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FORECASTING DEPOSIT GROWTH:
Forecasting BIF and SAIF Assessable and Insured Deposits

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FORECASTING DEPOSIT GROWTH

This paper develops a new method of forecasting growth in the deposits of financial institutions for use by the Congressional Budget Office (CBO) in projecting receipts and expenditures of the Federal Deposit Insurance Corporation (FDIC). Below I present an approach to forecasting the various deposit categories and include an example of out-of-sample forecasting performance. I briefly discuss the limitations of the approach and the results of some alternatives, including issues of regime change and cointegration. In the end, I propose a simple linear regression relating deposit growth to growth in a larger money aggregate (M2) and interest rate spreads, despite some statistical concerns.

1. Background

The FDIC distinguishes four classes of deposits, and it is necessary to forecast each separately. These classes include assessable and insured deposits from both the Bank Insurance Fund (BIF) and the Savings Association Insurance Fund (SAIF). Assessable deposits are essentially total domestic deposits, some of which (in amounts of $100,000 or less) are insured by the FDIC. Table 1 reports their values as of 2001. BIF assessable deposits are almost exactly four times as large as SAIF assessable deposits. In 2001, the insurance coverage ratio was about 67 percent for BIF and 90 percent for SAIF.

Table 1
2001 FDIC Deposits (millions of dollars)

BIF		SAIF	
Assessable	Insured	Assessable	Insured
3,584,610	2,408,878	897,278	801,849

Source: FDIC

One requirement of these forecasts is that they be consistent with other long-term CBO macroeconomic forecasts. It is therefore sufficient to specify contemporaneous relationships between deposits and macroeconomic variables currently forecast by CBO. In applications, one can then use the CBO forecasts to generate (conditional) deposit projections.

1.1 Available Data

The FDIC has provided a time series of annual (calendar year end) observations of BIF assessable and insured deposits from 1947 through 2001. Unfortunately, I have observations of SAIF deposits (of both types) only since 1989, also at an annual frequency. Deposit insurance for thrifts used to be managed by FSLIC but was moved under FDIC when FSLIC was dissolved. While deposit data for thrifts during the FSLIC era can be gathered, they correspond to such a different structural regime that they would be of little use in the current analysis.

I use data on the M2 aggregate from the Federal Reserve and yields on the three month and ten year Treasury securities. The M2 time series begins in 1959. As Table 2 shows, M2 is not a perfect substitute for assessable deposits, though both are related.

Table 2
Definition of M2

Category	Value as of December, 2001 (billions of dollars)	
M1		$1,179.3
Currency [a]	579.9	
Travelers Checks [a]	7.8	
Demand Deposits	330.4	
Other Checkable Deposits	261.2	
Retail Money Market Mutual Funds [a]		997.8
Savings Deposits		2,370.6
Small Time Deposits		973.3
	Total:	$5,521.0

[a] Not included in assessable or insured deposit base.

In contrast, "Assessable Deposits" are total domestic deposits (time deposits, demand deposits, and savings deposits, including money market deposit accounts at banks or thrifts and interest-bearing checking accounts) with some adjustments for the location of the insured institution relative to the economic agent who owns the deposits.

2. BIF Assessable Deposits

I begin by positing that growth in BIF assessable deposits (Deposits) may be related to growth in the M2 aggregate, since M2 partly includes these Deposits with some additions and modifications. CBO already generates an implicit forecast of M2, and thus almost generates an implicit forecast of Deposits.

Figure 1 indicates that M2 grows faster on average than do Deposits. Put differently, the ratio of Deposits to M2 is decreasing as other components of M2 become more significant. Forecasting Deposit growth by M2 growth "one-for-one" would not generally lead to accurate forecasts, particularly recently. Instead, I can at least project Deposit growth on M2 growth and obtain a better linear predictor.

