumstances seems unlikely.

The LDC would have to bear inflation risk. Worldwide inflation over the life of the option might lower the real value of the strike price at which the commodity would have to be sold. If this occurred, however, the same inflation that would make fulfillment of the option obligation costlier to the LDC would also relieve the LDC of some of its debt burden. Inflation increases the real cost of the option obligation but decreases the real cost of the debt obligations. As long as the term of the options were similar to or shorter than the interval at which banks reprice loans in response to inflation and changing interest rates, the two countervailing inflation effects

could offset one another. In this way, LDC covered calls could possibly offer creditors and debtors a hedge against inflation risk.

Logistical details need to be addressed on a case-by-case basis. For instance, to avoid simultaneous exercise of all options, which would put a tremendous strain on the LDC's ability to deliver the commodity, the option could be written so that a forward delivery contract would be sold to the holder, with the delivery date determined by the order in which the exercise request is received.

Conclusions

High strike price covered call options are a market-oriented solution that should be explored further and given serious consideration as a response to the current LDC debt crisis. Because their use offers LDCs a new source of revenue without adding to an already difficult debt burden, sale of call options would benefit both LDCs and the holders of existing LDC debt. By smoothing income across periods of high and low commodity prices and providing insurance against periods of excessively high commodity prices, this financial instrument holds advantages for LDCs, consumers of their export commodities, and investors. Thus, it presents a promising new approach to easing debt obligations and furthering economic advancement in highly indebted countries.

An Explanation of the Johnson-Stulz Pricing Model

The Johnson-Stulz method is useful for valuing "vulnerable" options, that is, options that face some risk of default. The method relies on various assumptions similar to those required by the Black-Scholes methodology, which is commonly used to price exchange-traded and other default-free options. Both models assume that the price of the underlying asset (oil in the Mexican example) moves randomly and smoothly through time and that the percent change over any instant of time is independent of the change at any other point in

time.¹ Therefore, the intrinsic value of the option—that is, the difference between the strike price and the underlying asset price—also moves smoothly. Black and Scholes showed that a portfolio consisting of the underlying asset and a short position in bonds could exactly replicate the option. Because the replicating portfolio and actual option offer the same payoff at expiration, their values must be the same any time before expiration. Otherwise, arbitrage profits could be realized. The Black-Scholes methodology essentially prices the op-

tion by adding up the observable prices of the assets in the replicating portfolio.

The Johnson-Stulz method differs from the Black-Scholes method in that it assumes the option writer has limited assets available to meet the potential liability of the option. Mexico, for example, has a limited pool of funds with which to cover its option obligations upon exercise. If the pool value falls below the option obligation, the option owners do not receive the full option payoff upon expiration.² Instead, they receive the available funds in the pool. In other words, at expiration the vulnerable call pays the minimum of the option's intrinsic value or its share of the pool (the total pool divided by the number of options issued).

In pricing the option used in the example, the pool was valued in the following manner: for a given period, Mexico's current account surplus, which was sometimes negative, was added to the previous period's foreign currency reserves, and required debt service was subtracted.³ This number, however, was often negative since Mexico partially financed large trade deficits and debt service by obtaining new loans. To apply the Johnson-Stulz method, it was necessary to adjust the pool, normalizing it to equal zero at the level at which default would be likely.

The unadjusted pool reached its historical minimum in the third quarter of 1981; the next year Mexico suspended interest payments. Since that time the total quantity of foreign debt has risen. Moreover, both the ratio of debt service to GNP and the ratio of external liabilities to GNP have similarly been much higher in several of the years since the time of the payments moratorium.⁴ Thus, the rapid rate of capital outflow, rather than the excessive level of debt amassed, apparently was the main factor prompting Mexico's interest suspension in 1982. To normalize the pool, therefore, it was assumed that Mexico would make payments on the options as long as the pool value remained above its historical minimum. If that minimum were ever again achieved, it would lead to default. To normalize the pool in this way, the historical minimum ($-\$5.4$ billion) was subtracted from each entry in the time series of pool values.⁵ Finally, the pool per option was computed by

dividing the total pool value by the number of options issued.

Table I presents Johnson-Stulz prices for Mexican oil options using various combinations of strike prices and maturities. The computation uses data from the second quarter of 1989. The oil price was \$17.25 per barrel at that time. The total value of the pool was \$5.1 billion, or \$10.77 per option if options are issued on one full year's worth of exports, 470 million barrels. Parameter inputs were estimated using quarterly data from 1982 to 1989. The standard deviation of percent changes in the pool value is 43 percent per year. The volatility of the oil price is 28 percent per year.

The prices in Table I may overstate the true value of these options for the following reason: the oil price may not follow a random walk as the Johnson-Stulz, like the Black-Scholes, model assumes. Oil prices may revert to some long-run level, which may vary over time. If this were true, the oil prices would not be as variable over time as the models predict, and so the computed prices would be too high. However, there is no firm empirical evidence that oil prices are mean-reverting. Nevertheless, the Johnson-Stulz prices, though possibly high, are closer to the true value of the default-risky options than the Black-Scholes prices. Further modeling research should achieve more reliable values for these options.

The Johnson-Stulz methodology takes into account the relationship between the value of the pool and the underlying commodity. When oil prices are high, the funds available to Mexico to service outstanding debt and pay off options are more plentiful. The correlation coefficient between these two variables is 0.5, estimated over the sample period running from 1982 to 1989. The higher this correlation, the lower the option default risk will be. A high positive correlation would be expected for countries like Mexico whose economies depend largely on single export commodities. Thus, high strike price covered call options are attractive instruments for these countries, since the relationship between commodity price and the country's financial resources mitigates default.

Notes

¹More precisely, the asset price is assumed to follow a diffusion process (a continuous-time geometric Brownian motion). This assumption is standard in option

pricing models. For the sake of greater realism, it would be desirable to allow discrete jumps in the process, which, for example, might be due to oil price

shocks. However, such a model poses serious technical problems in valuing vulnerable options. These details will be addressed in future research.

²Since Mexico would own the oil on which the option was written, however, a default on the options would entail selling the oil to a third party on the spot market rather than selling to the option owner at the strike price.

³Data were provided by the International Monetary Fund and Banco de Mexico.

⁴The Economist Intelligence Unit (1989), 35.

⁵Since this computation involved subtracting a negative number, it in effect added to the pool. This recognizes the historical record that the unadjusted pool could become negative without resulting in a default.

Notes

¹The type of option proposed here is the "European" option, which cannot be exercised until maturity.

²E. Schwartz (1982) cited two instances where commodity-linked bonds—which grant the lender the option to take a given quantity of a commodity instead of the principal at maturity—had been issued. O'Hara (forthcoming) described how commodity-linked bonds could be used to shift commodity price risk from LDCs to risk-neutral banks. Many other examples exist.

The "value recovery clause" in the recent Mexican debt package allows banks to receive additional payments starting in 1996 should the price of oil be above \$14 per barrel in constant 1989 dollars by that time. The additional payments will be subject to a cap proportional to the amount of old loans each bank tenders in exchange for the new fixed-interest bonds.

³The World Bank (1989a), 2.

⁴LIBOR is the rate of interest on large loans between credit-worthy international banks. It is commonly used as the base rate for floating-rate international loans, much in the manner that the prime rate is often used as the base for floating rates on loans in the United States.

⁵The World Bank (1988), xi.

⁶See Schuker (1988), 134.

⁷Ibid.

⁸Developing countries amassed current account surpluses totalling \$11.9 billion (U.S.) over the five years from 1971 through 1975. Over the period 1981-86, LDCs amassed deficits totaling \$242.7 billion (International Monetary Fund, 1987 Yearbook, 136).

⁹See Schuker (1988), 134.

¹⁰Latin America's per capita output fell 7 percent in the 1980s, whereas it had grown 40 percent in the 1970s. See Farnsworth (1990).

¹¹See "LDC Debt News" (1990), 12.

¹²See Sachs (1989b), 92, and DiLeo and Remolona (1989).

¹³In practice, it would not be necessary to issue two options; one contingent claim contract can be written with the same features.

¹⁴See "Country Risk-Watch," (1989/90), 94-95.

¹⁵The World Bank (1989b), 254.

¹⁶See Banco de Mexico.

¹⁷World Oil Price Table, Weekly Petroleum Status Report.

¹⁸For a description of the Black-Scholes model, see Black and Scholes (1973).

¹⁹This is the sum of the values of five series of options covering export production for the period between three and seven years into the future. Three-year options would cover the oil to be produced three years from now, four-year options would cover production four years from now, and so forth.

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Determinants of De Novo Bank Performance

William C. Hunter and Aruna Srinivasan

This study expands the focus of previous research on the performance of newly chartered banks. The authors' methodology not only identifies the determinants of financial success but also ranks these factors in terms of their relative importance. The research sample consists of 169 independent de novo banks chartered in 1980 and still operating as independent organizations in 1988. By gauging new banks' performance as compared with that of similar, established banks in the same state of charter, this study avoids possible biases due to differences in regional economies.

Identifying the characteristics that make a financial institution successful has become a significant consideration, especially given the failure of record numbers of banks and savings and loan institutions during the past decade. While much attention has been directed toward pinpointing the causes of financial distress in established institutions, analysts are focusing increasingly on determining the factors that lead to success in newly chartered financial institutions. By understanding the elements that contribute to soundness in de novo banks, regulators and management, as

well as depositors and other investors, may be able to identify problems in time to react judiciously. Bank chartering agencies, too, seek a better understanding of the economics of start-up banking operations in today's less regulated environment. This knowledge would aid in prescribing appropriate criteria for the charter application review and approval process.

This article investigates the financial performance of independent de novo banks chartered in 1980 and still surviving in 1988. The study compares earnings of these institutions, which were drawn from a national sample, in their first, third, fifth, and eighth years of operation with those of similarly situated, established banks during the same calendar years. A de novo bank is considered financially successful if its earnings, measured by the return on assets (ROA), are at least 80 percent of the median ROA for established banks with less than \$100 mil-

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lion in assets in the sample bank's state of charter.

This study develops a statistical model of the surviving banks' financial performance in 1981, 1983, 1985, and 1988 to identify and analyze several factors that are crucial in determining the probability of financial success.¹ This analysis reveals that only a small subset of the factors typically cited as key influences on *de novo* banks' survival plays a systematic role during the start-up phase of operations. Specifically, the study identifies the primary determinants of newly chartered banks' financial success as: (1) the overall quality of the bank's credit policies, exemplified by its procedures for credit evaluation and approval as well as loan monitoring and collection; (2) the bank's ability to control operating costs such as wages and salaries; and (3) the bank's level of capitalization at start-up. Factors such as market structure and economic conditions in the bank's local trade area, while important in a generic sense, do not exert much impact on the probability of financial success when considered independently.

A Previous Study of De Novo Bank Performance

Though a number of studies have examined the performance of *de novo* commercial banks, research by Nasser Arshadi and Edward C. Lawrence (1987) is most relevant to the analysis presented in this article.² Arshadi and Lawrence studied the financial performance of 438 banks chartered between 1977 and 1979 in their third and fifth years of operation, using canonical correlation analysis, a statistical technique useful for determining the maximum correlation between two sets of variables. The two researchers examined variables both internal and external to banks' decision making in relation to several gauges of performance: the return on assets, the ratio of interest and fees on loans to total loans, and the bank's share of the total loans in the primary trade area. Endogenous factors included indicators of bank cost such as the ratio of salaries and wages to total assets, loan portfolio composition (the proportion of the portfolio invested in consumer, real estate, commercial, and industrial loans), the return on the loan

portfolio, and deposit composition. Among the exogenous factors studied were indicators of market structure, such as the number of competing banks, as well as economic and demographic conditions in the primary trade area—for example, growth in effective buying income and population per banking office.

Based on their empirical analysis, Arshadi and Lawrence concluded that the performance of newly chartered banks depends most critically on endogenous factors such as cost structure, asset size, and the composition of the loan portfolio. A notable finding of their study was the relatively minor influence on performance exerted by market structure and economic conditions in the bank's trade area.

While Arshadi and Lawrence's results are interesting, the limitations of their methodology, canonical correlation analysis, precluded explicit calculation of the marginal value or impact of bank-specific and market characteristics on a *de novo* bank's chances of financial success. Their analysis therefore could not rank the factors in terms of their relative importance. In addition, because Arshadi and Lawrence analyzed sample banks' absolute performance rather than performance relative to similarly situated banks, regional factors such as the state of the oil industry in the Southwest or the farm economy in the Midwest may have biased their conclusions.

Research Methodology and Variable Definitions

In contrast to Arshadi and Lawrence's study, the explicit goals of the analysis in this article are to characterize the marginal impact of bank-specific attributes on the probability that a *de novo* bank will be financially successful and to determine whether exogenous market and regulatory factors play a significant role in determining success. By paying particular attention to the financial performance of each sample bank relative to the performance of similar banks in the sample bank's state of charter, this study avoids possible biases due to differences in regional economies.