I further find that given growth in M2, Deposits will grow faster if short-term interest rates (proxied by the three-month Treasury bill) are rising relative to long-term interest rates (proxied by the ten-year Treasury bond). This leads us to propose the following simple relationship:

$$\mathrm{dbif}_t = \alpha + \beta_1 \mathrm{dm2}_t + \beta_2 \mathrm{t3m}_t + \beta_3 \mathrm{t10y}_t + \epsilon_t, \tag{1}$$

where *dbif* is BIF assessable deposit growth, *dm2* is M2 growth, *t3m* is the log of the three month T-Bill, and *t10y* is the log of the ten year T-Bond.[1] Call this specification the Basic Model. Using data since 1959, I estimate (1) by OLS and obtain the following (see Figure 2):

[1] Specifically, "growth" is the first difference in the log level.

Table 3
Regression Results: Basic Model, 1959-2001

Variable	Coefficient	Standard Error*	T-stat
Constant	4.01	2.34	1.71
dm2	0.94	0.14	6.90
t3m	4.59	1.27	3.62
t10y	-6.21	1.79	-3.46

Durbin-Watson = 1.98, F(3,38) = 27.65, $\overline{R}^2$ = 0.66

* Unless otherwise indicated, I use Newey and West's estimator for variance, which is robust to autocorrelation and heteroskedasticity.

Other economic factors (such as real GDP growth, M1 or M3 aggregates, price index growth, corporate profits, other interest rates, as well as lagged values of the dependent variable and other variables) have been tested. None enters significantly.

2.1 Statistical Concerns

A simultaneous dependence likely exists between M2 and Deposits in this specification.[2] To believe that this is a statistically well-specified regression relationship, one must argue that the rate of M2 growth is set exogenously such that shocks to Deposit growth represent transfers across categories *within* M2 and not additions to or subtractions from M2. Examples might include people switching from demand deposits into cash, or drawing down retail money market accounts and increasing deposits. Otherwise, OLS estimates are biased and inconsistent estimates of the marginal effects of the regressors on Deposit growth. However:

- There are no unbiased estimators available by any technique (though there are techniques, e.g. Instrumental Variables, which correct for consistency. See below.)

- The OLS estimates are biased and inconsistent estimates *of the marginal effects* - but I really

[2] One could argue that the interest rates are set exogenously on a "world market."

have no interest in the marginal effects. The OLS estimates are unbiased and consistent estimates of "something else" - some linear combination of the marginal effects. As I will not use this relationship to perform counter-factual policy experiments, I do not need to properly identify the true marginal effects.

- It may be better for current purposes (to minimize the mean squared forecasting error) to trade consistency for variance in the estimates. For example, if I use lagged values to instrument for M2 and the interest rates, the results – though arguably consistent – have greater variance.

2.2 Instrumental Variables Estimation

The arguments above notwithstanding, I also estimate (1) by using $dm2_{t-1}$ as an instrument for $dm2_t$. The results are as follows:

Table 4
Regression Results: Basic Model, IV estimation for dm2, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	3.19	2.34	1.36
$dm2_t$ ($dm2_{t-1}$)	1.03	0.20	5.22
t3m	4.73	1.30	3.65
t10y	-6.24	1.92	-3.24

Durbin-Watson = 2.04, F(3,37) = 6.64, $\bar{R}^2$ = 0.66

The coefficients on *t3m* and *t10y* are unchanged as is, essentially, the intercept. The coefficient on *dm2* is not statistically distinct from the OLS results. Using this IV adjustment for the simultaneity between Deposits and M2 does not materially impact the results. Restricting to data since 1975 also does not change the results.

If I wish to be more conservative and also control for simultaneity between Deposits and the interest rates, I can use their lags as instruments as well:

Table 5

Regression Results: Basic Model, IV estimation for all, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	0.24	5.86	0.04
$dm2_t$ *($dm2_{t-1}$)*	1.11	0.40	2.81
$t3m_t$ *($t3m_{t-1}$)*	1.17	7.65	0.15
$t10y_t$ *($t10y_{t-1}$)*	-1.87	8.30	-0.23

Durbin-Watson = 2.11, F(3,37) = 19.20, $\bar{R}^2$ = 0.58

Clearly, these are dramatically different results. They are also less reliable, in that using the sub-sample since 1975 yields:

Table 6

Regression Results: Basic Model, IV estimation for all, 1975-2001

Variable	Coefficient	Standard Error	T-stat
Constant	-5.40	7.26	-0.74
$dm2_t$ *($dm2_{t-1}$)*	0.71	0.35	2.05
$t3m_t$ *($t3m_{t-1}$)*	1.17	8.79	0.13
$t10y_t$ *($t10y_{t-1}$)*	1.96	10.30	0.19

Durbin-Watson = 2.16, F(3,18) = 12.05, $\bar{R}^2$ = 0.61

If one is willing to accept that the interest rates are statistically exogenous, then correcting for simultaneity between Deposits and M2 is of no real consequence, and one may use either the OLS or the IV results. If, however, interest rates are believed to be endogenous in this specification, the subsequent IV results are too unstable to be useful, and one would prefer the reduced variance of the OLS results, inconsistency notwithstanding.

2.3 Regime Changes

Although there may have been structural shifts in monetary policy since 1959, the question in this case is not whether there are different relationships governing Deposit growth, M2 growth or interest rates, but whether there is a different relationship governing Deposit growth *given* M2 growth and interest rates. The very fact which raises statistical concerns over this specification - the partial overlap between Deposits and M2 - should help to make this specification somewhat robust to regime changes in the larger economy. Taking as given M2 growth, I am almost taking as given Deposit growth, and any "regime change" must be a change in *that* relationship, controlling for interest rates.

I nevertheless proceed to test for evidence of structural shifts. One source of such shifts could be that the statutory insurance cap has changed several times since 1959.[3] Allowing fixed effects for each of these insurance regimes (except the first), I obtain:

Table 7
Regression Results: Basic Model, different Insurance Regimes, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	2.80	2.15	1.30
dm2	0.92	0.13	7.05
t3m	3.99	1.40	2.85
t10y	-4.97	2.19	-2.27
D-15k	1.37	0.99	1.38
D-20k	0.96	1.41	0.68
D-40k	-0.62	1.71	-0.36
D-100k	-0.29	1.34	-0.22

Durbin-Watson = 2.20, F(7,34) = 11.77, $\bar{R}^2$ = 0.65

Taken individually, none of the insurance regimes offers a statistically significant level adjustment. Taken together, the hypothesis that all levels are equal cannot be rejected at any reasonable confidence level

[3] The nominal insurance ceiling of $10,000 in 1959 was increased to $15,000 in 1966, $20,000 in 1969, $40,000 in 1974, and finally to its current level of $100,000 in 1980.

(F(4,38) = 0.64). Notice also that the coefficient on *dm2* is essentially unchanged (numerically and statistically) from the Basic Model.

Another source of shifts could be money market mutual funds (MMMF’s) which began to compete with deposits about the middle of the 1970's. This corresponds closely with an apparent structural shift in Figure 1. Indeed, if I search numerically for a single regime change that maximizes fit, I would ultimately allow for an adjustment in 1975. A Chow test of the hypothesis that all coefficients (slope and intercept) are equal pre- and post-1975 yields F(4,34) = 1.12, and hence I would not reject that hypothesis. However, if I test only whether there are different level effects pre- and post-1975, I obtain F(1,37) = 3.54. I could reject the hypothesis of equal level effects at the 10 percent confidence level. In other words, while there is no evidence of different slope effects pre- and post- 1975, a case could be made that the "average" growth (as captured by the intercepts) is different, perhaps because of MMMF’s.

This result, of course, is related to the fact that even in the Basic Model, a 95 percent confidence interval around the intercept ranges from -0.58 to 8.60. This relative indeterminacy in relating the average growth in Deposits to M2 is consistent with the results on cointegration and is discussed further below.

2.4 Cointegration and the Long-Run Relationship

Figure 1 suggests that Deposits and M2 do not grow "one-for-one", and this observation is supported by the fact that their log levels are not related by the cointegrating vector [1 -1]. However, this does not mean that they are not related by some other vector.