The Performance Measure and Statistical Model. For the purposes of this study, a bank

was deemed financially successful if its return on assets (ROA) was equal to or greater than 80 percent of the median ROA for banks in the state of charter with total assets less than \$100 million. Similarly, a bank was identified as unsuccessful if its ROA was less than 80 percent of the median ROA for banks in the comparison group. A binary (indicator) variable was assigned for each sample bank and was set equal to a value of one if the bank was classified as financially successful and zero if the bank was considered unsuccessful.

The binary variable, which denotes the occurrence or nonoccurrence of the event "financial success," was developed to allow the use of probit analysis, a technique that estimates the impact of observable characteristics on the probability of an event's occurring. For a detailed description of the probit technique see the box on page 23.³ In this study, the probit technique permitted the determination of bank-specific and market or regulatory factors' marginal impact on the probability that a bank's financial performance will be classified as successful.⁴

For each year of analysis, the following probit model describing financial success was estimated:

$$S_i = \alpha + \beta X + e_i,$$

where S_i is the performance indicator variable for bank i , β is a vector of parameters to be estimated, X is a vector of bank-specific attributes and exogenous market and regulatory factors, and e_i is an error term. The model was estimated for 1981, 1983, 1985, and 1988, when the sample banks were one, three, five, and eight years old, respectively. These years are consistent with bank chartering agencies' practice of examining de novo banks within three to five years after granting their charters.

Variable Definitions. The specific bank attributes and exogenous factors included as components of the X vector in the probit model were selected to represent the following eight areas: bank operating cost structure, leverage, loan portfolio composition, credit policy, liquidity, local market structure, state branching law, and the economic climate of the local trade area.⁵ The specific variables included in each category are defined in Table 1.⁶

With respect to the variables measuring bank cost structure, the a priori expectation in this

study is that the probability of financial success will be inversely related to the variables SALARIES (the ratio of wage and salary expenses to total assets) and LTMEDEP (the ratio of large time deposits to total deposits). Holding other factors constant, increases in personnel expenses imply lower bank profitability and a reduced ROA. Likewise, the larger the proportion of deposits on which a bank pays interest rates that are highly competitive, the lower its profit margin should be. On the other hand, ceteris paribus gains in the variable NOWACC (the ratio of NOW accounts and other savings accounts subject to interest rate ceilings to total deposits) would be expected to increase the probability of financial success since this serves as a proxy for the bank's level of core deposits (that is, the bank's lowest-cost, most stable deposits). Lower funding costs should improve the bank's profitability, raising the ROA.

The logic of the relationship between a bank's cushion of capital and its financial performance is also essentially straightforward. Typically, the better capitalized a de novo commercial bank is, the better its chances for survival. Equity capital acts as a buffer against the unforeseen losses incurred by all banks; it is critical to newly chartered banks' probability of survival. This study assumes that if all other factors remain constant, increases in a bank's ratio of total capital to total assets (CAPITAL) will increase its probability of financial success.⁷

The relationship between the probability of financial success and the composition of a bank's loan portfolio is harder to characterize. Ordinarily, the more diversified its loan portfolio, the more likely the bank is to avoid significant losses resulting from concentrating its lending in an area or industry which unforeseen events may adversely affect. Nonetheless, a bank may concentrate its lending in few sectors and remain quite profitable if it has adequate credit evaluation, monitoring, and collection policies. Many banks' credit policy standards also specify the types of loans to be made and their proportions of the total portfolio. In these cases the relationship between loan portfolio composition and the probability of success depends critically on the quality of the bank's credit policies.

A bank's credit policy is generally considered a key determinant of its long-run survival prob-

Table 1.
Variable Definitions

Performance Measure:

S = 1, if ROA \geq 80 percent of median ROA of target group^a
0, otherwise

Cost Structure:

SALARIES = ratio of wage and salary expenses to total assets

LTIMEDEP = ratio of large time deposits to total deposits

NOWACC = ratio of NOW accounts and other savings accounts subject to interest rate ceilings to total deposits

Loan Portfolio Composition:

REALEST = ratio of real estate loans to total loans

CONS = ratio of consumer loans to total loans

C&I = ratio of commercial and industrial loans to total loans

Credit Policy:

LOANLOSS = ratio of charge-offs net of recoveries to total loans

Liquidity:

FEDFUNDS = ratio of net federal funds purchased to total deposits

LOANDEP = ratio of total loans to total deposits

Leverage:

CAPITAL = ratio of total equity capital to total assets

Market Structure:

MSA = 1, if the bank is chartered in a metropolitan statistical area (MSA)
0, otherwise

3FIRMCR = concentration ratio of three largest firms in the local market

Regulatory Structure:

STATEBR = 1, if bank is chartered in statewide branching state
0, otherwise

LTDBR = 1, if bank is chartered in limited branching state
0, otherwise

Economic Conditions:

CHGPI = change in personal income growth in the local market

^aThe target group is composed of all banks in the state of charter with total assets less than \$100 million.

ability. As noted above, three primary components of a bank's credit policy are its credit evaluation procedures and standards, monitoring policy, and collection procedures. The variable LOANLOSS represents the effectiveness of the credit policy. Clearly, this policy will control the quality of the loan portfolio, which, in turn, will determine the bank's net losses and, hence, its economic viability. Thus, in the absence of other changes, increases in the bank's ratio of net charge-offs to total loans should decrease profitability and the probability of financial success.

Making ex ante predictions about the impact of the variables measuring sample bank liquid-

ity (FEDFUNDS and LOANDEP) on a bank's probability of success is problematic without detailed knowledge of the bank's credit policy and its loan demand. The sample banks are net sellers of federal funds in all years. This transaction is essentially a short-term loan by one bank to another, which is borrowing to meet its reserve requirements or loan demand. A decrease in the FEDFUNDS variable (the variable becomes more negative) could be taken as a signal that the bank has additional temporary excess liquidity and is investing in this market short term; a decrease could be interpreted to mean, however, that the bank is refusing to make additional loans or hold more securities. Although

the latter explanations might suggest that the bank is being too conservative or turning down legitimate loan requests, such a conclusion is not warranted without an understanding of the bank's loan policies and loan demand. In the same manner *ceteris paribus* increases in a bank's loan-to-deposit ratio, LOANDEP, could enhance or detract from the bank's profitability under various loan-quality scenarios.

Like portfolio composition, some environmental variables could influence financial performance in opposite ways. For example, it is difficult to specify the *ex ante* effect of a *de novo* bank's location—represented by the MSA (metropolitan statistical area) variable—on the probability of success. Such factors as the bank's credit policy and the nature of competition in the bank's primary area will greatly affect the MSA variable's impact.

Independent of its location, and holding other factors equal, a newly chartered bank will be less likely to prosper during the start-up phase the more concentrated the primary trade area or local market is (the higher the variable 3FIRMCR).⁸ To the extent that the market is dominated by banks with strong customer relationships—and, hence, significant market shares—the new bank will be forced to compete on the basis of rates on loans and deposits as well as other services whose provision entails additional operating costs without any guarantee of increased revenues. Alternatively, banks in concentrated markets may earn high profits without having to offer competitive prices. These profits should provide a protective umbrella for new entrants.

State branching laws can play an important role in determining the long-run financial success of newly chartered banks. Although branching is a proven method by which banks can grow and diversify their retail deposit and loan portfolios, branching also allows competitors to enter a bank's trade area. Thus, relative to the case of unit banking laws, the effect of statewide and limited branching laws on the probability of financial success could be either positive or negative.

General economic conditions in the sample banks' primary trade areas are measured by the variable CHGPI, the change in personal income growth in the local market. Clearly, *ceteris paribus* increases in this variable should improve

de novo banks' probability of financial success.⁹

Data and Sample Selection. The full sample consists of 169 independent banks chartered in 1980 in 32 states. New independent banks warrant distinct scrutiny because recent evidence (John Rose and Donald Savage 1984) indicates that their performance differs from that of new banks formed as subsidiaries of multibank holding companies. As did earlier studies, this research excludes industrial banks, trust companies, "phantom" banks organized to facilitate acquisition of an ongoing bank, and banks organized by foreign banking organizations.

The year 1980 was selected as the starting point for two reasons. First, the Office of the Comptroller of the Currency (OCC), the principal regulator of national banks, liberalized its policy for granting national bank charters in that year. The OCC also adopted a new weighting scheme which placed greater emphasis on the agency's "appraisal of the organizing group and its operating plan for establishing and operating a bank" and less emphasis on "the community's economic and competitive characteristics." The revised policy reflected the OCC's experience that "a strong organizing group . . . [was] generally able to establish and operate a successful bank even in the most economically distressed or most highly competitive markets." Second, using 1980 as the base year permitted the examination of *de novo* banks during a period in which bank regulation was being liberalized. This focus is especially significant since little is known about the effect of interest-rate, product, and geographic market deregulation on new bank performance.

Of the sample banks opened in 1980, 67 percent were located in metropolitan areas (MSAs), and 123 of the 169 banks had state charters. By the end of 1988, only 96 of the original 169 banks were still operating independently. Seventy-three banks had either failed or merged with other financial institutions, including multibank holding companies.

The financial and regulatory data on each sample bank were taken from the Reports of Condition and Reports of Income filed annually with the Federal Reserve System. The data on personal income were gathered from various issues of the U.S. Commerce Department's *Survey of Current Business*.

Table 2.
Means of Variables for Different Years

Variable ^a	1981 (Age 1)	1983 (Age 3)	1985 (Age 5)	1988 (Age 8)
SALARIES	0.02	0.02	0.02	0.02
LTIMEDEP	0.31	0.24	0.21	0.17
NOWACC	0.06	0.05	NA	NA
REALEST	0.22	0.29	0.35	0.47
CONS	0.30	0.28	0.25	0.21
C&I	0.41	0.38	0.34	0.28
LOANLOSS	0.00	0.01	0.02	0.02
FEDFUNDS	-0.10	-0.04	-0.07	-0.08
LOANDEP	0.66	0.66	0.67	0.65
CAPITAL	0.15	0.10	0.07	0.07
MEAN ROA (Percent)	1.06	0.12	-0.44	0.37
MEDIAN ROA (Percent)	1.28	0.48	0.39	0.70
MEAN ROE (Percent)	6.37	0.42	-11.81	1.43
MEDIAN ROE (Percent)	7.53	4.38	4.45	9.28
Number of Surviving Banks	165	141	123	96

^a See Table 1 for variable definitions.

NA = Not applicable in the indicated years.

The Empirical Findings

The mean values of each of the continuous variables included in the analysis are given in Table 2 for 1981, the first full year of operation for the sample banks, and for 1983, 1985, and 1988, along with the median and mean ROA of the surviving banks. The mean ROA of the sample banks was a very favorable 1.06 percent for 1981, the first full year of operation. However, the ratio returned to more normal levels (less than 1 percent) as the surviving sample banks became more established.

Table 3 profiles the performance of the sample banks by age, showing the number and percentage of the surviving sample banks with

ROAs greater than zero, greater than or equal to 80 percent of the median ROA of established banks with total assets not exceeding \$100 million in the relevant state of charter, and greater than or equal to 150 percent of the median ROA of the established banks. Since the majority of the sample banks were chartered in late 1980, the zero age category typically represents operating performance over only one or two months. About 86 percent of the sample banks surviving for at least one year posted positive net income in the first year of operation; about 26 percent of the sample banks at that age demonstrated earnings superior to those of their established counterparts—that is, their ROA indices were 150 percent or more of the median of their more established counterparts.¹⁰

Table 3.
De Novo Bank Earnings Performance by Age, 1980-88

Age	Break-Even Analysis		Earnings Comparability with Established Banks		Earnings Superiority of De Novo Banks	
	Number of Banks	Percent ^a	Number of Banks	Percent ^b	Number of Banks	Percent ^c
0	76	45.0	20	11.8	3	1.8
1	142	86.1	96	58.2	42	25.5
3	99	70.2	54	38.3	22	15.6
5	80	65.0	54	43.9	20	16.3
8	73	76.0	49	51.0	18	18.8

^a Percent of de novo banks at given age with ROA > 0.

^b Percent of de novo banks at given age with ROA \geq 80 percent of the median ROA for established banks in state of charter with up to \$100 million in assets.

^c Percent of de novo banks at given age with ROA \geq 150 percent of the median ROA of established banks.

The results of the probit model for the four time periods studied are presented in Table 4, along with goodness-of-fit measures.¹¹ The estimated probit model performs reasonably well for each year. The estimated probability of achieving the observed value (0 or 1) exceeds 0.5 in 70 percent or more of the total cases in all years. The likelihood ratio, indicating how well the selected model specification explains financial performance, is also significant in all cases at the 0.01 level. Among the individual variables, CAPITAL and SALARIES have the expected signs with statistically significant coefficients in all four models. The LOANLOSS variable is significant with the correct sign in all years except 1988. The proportion of total loans in consumer (CONS) and business loans (C&I) is significant in the first year of operation, while the share of real estate lending in total loans (REALEST) is positive and significant in the later years of operation. The only exogenous variable of any significance was STATEBR (statewide branching) in all years except the fifth.

The probit analysis results indicate that differences in operating costs, credit policy, and leverage account for most of the performance variations among the sample banks relative to the established target group during the early years of operation. Other variables—namely, those measuring the composition of the bank's loan portfolio (REALEST, CONS, and C&I), li-

quidity (FEDFUNDS and LOANDEP), market structure (MSA and 3FIRMCR), and local economic conditions (CHGPI)—do not exhibit consistent, significant effects on the performance of new banks studied during the first eight years of operation.