A preliminary to any discussion of cointegration is to establish that the series in question are integrated to begin with. I perform the standard Dickey-Fuller tests on the following equations, using the log level of Deposits (*bif*) and M2 (*m2*):

$$bif_t = \alpha + \beta bif_{t-1} + \gamma t + \varepsilon_t, \text{ and} \qquad (2)$$

$$m2_t = \alpha + \beta m2_{t-1} + \gamma t + \varepsilon_t. \qquad (3)$$

In both cases, I wish to test first the hypothesis that $\beta = 1$ (unit root), and second the joint hypothesis that $\beta = 1$, $\gamma = 0$ (unit root and no time trend). For equation (2), I have for the first test that $F(1,39) = 0.006$ and for the second that $F(2,39) = 4.256$. Compared with the appropriate critical values, I cannot reject either hypothesis. In other words, there is good evidence that the Deposits series has a unit root but no time trend. For equation (3), I have first that $F(1,39) = 0.019$ and second that $F(2,39) = 2.258$. The conclusions are the same: the evidence is consistent with the notion that M2 has a unit root but no time trend.

Having established that the individual series are (probably) integrated of order 1, I proceed to test whether the vector [1 -1] is a cointegrating vector. That is, I construct the residuals u_t from:

$$u_t = bif_t - m2_t, \tag{4}$$

and perform a standard Dickey-Fuller test of the hypothesis that u has a unit root. Specifically, from the regression:

$$u_t = \alpha + \beta u_{t-1} + e_t, \tag{5}$$

I test the hypothesis $\beta = 1$. From (5), I have that $F(1,40) = 0.153$, and hence cannot reject the hypothesis. In short, the evidence suggests that the vector [1 -1] is *not* a cointegrating vector for Deposits and M2.

I can attempt to estimate a different cointegrating vector (if there is one) by running the following regression:

$$bif_t = \alpha + \beta m2_t + d_t. \tag{6}$$

Table 8
Regression Results: Deposits on M2, log level, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	7.22	0.14	52.64
m2	0.93	0.02	48.78

Durbin-Watson = 0.18, $\bar{R}^2 = 1.00$

Not surprisingly, the coefficient on *m2* is less than one, and the hypothesis that it is one is rejected. It is interesting to note that the coefficient of *m2* is identical to that of *dm2* in the Basic Model.

I proceed to apply an augmented Dickey-Fuller test to the residuals *d* from equation (6). That is, I test the hypothesis that $\rho = 1$ from the equation:

$$d_t = \rho d_{t-1} + \beta_1 \Delta d_{t-1} + \beta_2 \Delta d_{t-2} + ... + \beta_L \Delta d_{t-L} + \nu_t. \quad (7)$$

I estimate (7) with L = 3. For the hypothesis that $\rho = 1$, I have that $F(1,35) = 1.306$, and hence cannot reasonably reject the hypothesis. For the joint hypothesis that $\rho = 1$ and all other coefficients are zero, I have that $F(4,35) = 0.514$, and hence cannot reject this joint hypothesis either. Ultimately, the data suggest that Deposits and M2 are not cointegrated since there is no linear combination which is stationary.

If, disregarding these test results, I assume the series are cointegrated with vector [1 -0.93] as estimated in Table 8 and include an error-correction term in the Basic Model, I obtain:

$$dbif_t = \alpha + \gamma(bif_{t-1} - 0.93 \cdot m2_{t-1}) + \beta_1 dm2_t + \beta_2 t3m_t + \beta_3 t10y_t + \varepsilon_t. \quad (8)$$

The implication of the error-correction model is that as the log level of Deposits and M2 deviate from their long-run relationship, the growth rate of Deposits adjusts accordingly. For example, if Deposits are high relative to M2, then the subsequent growth of Deposits should be less than otherwise.[4] The results of estimating (8) (using a demeaned error-correction term) are:

Table 9
Regression Results: Basic Model with Error Correction, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	2.42	3.37	0.72
$(bif\text{-}0.93m2)_{t-1}$	-6.27	13.61	-0.46
dm2	0.96	0.12	8.27
t3m	4.51	1.18	3.83
t10y	-5.37	2.15	-2.50

Durbin-Watson = 1.94, F(4,37) = 20.52, $\overline{R}^2 = 0.66$

The error-correction term does not enter significantly, and the other results are effectively unchanged. If I repeat the above, but impose the cointegrating relationship [1 -1] instead, the coefficient on the error-correction term is 1.17 (nominally the wrong sign - forecasts would tend to diverge) with a variance of 6.19 and a T-statistic of 0.19. Again, the other results are unchanged from the Basic Model.

Finally, if I wish to simultaneously estimate the cointegrating vector and include the error-correction term, I can estimate the following:

$$dbif_t = \alpha + \gamma_1 bif_{t-1} + \gamma_2 m2_{t-1} + \beta_1 dm2_t + \beta_2 t3m_t + \beta_3 t10y_t + \varepsilon_t. \quad (9)$$

[4] The hypothesis is that γ should be negative.

Table 10
Regression Results: Model (3), 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	0.36	3.48	0.10
bif_{t-1}	-10.40	12.27	-0.85
$m2_{t-1}$	9.10	11.34	0.80
dm2	0.92	0.12	7.44
t3m	3.96	1.31	3.03
t10y	-3.66	2.50	-1.47

Durbin-Watson = 2.01, F(5,36) = 16.70, $\bar{R}^2$ = 0.66

These results imply a cointegrating vector of [1 -0.87] - different from Table 8 - and the error-correction term is still not significant.

There is no evidence in these data of a single, stable relationship between Deposits and M2 at low frequencies (i.e., no evidence that they are cointegrated) - though there clearly is one at higher frequencies. Since the Basic Model specification is defined over growth rates, it zeros out the lower frequencies in both Deposits and M2 and emphasizes the higher frequencies. As a result, it is consistent with many different hypotheses of the long-run relationship between Deposits and M2. For example, if one has a strong opinion that over a ten year horizon, Deposits and M2 should grow at the same average rate (but not necessarily the same in any particular year), then one could adjust the intercept from the Basic Model results accordingly.

The results presented in Table 3 are the best linear predictor of growth in Deposits given these regressors. By themselves, they may yield a wide variety of implications for the long-run relationship between Deposits and M2 (or anything else, for that matter) depending on the interest rate levels. If one has an *a priori* opinion as to what that relationship should be over the forecast horizon, one can adjust the intercept as needed. However, the available data by themselves do not identify any such relationship in particular, and certainly not over a ten-year horizon.

2.5 Holdout Performance

One simple alternative for forecasting Deposit growth is to use nominal GDP growth (*dgdp*) one-for-one. I wish to compare the forecasting performance of the specification presented above with this alternative. In sample, the Basic Model has a measured fit of $\overline{R}^2$ = 0.66, whereas the best fit between *dbif* and *dgdp* has $\overline{R}^2$ = 0.11, and that best linear relationship is not "one for one." Regressing *dbif* on *dgdp* I obtain:

Table 11

Regression Results: *dbif* on *dgdp*, 1959-2001

Variable	Coefficient	Standard Error	T-stat
Constant	2.61	1.64	1.59
dgdp	0.53	0.22	2.43

Durbin-Watson = 1.46, $\overline{R}^2$ = 0.11

The joint hypothesis that the intercept is 0 and the slope is 1 is rejected at the 5 percent confidence level (F(2,40) = 3.37).

To test performance out-of-sample, I estimate the coefficients of the basic model using data from 1959-1991, inclusive – thus holding out the last ten years of available data. I then apply the estimated coefficients to the actual data on M2 growth and Treasury Bill rates from 1992-2001, inclusive. The result is the forecast of Deposit growth which would have resulted in 1991 had I had perfect forecasts of M2 and Treasury Bill rates.