The positive and significant coefficient on the state branching laws variable (STATEBR) in 1981, 1983, and 1988 suggests that being chartered in a state that allows statewide branching increases new banks' probability of success. Statewide branching also allows established banks to set up de novo branches, thereby increasing the competition independent de novos face. Under these circumstances, the evidence that statewide branching enhances the financial performance of new independent banks corroborates the arguments of Constance Dunham (1989) and others that consumers prefer small independent banks over large, multioffice institutions.¹²

The insignificant coefficients on the NOWACC variable (the ratio of NOW accounts and other savings deposits subject to interest rate ceilings to total deposits) and LTIMEDEP (the ratios of large time deposits to total deposits), except for 1981, are especially interesting. The Depository Institutions Deregulation and Monetary Control Act of 1980, which phased out ceilings on deposit rates over a six-year period, was expected to increase competition in financial services. In this context, the low profile of LTIMEDEP is sur-

Table 4.
Results of Probit Model for Different Years of Operation

Variable	1981 (Age 1)	1983 (Age 3)	1985 (Age 5)	1988 (Age 8)
INTERCEPT	-0.09	-1.61	-5.06 [‡]	-5.79*
SALARIES	-93.70*	-58.64*	-55.50 [‡]	-49.65 [‡]
LTIMEDEP	-1.52 [‡]	-1.09	1.33	-2.21
NOWACC	-0.39	2.62	NA	NA
REALEST	0.77	-0.15	4.36*	4.57*
CONS	1.80 [†]	0.17	3.64	3.13
C&I	2.46*	-0.80	2.08	4.30 [‡]
LOANLOSS	-39.35 [‡]	-105.09*	-159.33*	2.97
FEDFUNDS	0.16	-0.24	-2.21	0.34
LOANDEP	0.63	1.57	2.30	0.56
CAPITAL	4.29 [‡]	9.50 [†]	34.00*	24.15*
MSA	0.07	0.61	-0.31	-0.14
3FIRMCR	-0.37	1.64	-0.17	-0.17
STATEBR	0.59 [†]	0.66 [†]	0.15	1.50*
LTDDBR	-0.01	-0.09	-0.23	0.67
CHGPI	1.58	-4.79	1.29	2.29*
Goodness-of-Fit Measures				
Number of Right Predictions	118	102	108	74
Percent of Right Predictions	72	72	88	77
Likelihood Ratio Test	36.5	55.9	94.5	34.4
Degrees of Freedom	15	15	14	14

* Statistically significant at the 1 percent level.

† Statistically significant at the 5 percent level.

‡ Statistically significant at the 10 percent level.

NA = Not applicable in the indicated years.

prising, suggesting that de novo banks did not use the relaxation of interest rate ceilings to spur growth by bidding for additional deposits. (In fact, the ratio of large time deposits to total deposits fell by nearly one-half at the sample banks from 1980 to 1988). The insignificance of NOWACC is partially attributable to the fact that, on average, NOW accounts and other savings deposits made up less than 10 percent of sample banks' total deposits in 1981 and 1983.

The coefficients on the liquidity variables (FEDFUNDS and LOANDEP) were insignificant for the most part. The sample banks were net sellers of federal funds in all years, and their

loan-to-deposit ratio held constant. Contrary to Arshadi and Lawrence's results, this study indicates that market structure variables had no significant impact on the new banks' probability of success.

As noted earlier, a major advantage of using probit analysis is that the marginal impacts of the independent variables on a new bank's probability of success can be assessed. Table 5 shows the marginal effects computed at the means of the regressors. Operating costs and credit policy dominate new bank performance in the first year of operation. For example, a ceteris paribus increase of 1 percent in the ratio

Table 5.
Marginal Effects of Change in Independent Variables
On Probability of Success of De Novo Banks

Variable	1981 (Age 1)	1983 (Age 3)	1985 (Age 5)	1988 (Age 8)
INTERCEPT	-0.03	-0.46	-0.19	-2.30
SALARIES	-36.50	-16.89	-2.07	-19.75
LTIMEDEP	-0.59	-0.31	0.05	-0.88
NOWACC	-0.15	0.75	NA	NA
REALEST	0.30	-0.04	0.16	1.82
CONS	0.70	0.05	0.14	1.25
C&I	0.96	-0.23	0.08	1.71
LOANLOSS	-15.33	-30.26	-5.93	1.18
FEDFUNDS	0.06	-0.07	-0.08	0.13
LOANDEP	0.25	0.45	0.09	0.22
CAPITAL	1.67	2.73	1.27	9.61
MSA	0.03	0.18	-0.01	-0.06
3FIRMCR	-0.14	0.47	-0.01	-0.07
STATEBR	0.23	0.19	0.01	0.59
LTDBR	-0.00	0.03	-0.01	0.27
CHGPI	0.61	-1.38	0.05	0.91

NA = Not applicable in the indicated years.

of wages and salaries to total assets (SALARIES) reduces the probability of financial success of new banks by 36.5 percent. An increase of similar magnitude in the ratio of loan losses net of charge-offs to total loans (LOANLOSS) lowers the probability of success by 15 percent. Although the relative importance of operating costs and credit policy (as measured by their marginal impacts) declines in the four years examined, these two factors clearly dominate in explaining overall de novo bank success. The marginal impact of CAPITAL is strongest in the eighth year of operation. The remaining statistically significant independent variables showed small marginal effects.

This study points to the importance of factors endogenous to the decision-making process at independent de novo banks in determining their financial performance. Controlling operating costs and loan portfolio quality clearly are critical in the early stages. Two other factors—a bank's equity capitalization and its location in a state that allows statewide branching—are also

significant in most years examined. These findings are consistent with those of some earlier studies and emphasize the appropriateness of the OCC's stress on managerial competence in evaluating charter proposals. The results do not imply that factors exogenous to managerial decision making are unimportant. Nonetheless, the findings clearly show that bank survival depends largely on factors directly under the bank management's control.

Conclusions

This article has identified the factors, both bank-specific and exogenous, most critical in determining the probability of financial success in independent de novo banks. Three bank-specific (internal) characteristics appear to be the primary determinants of newly chartered banks' likelihood of achieving financial success: credit policy, measured by the bank's ratio of

net loan losses to total assets; operating costs, indicated by the ratio of wages and salaries to total assets; and the level of equity capitalization. Other factors, such as loan portfolio composition and state branching laws, were found to be less significant. Variables often considered important determinants of de novo banks' success—such as market concentration and local economic conditions—evidence no consistent, significant effect in this analysis.

While these findings are generally consistent with previous research, two characteristics distinguish these conclusions. First, the use of the probit analysis technique allowed various bank and market factors to be ranked according to their relative importance in predicting financial success. Second, by comparing the financial performance of sample banks with similar, es-

tablished banks in the sample banks states' of charter, possible biases due to regional economic differences were avoided.

Because this research included only sample banks surviving for the entire eight-year period, attributing its results to all de novo banks would be inappropriate. Clearly, an area worthy of further study is the financial performance of de novo banks that failed, that were merged with or acquired by other banks, or that made acquisitions themselves. With the proper choice of methodology, such research can provide empirical evidence on the attributes important in determining the duration of newly chartered banks as independent entities as well as the differences between banks that fail during the start-up phase and those that fail after becoming established.

A Description of the Probit Technique

To understand how the probit model works in this study, assume that there exists an index S_i that measures de novo bank performance relative to established banks of similar size in the state of charter. S_i is chosen so that the higher its value is, the greater the likelihood that the bank will be financially successful. S_i is hypothesized to be a linear function of bank-specific attributes and market and regulatory factors:

$$S_i = \alpha + \beta X_i. \quad (1)$$

In addition, it is assumed that associated with each bank is a critical value S_i^* of the index S_i such that:

if $S_i \geq S_i^*$, the bank is financially successful;

if $S_i < S_i^*$, the bank is financially unsuccessful. (2)

The probit model assumes that S_i^* is a normally distributed random variable so that the probability that S_i^* is less than or equal to S_i can be computed from the cumulative normal probability function. The cumulative normal probability function is written as follows:

$$P_i = F(S_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{S_i} e^{-s^2/2} ds. \quad (3)$$

By construction, the variable P_i will lie in the (0,1) interval.

To obtain the variable S_i , which is assumed to be linear in the unknown parameters, β , the inverse of the cumulative normal function is applied to equation (3):

$$S_i = F^{-1}(P_i) = \alpha + \beta X_i. \quad (4)$$

The probability P_i resulting from the probit model may be interpreted as an estimate of the conditional probability that a bank will be financially successful.

It is important to note that the parameters of the model are not necessarily the marginal effects analyzed in the general linear model. In general,

$$\frac{\partial F}{\partial X_i} = f(\alpha + \beta X_i) \beta, \quad (5)$$

where $f(\bullet)$ is the density function corresponding to the cumulative distribution $F(\bullet)$. These derivatives predict the effect of changes in one of the independent variables on the probability of being successful. For the probit model, $f(\bullet)$ is $\phi(t)$, the standard normal density function.

Notes

¹Most previous studies of bank profitability determinants have examined one or more of the following issues: economies of scale, market concentration, and financial ratios associated with bank profitability. This study most closely approximates the third line of research as exemplified in studies conducted by Fraser and Rose (1972), Fraser, Phillips, and Rose (1974), Kwast and Rose (1982), Wall (1983), and Nejezchleb (1988).

²Studies by Alhadeff and Alhadeff (1976), Arshadi and Lawrence (1987), Austin and Binkert (1975), Huyser (1986), Martin and Sauter (1986), Tufts and Struck (1984), and Yeats, Irons, and Rhoades (1975) look at various aspects of new bank financial performance. More recent studies by Dunham (1989) and Rose and Savage (1989) examine new bank formation rates and market share accumulation, respectively.

³See Maddala (1986) and Pindyck and Rubinfeld (1976) for an in-depth look at the probit technique.

⁴Note that the probit model is used in this article to classify the sample banks as successful based on observable characteristics. The statistical tests are descriptive and are not derived from a formal model of financial success.

⁵Bank asset size is not included as a separate variable since the performance measure, ROA, involves the normalization of net income by asset size, thereby enabling the researchers to control for differences in bank size and the possible effects of economies of scale. The average asset size of the sample banks was \$14.8 million in 1981 and \$49 million in 1988.

⁶Many of these variables have been used as determinants of financial success in previous studies of de novo bank performance. See, for example, Arshadi and Lawrence

(1987), Fraser, Phillips, and Rose (1974), Gilbert and Peterson (1975), Gilbert (1984), Kwast and Rose (1982), Rhoades and Savage (1985), Rose and Savage (1984), and Rose (1977, 1988).

⁷It could be argued that better-capitalized de novo banks are more likely to survive simply because they can finance their assets less expensively than can weakly capitalized de novo banks. While this argument certainly applies to larger banks that rely on purchased funds for asset growth, it does not typically apply to de novo banks that rarely engage in the practice of liability management.

⁸The local market or primary trade area is defined as either the MSA or the non-MSA county where the sample bank is located.

⁹The poorer the economic conditions in a given area, the fewer should be the number of new bank charter applications in that area. However, one would still expect a positive relationship at the margin between local economic conditions and financial success.

¹⁰In 1981, 69 sample banks were classified as unsuccessful (ROA less than 80 percent of the median benchmark). In 1983, 1985, and 1988 the number of banks classified as unsuccessful was 89, 69, and 47, respectively.

¹¹The goodness-of-fit measures indicate the accuracy with which a model approximates the observed data (like the R^2 in linear regression models). In the case of qualitative dependent variables, accuracy can be judged either in terms of the fit between the calculated probabilities and observed frequencies (percent of right predictions) or the maximum of the likelihood function.

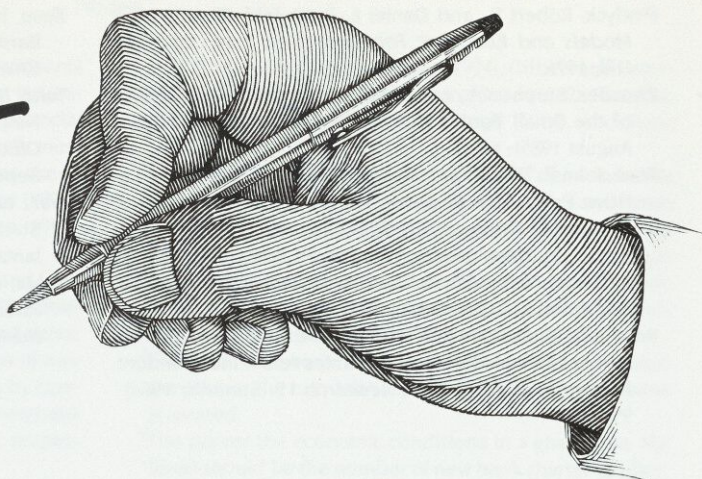
¹²Rose and Savage (1989) also conclude that liberal branching privileges for existing banks do not adversely affect market share accumulation by new banks.

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J. J. I.