I compare this deposit growth forecast, *dbif_ols*, with the actual deposit growth data *dbif*, where:

$$dbif\_ols_t = \hat{\alpha} + \hat{\beta}_1 \, \mathrm{dm2}_t + \hat{\beta}_2 \, \mathrm{T3m}_t + \hat{\beta}_3 \, \mathrm{T10y}_t. \quad (10)$$

I also compare the actual data *dbif* with the forecast under the alternative which assumes Deposit growth is exactly nominal GDP growth:

$$dbif\_gdp_t = dgdp_t. \qquad (11)$$

Finally, I convert the growth rates into levels. The results are presented below and in Figures 3-6. Also reported is the root mean squared forecasting error.[5]

Table 12
Forecasting Performance: Growth Rates

Year	*dbif*	*dbif_ols*	*dbif_gdp=dgdp*
1992	-0.3%	-1.0%	5.4%
1993	-0.7	-0.2	5.0
1994	-1.2	0.0	6.0
1995	4.5	5.0	4.8
1996	2.5	4.6	5.4
1997	5.3	6.2	6.3
1998	7.3	9.5	5.4
1999	1.4	6.1	5.5
2000	9.1	8.0	5.8
2001	7.5	4.8	2.6
	rmse:	2.1	4.3

Table 13
Forecasting Performance: Levels (billions of dollars)

Year	*BIF*	*BIF_ols*	*BIF_gdp*
1992	2,512	2,494	2,660
1993	2,494	2,489	2,796
1994	2,464	2,488	2,970

[5] Strictly, I present the root mean squared error in Table 12 and the root mean squared *percent* error in Table 13.

1995	2,576	2,617	3,116
1996	2,642	2,740	3,289
1997	2,786	2,916	3,502
1998	2,996	3,207	3,697
1999	3,038	3,409	3,904
2000	3,327	3,693	4,136
2001	3,585	3,875	4,244
	rmse:	6.52%	21.43%

The model forecast outperforms the GDP forecast. Regressing *dbif* on *dbif_ols* yields:

Table 14

Regression Results: *dbif* on *dbif_ols*, 1992-2001

Variable	Coefficient	Standard Error	T-stat
Constant	-0.26	1.07	-0.24
dbif_ols	0.88	0.19	4.52

Durbin-Watson = 1.53, $\overline{R}^2$ = 0.68

The results are numerically and statistically close to the hypothesis that " = 0 and $ = 1 (F(2,8) = 0.88).

However, regressing *dbif* on *dbif_gdp* yields:

Table 15

Regression Results: *dbif* on *dbif_gdp*, 1992-2001

Variable	Coefficient	Standard Error	T-stat
Constant	8.75	6.59	1.33
dbif_gdp	-1.00	1.24	-0.81

Durbin-Watson = 1.36, $\overline{R}^2$ = -0.04

3. BIF Insurable Deposits

Define μ_t as the ratio of insured BIF deposits to assessable BIF deposits at time *t*. I expect that μ will rise as the statutory insurance coverage rises, *ceteris paribus*. Furthermore, since the uninsured deposits belong to high net worth individuals and institutions, I speculate that these are more "financially savvy" than most deposit holders (insured). This would suggest that they are more responsive to the economy and interest rates. In particular, I expect that uninsured deposits are more sensitive to marginal fluctuations in M2 (thus μ should fall as M2 growth increases), and they are more sensitive to interest rates (hence μ should move with long-term rates and against short-term rates).

With this in mind, I regress μ on the same factors as the Basic Model and dummy the level of μ with different insurance coverage regimes. The results are:

Table 16
Regression Results: BIF Insurance Ratio, 1959-2001

Variable	Coefficient	Standard Error	T-stat
M2	-0.004	0.002	-2.09
T3m	-0.022	0.029	-0.76
T10y	0.053	0.030	1.75
D-10k	0.546	0.030	18.31
D-15k	0.566	0.034	16.47
D-20k	0.593	0.039	15.24
D-40k	0.624	0.045	14.03
D-100k	0.700	0.044	15.91

Durbin-Watson = 0.85, F(7,34) = 72.63, $\overline{R}^2$ = 0.92

In short, μ is almost constant within any insurance regime (dummy variables), but there are numerically slight fluctuations at the margin. Using the more robust standard errors as reported above, the interest rates do not enter significantly. However, using the traditional OLS errors, they are individually significant at the 5 percent confidence level.