Measuring Interstate Migration

William J. Kahley

It's hard to beat warm weather and jobs. An attractive climate and rapid employment growth help explain why states like Florida and Georgia attracted so many new residents in the 1980s that their population grew by about 30 percent and 18 percent, respectively, while the nation's grew only by 11 percent. Measuring state-to-state migration and understanding its causes are important because the effects of these population flows are significant for both the receiving and sending areas.

Unfortunately, data on migration from state to state are often not available on a timely basis. The Census of Population is the best source of information, but it is available only once every 10 years. The 1990 census, now being compiled, will not be available until 1991 on computer tapes and 1992 or 1993 in print. In addition, the statistical series on migration entail various measurement problems that users must be aware of before drawing conclusions and inferences.¹ With proper caution, however, those interested in population movements from state to state—not only demographers and econo-

mists but also developers, bankers, utility companies, and, perhaps most of all, state and local planners and policymakers—can tap a variety of information sources to monitor and understand the size, direction, and composition of migration. For policymakers, this information is essential to weighing immigration's costs and benefits and formulating appropriate policy responses.

Immigration can raise incomes, fuel job growth, stimulate demand for housing and other types of construction, and generally promote economic development.² A rapid population influx can also result in congestion, pollution, and increased need for public transportation, schools, and other infrastructure investment that creates added burdens for state and local governments. Thus, knowing the age profile of migrants, for example, is useful in determining future capacity needs for schools, hospitals, and retirement homes. Details regarding migrants' assets or income sources, skills, and education are likewise helpful in planning for community support systems.

This article reviews and evaluates the strengths and weaknesses of the various interstate migration information sources. It also applies this analysis to southeastern data to demonstrate what available figures reveal about migration in

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and out of these six states—Alabama, Florida, Georgia, Louisiana, Mississippi, and Tennessee—during the 1980s.³ In pointing out the lags, weaknesses, and shortcomings of certain data series, no criticism or judgment of the responsible organization is intended. Availability problems, for example, are virtually unavoidable. The United States is a nation of great geographic expanse with no state border controls or national register for citizens. Hence, collecting migration information is expensive. Gathering detailed data at the national level raises costs further, as does compiling figures about migration patterns in particular regions, states, or localities. For these reasons the U.S. government obtains migration data on an infrequent basis and from samples rather than the population as a whole. Federal agencies also collect more detailed information for the nation than for individual states or metropolitan areas.

The need to rely on samples introduces certain statistical problems. The magnitudes of sampling and nonsampling errors affect the accuracy of migration estimates. Chance variability in estimating occurs when surveying only a portion of the population; in other words, the estimated number will differ depending on the sample drawn from the surveyed population. Nonsampling errors occur for numerous reasons: responses may be incomplete, leaving gaps in information; categories might be imprecise; people may interpret questions in different ways; and some of those surveyed are likely to be unable or unwilling to respond correctly or to recall all the information sought. Recording and coding the data collected also introduce potential errors, and mistakes can be made while processing data.

Despite these problems, existing data measurement sources can yield careful users a surprising amount of information about migration at the state level. Researchers can use certain statistical methods to adjust migration data for some measurement problems and to understand better what the data indicate. While timeliness and level of detail remain difficult issues, one can trace noteworthy patterns and shifts in migration by examining not only the decennial Census of Population but also the U.S. Census Bureau's Current Population Survey and its yearly state population estimates from the Components of Population Change. Internal

Revenue Service data also can be used to produce migration estimates, as can information from the private sector, such as moving company shipments.

Before reviewing the sources of migration information released between the population censuses conducted in 1980 and 1990, as a backdrop to these series this article briefly discusses the migration information that can be obtained from the 1980 census. Table 1 summarizes key attributes of the data sources, including their frequency, sample size or migration universe, and level of geographic and demographic detail.

Migration Data Sources

1980 Census of Population. The U.S. government, by constitutional mandate, has undertaken a census of population every 10 years since 1790. Since the early 1900s the U.S. Commerce Department's Bureau of the Census has produced the census. In the 1980 census (and in the one just conducted) the source of migration information is a question regarding tenure of residents: respondents were asked whether they were living in the same house five years earlier, and, if not, in what U.S. state, county, city or town, or foreign country they lived earlier. The survey also asked whether their residence was within or outside the city/town limits. Census takers use the answers to these questions about residence in 1975 and 1980 to determine the U.S. population's geographic mobility. For example, a 1980 resident of Atlanta, Georgia, who responded that she lived in York, Pennsylvania, five years earlier would have been counted as an outmigrant from Pennsylvania and an in migrant to Georgia. Three of the "supplementary reports" series publish migration data from the 1980 census. Statistics are also available from computer tape files.

From several perspectives the Census of Population is the best single information source on population mobility although even it has certain shortcomings. Census migration data generally are more comprehensive, give greater information about migrant characteristics, and offer more geographic detail. The decennial census counts the overall number of migrants during a

fixed time period and provides gross as well as net migration streams among states. However, these data are based on a sample, albeit a very large one, and thus are subject to the kind of sampling error discussed above. In addition, some inaccuracy arises from the five-year period covered by the mobility question. People who moved away from and then returned to the same state within the 1975-80 period would not appear in the tally of interstate migrants, nor would those who moved after 1975 but then died before April 1, 1980. Meanwhile, others who moved two or more times during the period would be counted only once.

Aside from these problems with the 1980 census, a major historical gap in migration data exists because there is no standard reference or reliable source of precise net migration estimates by age, sex, and race at the state and county level during the 1970s, nor will there be such a benchmark series for the 1980s. The decennial census does not ask about all migration since the previous census, and the amount of migration cannot be deduced from census data for, say, 1970 and 1980. As one prominent researcher states the problem, "The higher level of coverage in the 1980 census compared with the 1970 census prohibits strict application of previous (estimating) methods, and there is now no satisfactory method for adjusting sub-national areas for differential undercount in the two censuses."⁴ In other words, because the numbers for population stocks are not strictly comparable, the precise amount of migration flow suggested by comparing the stocks is wrong. Counting black men has proven particularly difficult. Census takers also find it hard to enumerate illegal residents, the homeless, and those who distrust government. Population estimates for geographic areas containing high concentrations of these groups may be subject to substantial error.

A final shortcoming of census migration data results from its relative infrequency. Since census taking is a decennial event, significant shifts in migration streams between censuses can go unnoticed or, more likely, be very much under- or overestimated.

Current Population Survey. A ready source of intercensal information on migration is the Current Population Survey. Each month the Current Population Survey, a division of the U.S.

Census Bureau, collects labor force data for the noninstitutional civilian population from a sample of 57,000 households. Every March interviewers ask supplementary migration questions. As in the Census of Population, information on mobility is derived from answers to questions on residence one year before the survey date and the geographical location of the respondent's current residence. The survey's estimation procedure extrapolates weighted sample results to various age, sex, and race categories. Data from the annual surveys are published in series P-20 of the *Current Population Reports*; microdata computer files are also available for each survey beginning with 1968.

In some ways Current Population Survey data may be superior to those from the Census. The Current Population Survey staff is permanent, whereas this year the Census Bureau employed temporary workers—more than 450,000 in 1990—to help take the census. Among these, 200,000 enumerators visited the homes of persons who did not return their questionnaires. The smaller size of the Current Population Survey operation also facilitates closer surveillance and control. Moreover, the yearly frequency of the Current Population Survey makes these data more suitable for studying and analyzing time trends and cyclical movements in the statistics.

Perhaps the major drawback of the Current Population Survey data inheres in the sample size: because only 57,000 households are surveyed, details on geographic mobility are statistically valid only for the nation as a whole and its four major census regions—the Northeast, Midwest, South, and West. Moreover, the range of migration estimates, within which 95 out of 100 survey samples, say, would fall, is quite large. For example, the Census South's net gain from migration in 1986-87 is estimated at 279,000 plus or minus 193,000, and the Midwest's 111,000 estimated net outmigration is not statistically significant. Another shortcoming is that the data, while available yearly, are published with a considerable lag—usually about two years and sometimes longer. The March 1988 survey results will not be published until late this year because the Census Bureau staff has been working on the 1990 Census. Data on computer tape are available with a lag of about one year.⁵

Components of Population Change. A source of more geographically detailed yet still fre-

Table 1.
Sources of Migration Data

Source	Geographical Detail	Flows	Personal Characteristics	Migration Universe/Sample	Frequency
Census migration data are reported in: <i>State of Residence in 1975 by State of Residence in 1980</i> (PC80-S1-9); <i>Residence in 1975 for States, by Age, Sex, Race, and Spanish Origin</i> (PC80-S1-16); <i>Gross Migration for Counties: 1975 to 1980</i> (PC80-S1-17); and Vol. 2, Subject Reports: <i>Geographical Mobility for States and the Nation and Mobility for States and the Nation and Mobility for Metropolitan Areas</i> (PC80-2-2C). All from the Bureau of the Census.	United States, region, division, state, and county	In-Out-Net	Depends on report; may include age, sex, race, Hispanic origin, marital status, education, labor force status, occupation, and income.	Sample is 10 percent of census responses.	Decennial starting in 1940. Most recent is 1980.
Migration data from March Current Population Surveys are from micro-data files or from the published reports in the <i>Current Population Reports</i> series: <i>Mobility of the Population of the United States: March 1986 to March 1987</i> (P-20, no. 430) from the Bureau of the Census.	United States, region	In-Out-Net	Age, sex, race, Hispanic origin, education, labor force status, income, occupation.	Sample is 57,000 households from civilian noninstitutional households and members of the Armed Forces.	Annual since 1948, but data are not available for 1972-75 or 1977-80. Most recent is 1986-1987.
Estimates of net migration for states and counties are prepared annually by the Bureau of the Census and published in the P-25 and P-26 series of Current Population Reports. See, for example, <i>State Population Estimates by Age and Components of Change: 1980 to 1989, Current Population Reports</i> , series P-25, no. 1058 (Washington, D.C.: U.S. Government Printing Office, 1990).	United States, region, division, state, and county	Net	None	Estimate for resident U.S. population derived from administrative records and statistical techniques.	Annual since 1980-81. Most recent is 1988-89.
Individual Master File, Internal Revenue Service, U.S. Department of Treasury.	State and county	In-Out-Net	None	U.S. income tax filers	Annual since 1980; also 1970-73; 1975-76; 1976-77; 1978-79. Most recent is 1986-87.
Allied Van Lines and United Van Lines.	State	In-Out-Net	None	Company customers	Annual since 1983 for Allied and since 1979 for United.

quent data on migration is the Census Bureau's annual estimate of the components of population change—births, deaths, and net migration—for states, metropolitan areas, and counties as of July 1. Net migration, along with total population estimates, is derived via the averaging of estimates from two methods. One is the "composite" procedure, which uses vital statistics (information on births and deaths), school enrollment figures, and ratio-correlation techniques in making the estimates. The second method is a "component" procedure that relies on administrative records such as individual income tax returns to estimate internal migration and immigration reports to calculate net immigration from abroad.⁶

Even though the Components of Population Change does not measure net migration at the state and local level directly, this series is useful for estimating migration flows among states, large cities, and counties—areas for which the Current Population Survey does not provide yearly estimates. For example, one can use the Components of Population Change to compare metropolitan area growth rates and the contribution of migration (internal and international) to an area's population growth. Also, the components data for states are available on a more timely basis than are the Current Population Survey data: estimates for the year ending July 1, 1989, were available on December 31, 1989, six months after the reference date.

A major drawback of Components of Population Change data is their questionable accuracy. Annually the Census Bureau publishes a revised estimate for the cumulative net migration figure since 1980. The Census Bureau does not publish data that give the yearly residual net migration estimates consistent with the cumulative number that is published in the *Current Population Reports* series, although these are provided upon request. While the agency considers the yearly data unacceptable for publication, noting that it "cannot defend the use of any individual numbers," it does say that "the annual figures may be indicative of general migration trends."⁷

Still, the Components of Population Change data have other major failings. They do not provide information on gross immigration and out-migration flows, nor do they give any information on migrant characteristics. Also, the 1989

estimates are the most questionable in terms of accuracy since the population base, or "head count," to which estimating techniques were applied was nine years old. Because of error accumulation, the further the annual derived estimates are from the base year, the worse they become.

Internal Revenue Service Data. While the Census Bureau is the main government source of migration statistics, the Internal Revenue Service (IRS) has state-to-state migration flow data for most years since 1970 and county-to-county data for selected time periods between 1978 and 1986. These statistics, generated from the IRS data by the Census Bureau, are not as current as the Components of Population Change series, but they give more detail. Information collected comes from administrative records of

"One can use the Components of Population Change to compare metropolitan area growth rates and the contribution of migration (internal and international) to an area's population growth."

income tax returns filed with the IRS. The migration estimates were developed by matching the Social Security number of primary taxpayers and comparing addresses on returns in consecutive years. The total exemptions claimed by taxpayers with the same Social Security number but different addresses indicates the number of persons moving.

An advantage of this series compared with the other intercensal migration data sources is that it provides place-to-place migration flows based on the addresses supplied on individual income tax returns. Thus, it is possible to identify which areas are sending many or few people to a given place and which are receiving many or few people from another place. Information also is available at the county level.

However, certain limitations of these data cause IRS estimates to differ from actual migration flows. First, people are excluded if their

income is below the required minimum for filing. Second, the methodology assumes that all the people listed as exemptions on tax returns move with the tax filer. Finally, the residences of taxpayers who file through the office addresses of their bankers, lawyers, or accountants will not be accurately reflected in the data. Overall, IRS data underestimate the actual total migration flow.

Another major shortcoming of IRS data is that information for 1985-86 and 1986-87 was determined to be inaccurate for selected states, including Florida and Georgia. In response, migration flows based on the IRS data have been reestimated by the Census Bureau for these years using a revised estimation methodology.⁸ The new methodology also is being used to estimate migration flows for 1987-88. Unfortun-

"[Moving company shipments] data do not accurately indicate the actual magnitudes of migration streams but are still valuable because they can point to changes in the size or direction of state migration."

nately, the revised data were not available as of March 1990, further reducing the timeliness of the estimates.

Moving Company Shipments. Two other sources of migration data come from the private sector. Moving companies such as Allied Van Lines and United Van Lines release information on the number of state inbound and outbound shipments to each state handled by their companies each year. Both Allied and United claim in news releases that their company data on interstate household goods shipments are representative of the nation's mobility patterns. In 1989 the number of such shipments was 165,000 for Allied and more than 172,000 for United.

Because of their timeliness moving company shipments data can offer valuable information insofar as they accurately reflect U.S. migration patterns at the state level. These data provide the most current information generally avail-

able that deals with interstate migration; data on shipments for all of 1989 became available just one month into 1990.

However, moving company data have certain drawbacks. First, it is not possible to determine the accuracy of the data as a measure of migration. To a degree, the flows reflect particular movers' market shares in different states. It is encouraging, though, that the series are highly correlated with each other and with the Current Population Survey data when aggregated to the census region level. In general, correlations of these data with the other available information series on migration tend to show higher associations for the immigration and outmigration series than for the net migration series (see the box on page 32).

Another shortcoming is that moving company shipments data reflect only a portion of total interstate migration because many migrants move themselves. In particular, people with lower incomes or seeking employment are more likely to undertake their own move, whereas those with higher income jobs (or their employers) hire moving companies. Movers' data also may be procyclical. If jobs are plentiful, more households and companies are likely to hire movers. When jobs are scarce, families forgo this expense and move themselves.

Given the limitations noted, these data do not accurately indicate the actual magnitudes of migration streams but are still valuable because they can point to changes in the size or direction of state migration. Although moving company shipments data do not provide information about place-to-place migration or the characteristics of those moving, several other data sources have the same gap.

Moving company shipments statistics are not the only source of migration data in the corporate sector. Records regarding customers or clients of utility companies, such as new hookups by electric power companies and billing address changes, can provide valuable insights into shifts and migration gains at the local level. Similarly, changes of addresses among credit card or banking account holders could yield additional information concerning migration.

Data like these may be especially helpful at the metro or county level in making migration estimates on a timely basis. For example, new hookups figures might be used to estimate pop-

Associations among the Data Series

How closely do the different migration estimates discussed in the text conform to each other? Except for moving company data, it is not possible to compare migration estimates directly because the measures differ in their timing and coverage of interstate migration. Nevertheless, as measured by the Pearson correlation coefficient, the different sources of migration tend to move in tandem.

The correlation coefficient, denoted by r , is a summary number that quantifies the strength of the association between two variables. It is defined as

$$r = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{(N-1) S_x S_y},$$

where N is the number of cases; S_x , S_y are standard deviations of the two variables; \bar{X} , \bar{Y} are sample means; and X_i , Y_i are sample observations. The absolute value of r indicates the strength of the linear relationship. The largest possible absolute value is one, which means that a change in X determines exactly an increase in Y (and vice versa); a value of zero indicates no linear association.

Calculation of correlation coefficients for the Allied Van Lines and United Van Lines interstate household shipments data for each of the seven years from 1983 through 1989 yielded the following coefficients: for inbound shipments the value was .98 for each year except 1983's value of .97; values ranged from .93 to .96 for outbound shipments and from .67 to .91 for net shipments. Statistically, these associations are very strong, suggesting that the two data series tell much the same story.

Calculation of correlation coefficients for other pairwise comparisons are shown in the accompanying table. Overall, these association patterns suggest that the different data series, though not perfectly aligned, tend to be strongly associated. The weakest associations are between the moving company data and the Components of Population Change data in 1988 and 1989. The Components of Population Change data show outmigration for Alabama in the 1987-88 and 1988-89 period, whereas moving company data show net immigration for 1987, 1988, and 1989. The results of the 1990 Census may eventually determine which estimate was correct. (Note, too, that the Components of Population Change data include immigrants.)

Pearson Correlation Coefficients for Migration Data

	CPS	COP*	IRS	MCS _A	MCS _{A+U}
Current Population Survey (CPS)		net = .77	in = .94 out = .75 net = .89	in = .92 out = .89 net = .79	in = .92 out = .87 net = .77
Components of Population Change (COP)	net = .77		1980-81-1985-86 .81-.92	1983-89 .12-.91	1983-89 .41-.87
Internal Revenue Service (IRS)	in = .94 out = .75 net = .89	1980-81-1985-86 .81-.92		.92-.98	.92-.98
Moving Company Shipments (Allied Van Lines) (MCS _A)	in = .92 out = .89 net = .79	1983-89 .12-.91	.92-.98		
Moving Company Shipments (Allied Van Lines and United Van Lines) (MCS _{A+U})	in = .92 out = .87 net = .77	1983-89 .41-.87	.92-.98		

* Net comparisons only.

ulation growth, using historical ratios for average household size and households per hookup. One could then calculate residual migration using vital statistics data on births and deaths by applying the "demographic equation":

$$M = (p_1 - p_0) - (B - D),$$

where M represents net migration, p_1 and p_0 stand for population in the current (p_1) and base (p_0) period, B equals births, and D , deaths during the period. In other words, net migration equals total population change less the natural increase over the time interval.

This methodology, as might be expected, entails some difficulties. For example, average household size has been declining, and this decline would need to be reflected in the ratio analysis. Aside from this technical issue and certain others, hookups data are proprietary and thus analysts and researchers may not have access to them, particularly if the electric utility company does not regularly process and summarize them. Even if available, such data could be cumbersome or expensive to prepare for detailed analysis. Nonetheless, even raw data on hookups or building contractor advance orders for hookups could help to indicate whether migration is augmenting or draining an area's population growth.

Case Study: Shifting Migration Patterns in the Southeast

Information from the migration sources reviewed above can help construct the likely patterns of southern migration in the 1980s. In doing so, it is tempting to use the numbers to support various hypotheses that claim to explain why particular patterns appear. However, using these statistics in this way is risky. Whether migrants follow jobs or vice versa, for instance, is an unresolved issue among researchers despite their use of sophisticated statistical techniques.

What recent Census of Population data show. The Census of Population provides the most accurate measures of mobility and change in mobility over time, notwithstanding its shortcomings, which are probably inherent or very costly to remedy. When new census mobility

data become available, researchers in some instances are surprised, but more often these statistics simply confirm trends and patterns already suggested by observation or other data. For example, comparison of interregional migration patterns using 1970 and 1980 census data revealed several significant but expected changes in southern migration patterns:⁹

- net migration losses, which had been typical throughout the twentieth century for most southern states, were reversed in the 1970s, and for the first time interregional migration added to the South's population;
- experienced workers were becoming a more dominant force in the South's migration gains;
- the South gained workers in all the broad occupational categories in the late 1970s, whereas mostly white collar workers and skilled craftsmen flowed to the South during the late 1960s;
- the South benefited from a North-to-South "brain drain" as a result of migration;
- migration to the South helped lower the incidence of southern poverty; and
- migration started adding more women than men to the South's population.

Eight years have passed since the 1980 census data, from which these conclusions were drawn, became available. Naturally, one wonders whether or not these patterns persisted in the 1980s and if they intensified or abated. The answers to these questions were recorded when the Census of Population was taken in the spring and summer. However, as mentioned above, the process of tallying and refining the statistics will take several years. Meanwhile the other sources of migration information discussed in this article can paint a preliminary picture of southern migration trends as they developed in the 1980s.

What recent CPS interregional data indicate. The net migration gain by the 16 states plus the District of Columbia that make up the Census South region slipped in the 1980s.¹⁰ This increase declined from 1,986,000 people in the 1975-80 period to an estimated 1,898,000 in the 1980-85 period. The yearly gain then dropped to a margin of 35,000 from 1985 to 1986 (not statistically significant) before rising to 279,000 between 1986 and 1987. Migration from the

Northeast to the South slowed sharply in the second half of the 1975-85 period, while outmigration from the Midwest to the South increased. Between 1980 and 1985, for the first time ever, the South registered a net gain (roughly 60,000) from population exchange with the West. Over the next two years the South resumed its loss in exchange of residents with the West, but it continued to gain from the Northeast. It lost 117,000 in population exchange with the Midwest in the 1985-86 period but gained a similar number from 1986 to 1987.

It is not the purpose of this article to explain why these and other migration patterns emerged or changed.¹¹ Nevertheless, the broad changes noted are consistent with major shifts in national economic and demographic determinants of migration flows. For example, as the large baby-boom generation ages, passing the time when they are most likely to migrate, population movement is slowing nationally. Also, as strengths and weaknesses have shifted from one economic sector to another, states and regions most dependent on particular industries such as energy or manufacturing have experienced attendant transitions in migration patterns.

Net migration by blacks to the South also dropped between the 1975-80 and 1980-85 periods—from 108,000 to 84,000, or by about one-fifth. This percentage drop was much larger than the 4 percent decline for whites. However, the black net migration rate apparently has begun rising again in the 1985-90 period. The South's net addition of blacks was 18,000 between 1985 and 1986 and 148,000 from 1986 to 1987. Black net migration accounted for over half the region's total migration gain during these two years.

What Components of Population Change migration data reveal. Migration patterns in several southern states have shifted markedly between the 1970s and the 1980s (see Table 2). The Components of Population Change data indicate that the South had gained an estimated 1.2 million fewer people from migration in the 1980s in the period up to nine months before the 1990 Census was taken. Maryland, Virginia, North Carolina, and Georgia posted sharp increases, and all of the Atlantic coastal states gained population from migration in the 1980s. However, five states—West Virginia, Ken-

tucky, Mississippi, Oklahoma, and Louisiana—experienced net outmigration during the 1980s after posting net gains in the 1970s.

Examination of net migration yearly estimates for southern states reveals that sharp declines developed among energy-dependent states as oil prices dropped. Texas, for example, started the decade with a net migration gain of 431,000 in 1981-82 but lost 122,000 residents to outmigration in 1987-88. Net migration added 91,000 residents to Oklahoma between 1981 and 1982, whereas 55,000 people moved out from 1986 to 1987. Housing and office markets in these and other states plunged as the previously positive net migration stream reversed direction.

Louisiana, the most energy-dependent southeastern state, experienced a shift in net migration from a 36,000 gain between 1981 and 1982 to an 89,000 loss from 1986 to 1987. The outflow apparently then stabilized, as losses held to 78,000 and 64,000 in the 1987-88 and 1988-89 periods, respectively. Altogether, between July 1983 and July 1989 Louisiana lost 308,000 people from migration, or 7 percent of its 1980 population base.

Other southeastern states have had different migration experiences, according to the Components of Population Change data. The population influx to Florida and Georgia, which had been fairly strong from 1980 to 1983, accelerated significantly in the July 1983-July 1987 period. Net immigration then dropped somewhat in Florida and even more in Georgia over the next two years.¹² Tennessee's pattern was similar to Florida's and Georgia's but much smaller in magnitude. Alabama's net migration reversed twice in the 1980s, with gains posted in the 1983-87 period and losses at the beginning and end of the decade. However, the yearly figures for net migration over the decade in Alabama were small, ranging only from -10,000 to +11,000. Mississippi experienced net outmigration throughout the decade and especially during the last three years.

What IRS data show. Yearly patterns of southeastern migration in the 1980s shown by the Internal Revenue Service data are similar to those indicated by the Components of Population Change data. However, IRS statistics reveal some additional information about state-to-state flows (see Table 3):

Table 2.
Southern Net Migration
(in thousands)

	April 1970- April 1980	Monthly Average	April 1980- July 1989	Monthly Average
West Virginia	71	0.59	-143	-1.29
Maryland	-36	-0.30	187	1.68
Delaware	-6	-0.05	40	0.36
District of Columbia	-164	-1.37	-60	-0.54
Virginia	239	1.99	377	3.40
North Carolina	278	2.32	351	3.16
South Carolina	210	1.75	159	1.43
Georgia	329	2.74	526	4.74
Florida	2,519	20.99	2,549	22.96
South Atlantic	3,440	28.67	3,986	35.91
Kentucky	131	1.09	-117	-1.05
Tennessee	297	2.48	122	1.10
Alabama	97	0.81	8	0.07
Mississippi	31	0.26	-82	-0.74
East South Central	556	4.63	-69	-0.62
Oklahoma	230	1.92	-16	-0.14
Arkansas	184	1.53	14	0.13
Louisiana	100	0.83	-226	-2.03
Texas	1,481	12.34	1,087	9.79
West South Central	1,995	16.63	859	7.75
South Total	5,991	49.93	4,776	43.04

Source: Computed by Federal Reserve Bank of Atlanta from Bureau of the Census, U.S. Department of Commerce, Components of Population Change, series P-25, various years.