4. SAIF Assessable Deposits

The available time series on SAIF deposits is short (1989 – present), probably too short to model separately. One approach to obtaining earlier data under FSLIC might be to use Federal Reserve data on "total deposits," and assume that Total Deposits = BIF Deposits + SAIF Deposits, and thus SAIF = Total – BIF. Using the Federal Reserve's time series on savings deposits, small time deposits, large time deposits, demand deposits, and other checkable deposits, I obtain the following:

Table 17
Assessable Deposits Data: FDIC and Federal Reserve Proxy

Year	I FDIC	II Fed	(II-I)/I % Difference
1989	3414.1	3131.6	-8.3%
1990	3415.7	3142.4	-8.0
1991	3330.7	3138.6	-5.8
1992	3273.2	3124.0	-4.6
1993	3220.1	3130.8	-2.8
1994	3184.6	3127.6	-1.8
1995	3318.5	3250.0	-2.1
1996	3350.9	3411.2	1.8
1997	3507.5	3629.0	3.5
1998	3747.8	3856.5	2.9
1999	3802.7	4037.8	6.2
2000	4150.6	4302.5	3.7
2001	4481.9	4653.4	3.8
		Average:	-0.9%

This measure both under- and over-states "BIF + SAIF." While it is almost correct "on average", its implications for SAIF deposit levels in particular are inaccurate:

Table 18
SAIF Assessable Deposits Data: FDIC and Federal Reserve Proxy

Year	I SAIF	II Fed-BIF	(II-I)/I % Difference
1989	948.1	665.7	-29.8%
1990	874.7	601.5	-31.2
1991	810.7	618.5	-23.7
1992	760.9	611.7	-19.6
1993	726.5	637.2	-12.3
1994	720.8	663.8	-7.9
1995	742.5	674.0	-9.2
1996	708.7	769.1	8.5
1997	721.5	843.0	16.8
1998	751.4	860.1	14.5
1999	764.4	999.4	30.8
2000	823.8	975.8	18.4
2001	897.3	1068.8	19.1
			Average: -2.0%

The implications for SAIF deposit growth rates are even more misleading.

Another argument against attempting to model SAIF deposit growth before 1989 is the disruption of the 1980's savings and loan collapse. Any model would need to control for this unique set of circumstances.

A different approach would be to establish some reasonable "rules of thumb" relating SAIF deposits to BIF deposits. The most obvious method would be some statement that SAIF deposits tend to be X percent of BIF deposits. Using FDIC data, the ratio of SAIF to BIF deposits seems to be moving from a higher level at the end of the 1980's to a (seemingly) stable 25 percent:

Table 19

FDIC Data: Ratio of SAIF to BIF Assessable Deposits

Year	SAIF/BIF
1989	38.4%
1990	34.4
1991	32.2
1992	30.3
1993	29.1
1994	29.3
1995	28.8
1996	26.8
1997	25.9
1998	25.1
1999	25.1
2000	24.8
2001	25.0

Since I don't have much data on FDIC classified SAIF deposits and since it would be difficult to construct a reliable econometric model even if I had, it may be that using a rule of thumb such as "SAIF = 0.25 x BIF" would be no worse than any other approach. This 25 percent rule has held since 1998, a period which includes both boom and bust conditions. Such a simple rule is also consistent with recent regulations which require those institutions which hold BIF and SAIF funds to grow them at the same rate.

Of course, as a forecast, such a rule would imply that SAIF deposit growth would exactly equal BIF deposit growth in all but the first year if one starts from a point in time at which SAIF is not exactly 25 percent of BIF. It might be more satisfactory simply to assume equal growth rates in all years, regardless of the implication for the levels.