Alabama. At the beginning of the decade Florida, Texas, and Louisiana were the three largest gainers from exchange with Alabama. Toward the end of the decade, though, Georgia and Tennessee had replaced the two energy-dependent states as the biggest gainers from Alabama. In a startling turnaround Louisiana actually lost more from migration exchange with Alabama than all but one other state. It is likely that many of those who moved to Alabama from Louisiana were return migrants who had lost their jobs in Louisiana's depressed economy.

Florida. Texas was the biggest gainer from migration exchange with Florida at the begin-

ning of the decade but became a net loser when the price of oil started to drop in 1982. New York consistently ranked as the biggest contributor to Florida's migration gain, but several other large northern states contributed significant numbers too. When Floridians left the state, they were most likely to go to Georgia, which drew more and more of its southern neighbors as the decade progressed.

Georgia. Indeed, the biggest contributors to Georgia's yearly net migration gain switched during the decade from Michigan to Florida. Generally, though, Georgia gained population from exchange with its southern neighbors and

Table 3.
Southeastern States' Net Migration Exchange*

State	1980-81		1981-82		1982-83		1983-84		1984-85		1985-86	
Alabama	FL	-4,029	TX	-6,398	FL	-2,374	GA	-2,948	GA	-3,733	GA	-3,858
	TX	-4,008	FL	-2,766	GA	-1,848	FL	-2,906	FL	-2,429	FL	-1,283
	LA	-1,792	LA	-2,290	TX	-1,639	NC	-532	NC	-498	TN	-168
	OH	764	IL	1,074	IN	740	MI	692	LA	894	MS	1,265
	IL	1,072	TN	1,180	IL	965	IN	732	MS	1,153	LA	1,666
	MI	1,611	MI	1,216	MI	1,900	IL	1,185	IL	1,395	IL	1,838
Florida	TX	-7,078	TX	-11,835	GA	-2,422	GA	-3,619	GA	-4,619	GA	-7,279
	GA	-1,909	GA	-2,038	NC	-1,382	NC	-1,326	NC	-1,997	NC	-1,550
	LA	-1,556	CA	-1,522	TX	-995	AZ	-209	DC	-310	AZ	-177
	MI	20,490	OH	21,347	OH	20,425	MI	18,269	IL	17,685	NJ	23,666
	OH	20,781	MI	21,735	MI	20,500	OH	22,358	OH	21,826	OH	25,981
	NY	48,320	NY	40,307	NY	32,407	NY	36,573	NY	37,450	NY	56,631
Georgia	TX	-2,430	TX	-4,050	TX	-290	DC	-69	HI	-14	DC	-32
	LA	-752	LA	-842	HI	-282	MT	-43	VT	-8	AK	-20
	AZ	-284	OK	-603	AK	-258	ND	-27	—	—	—	—
	NY	2,792	NY	2,360	MI	2,451	IL	3,194	TN	4,492	IL	5,384
	OH	2,824	MI	2,684	IL	2,622	FL	3,619	FL	4,619	OH	6,398
	MI	3,050	OH	2,951	OH	3,674	OH	4,321	OH	5,438	FL	7,279
Louisiana	TX	-4,027	TX	-6,374	CA	-4,830	TX	-4,470	TX	-7,467	TX	-10,441
	CO	-461	OK	-1,090	TX	-1,424	FL	-2,095	FL	-2,963	FL	-3,378
	OK	-203	CO	-630	MS	-705	GA	-977	CA	-2,277	CA	-3,315
	MI	1,728	MI	2,262	MI	1,106	OH	462	MI	234	ND	97
	AR	1,729	AL	2,290	OH	1,107	IN	491	OK	313	IA	156
	AL	1,792	IL	2,300	IL	1,399	IL	587	IN	591	IN	222
Mississippi	TX	-2,868	TX	-3,654	TX	-1,910	TX	-2,067	TX	-2,652	TX	-1,956
	LA	-1,624	LA	-1,349	FL	-962	FL	-1,491	GA	-1,511	FL	-1,641
	FL	-758	OK	-587	CA	-532	GA	-824	FL	-1,455	AL	1,265
	MI	602	AL	853	LA	705	IN	256	IN	333	TN	599
	TN	661	IN	1,229	TN	1,134	LA	455	IL	671	IL	834
	IL	1,230	TN	2,942	IL	1,152	IL	618	LA	1,756	LA	2,243

continued on next page

Table 3 continued

State	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Tennessee	TX FL GA	TX MS GA	TX GA FL	GA FL NC	GA FL NC	GA FL NC
	-4,944 -1,832 -1,255	-7,799 -2,942 -1,826	-2,915 -2,090 -1,867	-3,145 -2,867 -1,132	-4,492 -2,262 -1,485	-4,805 -1,465 -1,117
	IL IN MI	OH IL MI	OH IL MI	IL MI KY	OH IL KY	MI KY IL
	2,423 2,524 3,308	2,384 2,692 3,232	1,914 1,918 2,833	2,485 2,743 3,043	1,676 2,660 3,870	2,742 2,761 4,175

* (-) indicates net outmigration; (+) indicates net immigration.

Source: Computed by Federal Reserve Bank of Atlanta from Internal Revenue Service, U.S. Department of Treasury data.

from the large northern states. Between 1984 and 1985 Georgia posted net losses only with Hawaii (14 people) and Vermont (8) and these were not statistically significant; from 1985 to 1986 the only losses were with the District of Columbia (32) and Alaska (20). The Peach State's experience with Texas has been similar to that of Florida, losing population at the beginning of the decade and then gaining later.

Louisiana. The Pelican State started the decade with net losses to only eight states; by 1985-86, it was a net gainer with only ten states, and its biggest gain was only 222 people with Indiana. Typically, Texas drew more Louisiana residents than any other states; its gain rose from 4,000 in 1980-81 to over 10,000 in 1985-86.

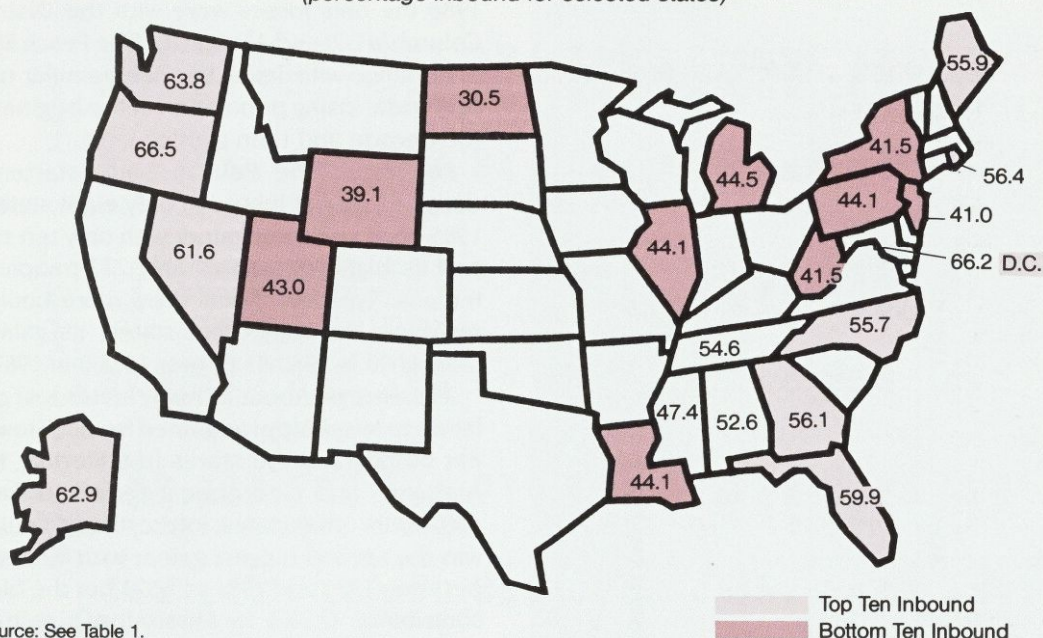
Mississippi. About as many states lost population to Mississippi as gained from it. However, net outmigration to states like Florida, Texas, Alabama, and Georgia exceeded its largest gains from other states. Interestingly, Louisiana was the second biggest gainer with Mississippi between 1980 and 1981 at 1,624 but the biggest contributor (2,243) to Mississippi's gain from 1985 to 1986. Like Alabamians, some of these migrants undoubtedly were returning to their state of birth after having been lured to Louisiana during the energy boom of the 1970s.

Tennessee. The Volunteer State has consistently contributed population to Florida and Georgia while gaining from Michigan, Illinois, Ohio, and Kentucky. On balance, the number of states from which Tennessee has been a net gainer increased during the 1980s. However, migration does not appear to have been nearly as important a phenomenon in Tennessee as it has been in Florida and Georgia (positively), or Louisiana (negatively).

What moving company shipments data suggest. Allied's headline on its 1989 data release reads, "Allied Van Lines' 'Magnet States' Survey Confirms U.S. Mobility Patterns toward U.S. Coastlines." United's headline states: "Oregon, Pacific Northwest Area Lead United Van Lines' 1989 Migration Patterns Study." Both releases discuss details of states' 1989 experiences, describing a similar, though not identical, picture of migration streams. (See the map on page 38 for a visual summary of combined Allied Van Lines and United Van Lines shipment data.)

If accurate, these data provide encouraging news to southeastern states (see Table 4). For

Map.
Moving Company Shipments (Allied Van Lines and United Van Lines)
(percentage inbound for selected states)



Source: See Table 1.

Table 4.
Combined Moving Company Shipments Net Migration Estimates

State	1983	1984	1985	1986	1987	1988	1989
Alabama	-221	-195	-290	432	395	420	456
Florida	8,465	9,237	9,846	9,944	10,462	8,875	9,561
Georgia	2,678	3,894	4,180	4,086	3,755	2,745	2,708
Louisiana	182	56	-760	-1,661	-1,577	-959	-1,096
Mississippi	-97	-202	-241	-124	-319	-270	-209
Tennessee	169	225	303	1,448	1,815	914	1,143
Southeast	11,176	13,015	13,038	14,125	14,531	11,725	12,563

Source: Computed by Federal Reserve Bank of Atlanta from Allied Van Lines, Inc., and United Van Lines, Inc., data.

Alabama net outmigration in the 1983-85 period gave way to net immigration in each of the next four years. Florida and Georgia both enjoyed rising net immigration in the 1983-86 period and then diminishing population inflows over the next two years; net immigration may have sta-

bilized in Georgia during 1989 and resumed its growth in Florida. Net outmigration from Louisiana and Mississippi continued, but the amounts declined in the 1988-89 period compared to 1987. Meanwhile, net immigration to Tennessee has been higher in the 1986-89 period than it

was earlier in the 1980s. For the region as a whole, migration gains increased during the 1983-87 period, dropped in 1988, and stabilized in 1989.

Directions for Future Migration Research

As additional information about migration becomes available from the intercensal sources reviewed above and the 1990 Census of Population, several aspects of migration should elicit further research. With more and better information, policymakers and planners will probably seek more accurate assessments of migration's impacts on income, educational needs, and labor force skills. States that experienced reversals of migration patterns during the 1980s should be especially interested in such research since it appears that past planning was often based on simple extrapolations and the implicit assumption that current economic conditions, particularly prosperity induced by high oil prices, would continue indefinitely, as would immigration. In addition, future research ought to probe the determinants of migration, including the effect on migration decisions of employment opportunities (or the lack thereof) and other economic conditions in both the sending and receiving areas.

Conclusions

This survey of the various data series on U.S. migration and review of what the data indicate about southeastern migration is revealing. First, a

surprising amount of statistical information is available between the detailed decennial censuses—probably the best source of information. A review of the alternative intercensal series indicates that each one offers certain advantages. The Current Population Survey data give the most detail about movements of major population groups, such as blacks, from one large region of the country to another. Components of Population Change estimates are comprehensive and fairly current. Internal Revenue Service data offer place-to-place migration estimates, and moving company shipments data provide the most current direct estimates of interstate migration.

Against the backdrop of information from the 1970 and 1980 Censuses of Population, these sources indicate several significant changes in southeastern migration patterns during the past decade. The Southeast continued to gain population from net immigration. Florida and Georgia registered an acceleration from already strong levels. Tennessee's gains were positive, and Alabama's performance, though mixed, seemed to be strengthening at the end of the decade. In contrast, Louisiana and Mississippi suffered significant migration losses during the 1980s, though improvement seemed evident in the past few years.

The decade of the 1990s is sure to bring new surprises. As events unfold and state economies strengthen or weaken in response, migration patterns will continue to change. With new insights into the causes and consequences of migration based on solid empirical tests using the extensive data available from this year's census, the burdens and benefits of swelling and sharply receding migration streams can be managed better.

Notes

¹In a nation of 250 million people who are highly mobile, census takers are bound to miss some people. Based on post-1980 census surveys and reviews of vital statistics, the Census Bureau estimates that the U.S. population on April 1, 1980, was 1.4 percent higher than the 226.5 million it reported. The undercount for 1970 was estimated at 2.9 percent; in 1960 it was 3.3 percent.

²See, for example, J.D. Kasarda, M.D. Irwin, and H.L. Hughes, "The South is Still Rising," *American Demographics* 8 (June 1986): 33-40. Other research, reviewed by M.J. Greenwood in "Human Migration: Theory, Models, and Empirical Studies," *Journal of Regional Science* 25, no. 4 (1985): 521-45, suggests that more is known about the determinants of migration than about its consequences, but that even the causal linkages have not yet been well established.

³Throughout this article Southeast refers to these six states, which are wholly or partly in the Sixth Federal Reserve District.

⁴Larry Long, *Migration and Residential Mobility in the United States* (New York: Russell Sage Foundation, 1988), 284. The Census Bureau has published three components of population change for states during the decade of the 1970s: net migration, natural increase, and "error of closure." The last represents the difference between the Census Bureau's Components of Population Change estimate for April 1, 1980, and the 1980 Census of Population count. It amounted to over 4.7 million persons for the nation. These estimates appear in Bureau of the Census, *Estimates of the Population of States: 1970 to 1983*, *Current Population Reports*, series P-25, no. 957 (Washington, D.C.: U.S. Government Printing Office, 1984).

⁵The Census Bureau points out in an appendix to its *Geographic Mobility* that two other current surveys conducted by the bureau give additional migration information. The American Housing Survey, conducted since 1973, contains residential mobility data for selected metro areas, and the Survey of Income and Program Participation, begun in 1984, is a series of annual panel surveys of a

national sample of individuals who are reinterviewed every four months for a period of two and a half years.

⁶Both of these methodologies are quite complex. A more detailed description of the estimating methodologies can be found in the Census Bureau's *Current Population Reports*, series P-25, no. 957.

⁷This statement is stamped on the unpublished table on yearly residual migration that the Census Bureau sends to researchers upon request.

⁸Detailed information on processing the IRS data can be obtained in an unpublished Census Bureau document titled *Use of Federal Tax Returns in the Bureau of the Census*, Population Estimates and Projections Program.

⁹For a detailed discussion of changing southern migration patterns, see William J. Kahley, "Migration: Changing Faces of the South," Federal Reserve Bank of Atlanta *Economic Review* 67 (June 1982): 32-42.

¹⁰The states are Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas.

¹¹For a detailed discussion and explanation, and also for projections of southern migration in the 1990s, see William J. Kahley, "Interregional Migration: Boon or Bane for the South?" Federal Reserve Bank of Atlanta *Economic Review* 74 (January/February 1989): 18-34.

¹²State agencies and some state-affiliated institutions, such as the Bureau of Business and Economic Research (BBER) at the University of Florida, also produce migration estimates. These are prepared using similar techniques. For Florida in the 1980s, estimates prepared by the BBER show a pattern similar to that shown by the Census Bureau's Components of Population Change data. However, the BBER migration estimates have been 50,000-55,000 higher over the past several years. BBER estimates for the 1980s, in thousands, are as follows: 1980, 476; 1981, 333; 1982, 237; 1983, 181; 1984-85, 609; 1986, 336; 1987, 341; 1988, 327; and 1989, 326.

Book Review

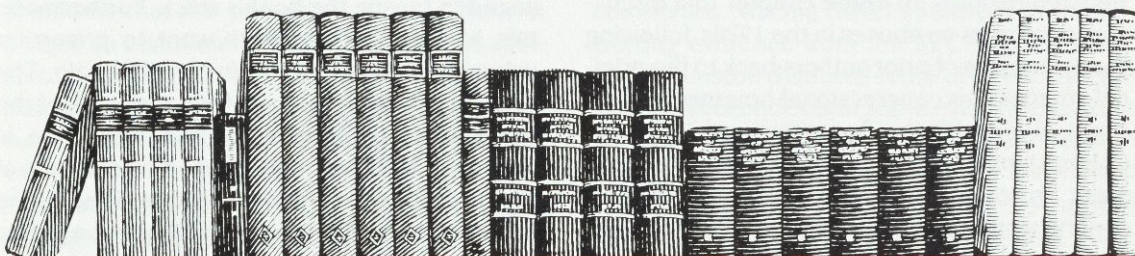
The Separation of Commercial and Investment Banking: The Glass-Steagall Act Revisited and Reconsidered

by George J. Benston.

New York: Oxford University Press, 1990.

(Also published in England by The Macmillan Press, London, 1990.)

272 pages. \$29.95.



Congress passed the Banking Act of 1933 to restore order to the banking industry in the wake of financial distress during the late 1920s and early 1930s. The portion of the law authored by Senator Carter Glass and Representative Henry Steagall—widely referred to as “the Glass-Steagall Act”—limited commercial banks’ participation in the securities business. Ties between commercial and investment banking had allegedly led to such abusive bank practices as granting unsound loans to shore up investment affiliates, pressuring customers to invest in securities, and investing in excessively risky long-term securities.

During the 1980s commercial banks have urged regulatory agencies and the courts to interpret Glass-Steagall less stringently and have lobbied Congress to repeal the act. On the other hand, trade groups representing the securities and investment industries have fiercely contested attempts to relax restrictions or rescind the act. They argue that permitting banks additional securities powers would invite a repetition of the problems of the 1920s and 1930s. Opponents of Glass-Steagall have countered

that there is no evidence that commercial banks’ securities affiliates caused the collapse of the banking system. While acknowledging that numerous other abuses occurred during the 1920s, banks point out that most of these questionable practices were legal at that time but are now illegal. In a recent turnaround, the Securities Industry Association (SIA) endorsed a plan to allow commercial banking organizations to expand their securities activities (see Robert Guenther 1989). Congress, however, appears unlikely to repeal Glass-Steagall promptly.

George J. Benston steps into the middle of this debate with his latest book, *The Separation of Commercial and Investment Banking: The Glass-Steagall Act Revisited and Reconsidered*, which considers a variety of arguments for and against revising or repealing Glass-Steagall. The book’s main contribution is its careful reexamination of the 1930s’ congressional record to assess the evidence of alleged bank abuses during that period. Benston—John H. Harland Professor of Finance, Accounting, and Economics at Emory University in Atlanta—rejects almost all claims of abuse as not being supported by specific examples or empirical evidence. The

book also reviews contemporary arguments against granting additional security powers, including claims that banks' security affiliates would exploit federal protection of commercial banks. An appendix reprints a survey by William M. Isaac and Melanie L. Fein (1988) of permissible security activities carried out by banking organizations.

Sources of Information

Many recent analyses of Glass-Steagall cite secondary sources such as Ferdinand Pecora (1939) to document abuses prior to the act. Benston devotes an entire chapter to a discussion of sources on abuses in the 1920s, following the references of prior authors back to the original sources—six congressional hearings and reports, along with the Securities and Exchange Commission's (1940) report, *Study of Investment Trusts and Investment Companies*. The congressional references are: (1) 1932 hearings on foreign bond sales held by the Senate Committee on Finance, (2) 1931 and 1932 hearings held by Senator Glass before a subcommittee of the Senate Committee on Banking and Currency, (3) the 1932 report of the Glass subcommittee hearings, (4) comments made on the House and Senate floors during May 1932 and May 1933 as reported in the *Congressional Record*, (5) the 1933 and 1934 Stock Exchange Practices (SEP) Hearings of the Senate Committee on Banking and Currency (frequently called the Pecora Hearings, after the committee's counsel), and (6) the 1934 report of the SEP Committee. He also uses "scholarly articles and reports" that provide analysis, especially of financial data.

Evidence That Securities Affiliates Caused Bank Failures

The most serious charge raised against commercial banks affiliated with securities firms in the 1920s was that such linkages led to the collapse of the banking system and thus contributed to the start of the Great Depression. Benston examines this issue from several perspectives.

The Glass Subcommittee Hearings (1931, 1063-64) list a variety of ways in which banks can adversely affect their affiliates. Benston notes, though, that this often-cited list refers to potential problems and not necessarily to ways in which banks had actually been endangered. A review of the hearings, Benston claims, yields little evidence that banks with securities affiliates were more likely to fail or that they caused larger depositor losses when they did fail.¹

One case in which a bank clearly failed as a result of its affiliates was that of the Bank of the United States. Its affiliates' primary purpose, however, was to hold real estate; the only securities affiliate that caused problems was engaged in buying the bank's stock. Furthermore, two of the bank's leaders went to prison for using bank assets for their personal gain. The sole lesson to be learned from the Bank of the United States' failure, according to Benston, is that bank affiliates may be used as a means of hiding bad loans from examiners. Prohibiting banks from having securities affiliates, he points out, cannot eliminate such practices.

Benston also examines the hypothesis that large banks' securities affiliates damaged smaller banks by pushing securities on them. Senator Glass (*Congressional Record* 1932, 9887) asserted that a significant portion of bank failures was caused by small banks' investment in long-term securities. Benston finds no support for this charge in the subcommittee's hearings. Indeed, in the few cases in which securities investments were discussed, the evidence before the subcommittee suggested that investment portfolios were not a significant cause of failure.

Evidence That Banks Committed Other Abuses

Benston considers a variety of allegations concerning abusive activities by banks' securities affiliates. Of these charges, those in the testimony of Charles E. Mitchell, president of National City Bank, and Albert Wiggin, president of Chase National Bank, before the Pecora Hearings had the most influence on Congress's decision to pass the Glass-Steagall Act. These

men ran the two largest banks in the United States at that time.²

Mitchell's and Wiggin's testimony. Benston evaluates various authors' claims that Mitchell's and Wiggin's testimony at the Pecora hearings exposed a variety of abuses. He remarks that, although many of these alleged abuses are not relevant to the separation of commercial and investment banking, they engendered significant public resentment in 1933, when the country was still in the throes of depression. Some of the questionable practices not addressed by Glass-Steagall were excessive salaries and bonuses as well as tax avoidance and, in some cases, possible tax evasion.

Other charges raised at the hearings relate to problems that are potentially serious but not unique to commercial banks' investment affiliates, according to Benston. Moreover, Benston claims, a careful scrutiny of the record reveals most of these charges are not supported. For example, Vincent Carosso (1970, 330-31) alleges that National City Corporation (the investment affiliate of National City Bank) sold bonds issued by Minas Geraes (a Brazilian state, now Minas Gerais) with inadequate disclosure. One specific allegation is that National City withheld particularly damaging information about the state uncovered by one of the corporation's officials. Benston reports that this information consisted merely of a description of conditions under former leaders of Minas Geraes at least 10 years before the state issued the bonds.

Some of the alleged abuses reported at the Pecora Hearings are unique to securities firms affiliated with commercial banks. If substantiated, these charges might justify legislation banning any relationship between the two types of financial firms. Yet, after careful examination, Benston concludes that the accusations fail to support Glass-Steagall restrictions. For instance, Benston considers Carosso's (1970, 333) allegation that National City Bank sold bad loans to its investment affiliate in an attempt to disguise bad banking practices from the bank's shareholders. This charge would be serious if the bank had used the sale to hide the losses from bank examiners, but Carosso acknowledges that examiners had previously criticized the loans. Furthermore, Benston states, the bank's shareholders had been informed about the loan before its sale. Although the bank did not notify

shareholders of the sale, the sale itself had no effect on the value of their shares. An owner of a given percentage of National City Bank shares was required to own the same percentage of National City Corporation. National City management claims that it made the transfer to increase the bank's portfolio's liquidity. In any case, management thought the loans were good at the time of the transfer.

Trust Departments and Affiliated Investment Companies. A final area of alleged abuse that Glass-Steagall purported to correct was the conflicts of interest that commercial banks affiliated with securities and investment firms may experience. David Silver (1987) alleges numerous abuses by bank-sponsored investment companies. Tracing Silver's references to supporting evidence from the SEC Reports (1940, 1942), Benston disputes some of Silver's allegations but concedes that some evidence exists to support other charges. In particular, Benston finds that banks occasionally used investment company funds to support activities of special value, such as purchasing bank loans. Such activities by bank-sponsored investment companies could cause substantial losses to investors if banks forced the investment companies to purchase assets at above-market values. Benston finds no evidence, however, that these practices resulted in losses to investment companies or their shareholders. Moreover, he argues, the SEC Reports found far more abuses involving independent investment companies than among bank-sponsored companies.

Benston also disputes other evidence of abuses involving investment affiliates, such as a U.S. Supreme Court statement in *Investment Company Institute v. Camp* (401 U.S. 617, 633 [1971]): "Congress had before it evidence that security affiliates might be driven to unload excessive holdings through the trust department of the sponsor bank." (The emphasis is Benston's.) Although the hearings produced evidence that one trust department bought securities from its affiliate and that some other trust departments may have made such purchases, Benston says the record also suggests that most banks did not buy securities from their affiliates. Furthermore, Benston's review uncovered no evidence that investment affiliates "unloaded" securities on trusts at above-market prices.

While Benston's analysis to this point appears sound, his evaluation of banks' investment affiliates suffers from two minor weaknesses. First, a careful reading of the Supreme Court's opinion and Benston's analysis shows that the two are not necessarily in conflict. The court referred to evidence that securities affiliates "*might* be driven to unload" (emphasis added) securities on the trust affiliate. The court did not claim to have evidence that such an action had occurred.

Second, Benston cites evidence suggesting that investment affiliates in general, and City Bank Farmers Trust in particular, did not buy securities from their affiliates. However, evidence not cited by Benston suggests that City Bank Farmers Trust Company, affiliated with National City Bank, may have bought securities from National City Corporation, the bank's securities affiliate. Carosso (1970, 332) notes that Mitchell testified at the Branch, Chain, and Group Banking Hearings (1930) that National City's trust affiliate would not buy from the securities affiliate without express permission from the maker. Mitchell (p. 1972 of the hearings) stated, however, that individuals who sought a trust agreement were shown "the advantages" of granting permission. This testimony implies that some trusts made purchases from the investment affiliate, but the implications are never directly addressed at these hearings. In the Glass Subcommittee Hearings (1931), as quoted by Benston, Mitchell testified that the trust affiliates' policies prohibited purchases through the investment affiliate, even if such purchases were authorized by the trust agreement. Nonetheless, a careful review of these hearings does not indicate when this policy took effect. Thus, contrary to Benston's conclusions, the record neither confirms nor disproves the trust affiliate's purchase of securities from National City's investment affiliate.

Overproduction of Financial Securities

Aside from bank failures and abusive practices supposedly engendered by the affiliation of commercial and investment banking, some

proponents of Glass-Steagall believed that such relationships would necessarily cause commercial bankers to relax their normal caution. Benston explores this argument as developed by Senator Bulkley in a frequently cited 1932 speech.³ Bulkley claimed that banks made excessive margin loans to support their securities affiliates and that investment banking affiliates encouraged overproduction of securities to keep their sales forces busy. These charges suggest that commercial banks and their securities affiliates contributed to the 1929 stock market crash by increasing already-excessive speculation during the 1920s through the excessive use of margin loans and the sale of questionable securities.

Benston notes that subsequent economic analysis does not support Bulkley's claim that speculation fueled by bank margin lending caused or increased the severity of the Depression. He also points out that Glass-Steagall does not prohibit banks from making margin loans. Benston adds that economic activity and securities underwriting remained depressed long after bank securities affiliates were eliminated.

If Senator Bulkley's second charge were valid, then returns on bank-underwritten securities should have been significantly worse than returns on securities underwritten by other firms, according to Benston. He notes that exact comparison is difficult because the relevant returns are the unobservable *ex ante* expected distribution of returns rather than the observed *ex post* realized returns. However, conceding this limitation, Benston cites studies by Terris Moore (1934) and George Edwards (1942), both of which suggest that issues originated by commercial banks' affiliates actually had slightly better *ex post* returns than issues from independent organizations.

Explanations for the Passage of Glass-Steagall

Given that Benston's analysis suggests little economic rationale for the adoption of Glass-Steagall, the question arises as to why the act was passed. In chapter 6 Benston develops the hypothesis that the act resulted from a com-

bination of special interest trade-offs and banks' desire to avoid even worse legislation. Chapter 11 reviews a number of other factors that may have contributed to the passage of the act.

Chapter 6 reports that banks' securities affiliates were increasing their share of the new issue market in the 1920s, originating over 50 percent of new bonds in 1929. Benston (pp. 134-35) attributes this growing market share to two factors: (1) banks' "apparent positive reputations among their customers, which provided them with goodwill that they could transfer to securities products" and (2) economies of scale and scope that could be realized by combining commercial and investment banking. Bank affiliates' gain in market share provided unaffiliated securities firms with a strong incentive to seek a legislative ban on affiliation.

Benston discusses Jonathan R. Macey's (1984) argument that, since Glass-Steagall could not be justified on the basis of its public benefits, the actual motive behind the act must have been to protect special interests. Benston is sympathetic to Macey's proposal but suggests that commercial banks had several reasons for not resisting the legislation. First, banks' securities affiliates had become unprofitable by 1933. In addition, banks were already dealing with public outrage resulting from the large number of bank failures, the losses on investments made through bank securities firms, and the charges of wrongdoing by bankers, especially by Charles Mitchell. In fact, Benston avers, Winthrop W. Aldrich, the new president of Chase National Bank, probably lent support to Glass-Steagall to distance himself and the Rockefeller interests from the controversial activities of Chase's prior administration.

Some of the explanations offered by Benston may help to explain the passage of Glass-Steagall. However, Macey's claim that special-interest theory must be true because the public did not benefit from the act is weak even if one is skeptical of the public interest justifications. The relevant issue, which is not discussed by Benston, is whether Congress believed Glass-Steagall to be in the public interest, not whether it actually was. The available evidence from congressional speeches and newspaper editorials suggests that many believed that the act was indeed in the public interest.⁴

Chapter 11 begins with a discussion of Senator Glass's long-held beliefs that banks' loans should be limited to businesses' short-term credit needs and that margin lending was a perversion of the banking system. Along with this explanation, Benston considers the failure of the Bank of the United States as well as the banking system's collapse in the early 1930s as reasons for eliminating bank securities affiliates and "punishing" banks.

A structural weakness of the book is chapter 11's recap of the reasons for passage of Glass-Steagall presented in chapter 6. The division of explanations into two widely separated chapters interrupts the flow of the argument and causes an unnecessary repetition of material.

A more serious problem for the book is that some of its explanations for the passage of Glass-Steagall may be construed as providing ammunition for those opposed to repealing the act. Benston, a strong advocate for repeal, seems not to recognize this problem. He argues that bank affiliates benefited from the public's confidence in banks, which had maintained good service records. Consumers seem to have felt that bank affiliates would give better or at least more conservative investment advice than independent firms. Banks and affiliates used this goodwill to boost their market share in the 1920s. Whatever edge affiliates may have had, they were unable to offset the magnitude of the 1929 market crash. Yet the public appears to have judged banks and their affiliates harshly after the crash because of unrealistic expectations of their investment prowess.

Today's proponents of Glass-Steagall cite the public's overconfidence in bank affiliates' investment advice in the 1920s as justification for banning bank securities affiliates. Supporters of the act argue that consumers will suspend normal caution toward new investments if they are recommended by banks and will therefore be more likely to make inappropriate, excessively risky investments.

While policymakers should consider ways to reduce the risk that some consumers will place excessive confidence in banks' affiliates, this issue does not necessarily justify a ban on securities affiliates. A total ban would reduce competition among investment firms and eliminate some gains in convenience that consumers would obtain from one-stop financial shopping.

Furthermore, while some consumers may place unjustified confidence in their bank's securities affiliate, several factors suggest that this problem would be limited. Investors of the 1980s are likely to be more sophisticated than those of the 1920s due to the growth of business and financial reporting on television and in print media. Thus, the proportion of investors who would naively trust advice from a securities affiliate of their bank has probably dropped significantly since the 1920s. Additionally, experience will teach consumers that the quality of investment advice offered by banks is not necessarily superior to that offered by unaffiliated firms.⁵

Moreover, bank affiliates may have a greater incentive to maintain consumer goodwill than unaffiliated firms. Unaffiliated firms that make excessive promises to an individual risk losing that individual's securities business. Bank affiliates that promise more than they can deliver may lose not only an investor's securities business but also that person's accounts at the affiliate bank. Benston would probably not disagree with any of these points, but his argument would have been stronger had he dealt with this issue directly.

Contemporary Justifications for Glass-Steagall

Benston recognizes that other arguments exist for continuing Glass-Steagall even if the original rationale is questionable. One commonly raised objection to repeal is that allowing banks to have securities affiliates would substantially increase the risks borne by the Federal Deposit Insurance Corporation (FDIC) and the Federal Reserve System. This view holds that securities activities are inherently riskier than traditional commercial banking activities and that risks incurred by one affiliate will ultimately affect the operations of the entire banking organization. Moreover, according to current Glass-Steagall proponents, the government, through the FDIC and Federal Reserve, would bear most of the losses associated with the bank affiliates' failure.

While conceding that deposit insurance should be reformed because it creates a moral hazard problem—encouraging bankers to take

on more risk because insurance limits the potential losses to depositors—Benston provides several arguments suggesting that securities affiliates will not substantially increase the risk borne by the government. The Federal Reserve, he claims, already provides a safety net for securities markets, as demonstrated during the October 1987 stock market crash, and banks may already achieve any desired risk level through traditional commercial banking activities. Benston contends that securities activities would not increase banks' risks except in circumstances involving inexperienced bankers who do not fully appreciate the hazards inherent in activities. In fact, he observes, in the 1930s banks with securities affiliates had a failure rate significantly lower than that of banks without affiliates.

Benston notes several studies that suggest potential reductions in banks' risk due to diversification.⁶ Other studies indicate that corporate stock underwriting is not particularly risky. Though Benston admits that the effect securities affiliates will have on commercial banking is uncertain, he summarizes the evidence as suggesting that "there is no reason to believe that banks would be more likely to become insolvent" or place a greater strain on the federal safety net. He also doubts that securities affiliates will make banks significantly more profitable.

Proponents of Glass-Steagall contend that bank-affiliated securities firms would constitute unfair competition for independent firms because deposit insurance would lower affiliates' funding costs and their captive market would provide ready customers on whom they could unload securities. In response, Benston argues that the relevant issue is not bank affiliates' possible lower funding costs but the opportunity cost of using those funds, which is independent of deposit insurance. Countering the argument that securities affiliates would have captive markets in the affiliate bank, bank-administered trusts, and correspondent banks, Benston asserts that securities affiliates which overbid for securities will create losses for their parent whether they sell the securities in the market or to the bank. Hence, the presence of a bank affiliate provides no incentive to overbid. Bank-administered trusts would violate the law if they purchased overpriced securities from

their affiliates. He also points out that securities affiliates would not be unique in facing potential conflicts of interest. Many unaffiliated securities firms have mutual funds that can give rise to the same situation. Finally, he argues that correspondent banks would be unlikely to unload overpriced securities on their respondent banks because the market is too competitive.

Benston also considers the effect that repeal of Glass-Steagall would have on banks' concentration of power. The claim that repeal would give too much power to banks is based on the assumption that banks could use their trust-administered stock holdings plus any mutual fund holdings to control nonfinancial firms. Benston finds no evidence that banks have used their trust holdings to dominate other corporations and sees no indications that securities privileges would be used manipulatively. The economist reviews a related argument—that repeal of the act could reduce concentration by expanding the limited number of firms that currently dominate the underwriting of corporate securities. Benston finds the evidence on both sides of this argument ambiguous and suggests that the best way to determine the effect of banks on the market is to repeal the act and see what happens.⁷

The last issue considered by Benston is universal banking. Universal banks can offer a full range of financial services, may be owned by nonbanks, and can vote the shares of companies whose stock they own. This chapter considers the arguments for and against both specialized banking, as now mandated in the United States, and universal banking, as practiced in West Germany. Benston concludes that the substantial advantages universal banking can provide would outweigh the few problems it might create for the economy.

Summary

An understanding of the merits of the Glass-Steagall Act is important to Congress as it considers whether to repeal or revise the act, and to regulators and the courts as they interpret it. The most important contribution of *The Separation of Commercial and Investment Banking: The Glass-Steagall Act Revisited and Reconsidered* is its thorough review of the documentation concerning alleged abuses by commercial banks' securities affiliates during the decade before Glass-Steagall was enacted. No future deliberation on expected abuses if the act is relaxed will be complete unless it considers Benston's work. His discussion of contemporary issues in reforming Glass-Steagall is largely a review of the existing literature, but it provides valuable insights on these studies' strengths and weaknesses.

Perhaps the book's least valuable discussion, certainly in terms of the current debate on Glass-Steagall, is its attempt to explain why the act was passed. Any discussion of this type is necessarily speculative. Moreover, understanding the reasons for passing the act does not necessarily have much bearing on deciding what the best policy would be in the future. Overall, however, Benston's book should be useful to policymakers in that it provides a careful review of the evidence considered in enacting Glass-Steagall and a timely examination of research on this legislation's impact on the banking industry.

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Notes

¹Benston cites further evidence from White (1986) that securities operations were not responsible for the wave of bank failures in the early 1930s. White performs a variety of tests and concludes that securities affiliates did not endanger banks.

²Additional allegations arising from this period concern trust departments' relationships with investment affiliates and investment companies' (now called mutual funds) relationship with their commercial bank sponsors.

³*Congressional Record* (1932), 1931-32.

⁴See, for example, "Big Bankers' Gambling Mania," *The Literary Digest*, March 11, 1933, 11-12.

⁵Indeed, the issue of misplaced confidence would probably not exist at this time if the Glass-Steagall Act had

never been passed. The stock market crash of 1929 taught investors that even securities promoted by bank affiliates could suffer significant losses.

⁶He also points out that one important study suggesting that securities activities are riskier than traditional banking, Boyd and Graham (1988), misclassifies six of the firms labeled as securities firms.

⁷Benston inaccurately states (in chapter 9) that "concerns for concentration of power by commercial banks over corporations did not arise before the passage of the Glass-Steagall Act." In fact, such concerns had existed at least since the House of Representatives conducted the Pujo Hearings, which investigated the concentration of the control of money and credit (Pujo Report 1913).

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