5. SAIF Insurable Deposits

The same reasons which make it difficult to forecast SAIF assessable deposits (i.e., short time series and unique S&L disruptions) make it difficult to translate them into insured deposits. Let μ_t^S be the ratio of SAIF insured to assessable deposits at time *t*. The available data are:

Table 20
FDIC Data: Ratio of SAIF Insured to Assessable Deposits

Year	SAIF Insured/Assessable
1989	93.1%
1990	94.9
1991	95.8
1992	95.9
1993	95.7
1994	96.1
1995	95.8
1996	96.4
1997	95.7
1998	94.4
1999	93.1
2000	91.7
2001	89.4

SAIF assessable deposits were contracting from 1990-1994 and again in 1996. This contraction corresponds to high and generally increasing insurance coverage ratios. Once SAIF assessable deposits begin increasing, the insurance coverage ratio falls.

These results suggest four strategies:

1) Use the sample average coverage ratio (94.4 percent) to translate assessable into insured SAIF deposits.

2) If the early sample was influenced by holdovers from the S&L debacle, use instead the most recent average coverage ratio (89.4 percent).

3) Try and relate these coverage ratios to deposit growth during this same period. That is, regress μ^S on growth in SAIF assessable deposits (*dsaif*) using FDIC data:

Table 21

Regression Results: μ^S on *saif*, 1989-2001

Variable	Coefficient	Standard Error	T-stat
Constant	0.944	0.007	139.796
dsaif	-0.003	0.001	-2.154

Durbin-Watson = 0.65, $\overline{R}^2$ = 0.49

Note that this is a regression with 12 data points.

Since the forecast of *dsaif* is going to be essentially the forecast of *dbif*, if I use the sample mean of *dbif* in the above equation, I come up with an average SAIF insurance coverage ratio of 92.7 percent, putting it midway between the first two strategies.

4) Accept different levels of insurance coverage between SAIF and BIF deposits but assume that whatever forces cause μ to rise/fall also cause μ^S to rise/fall, such that I can (linearly) use μ to forecast μ^S. This intuition is bolstered by the fact that over the 13 years for which there are overlapping data, μ and μ^S correlate at 0.87. Thus, regress μ^S on μ to obtain:

Table 22

Regression Results: μ^S on μ

Variable	Coefficient	Standard Error	T-stat
Constant	0.549	0.080	6.873
μ	0.532	0.108	4.935

Durbin-Watson = 0.53, $\overline{R}^2$ = 0.73

Using sample means of *m2*, *t3m*, and *t10y* in the model of μ implies that $\hat{\mu}$ = 0.73, and this in turn implies that $\hat{\mu}^S$ = 94.0 percent, close to the sample average of μ^S.

The differences which would result from using these options are probably well within the initial error of forecasting SAIF assessable deposits. Having said that, option four is somewhat satisfying. One may still make ad-hoc adjustments to the level of μ^S (by reducing the intercept), but this is no worse than any other ad-hoc approach one might take.

6. Conclusion

The model for BIF assessable deposit growth outperforms some simple, reasonable alternatives. The model may yet be refined further, but it remains the best performing out-of-sample forecasting model. While the model is subject to valid statistical criticism, I believe that the alternatives, such as IV estimation and corrections for cointegration, present other problems of greater practical concern. So long as the estimated relationship is used only for forecasting and not for counter-factual analysis, this recommended approach should be useful.

There has existed a strong linear relationship between BIF insured and assessable deposits ($\overline{R}^2$ = 0.92), and I am confident that this may be exploited going forward, given an insurance coverage ratio. To test the effects of changing insurance coverage, another approach would be required.

Data limitations restrict any acceptable econometric modeling for SAIF assessable deposit growth.

However, very recent history (1998-2001, inclusive) which has included very strong and very weak macro-economic conditions, indicates that the relationship between SAIF and BIF assessable deposits has been fairly stable at SAIF = 0.25 x BIF. This "rule of thumb," or the related rule of thumb that SAIF and BIF growth rates should be exactly equal going forward, is probably no worse than any other approach, and is consistent with some new regulations governing organizations operating both BIF and SAIF deposits.

It is also difficult to have confidence in any model relating SAIF insured and assessable deposits since the time series is short and arguably not representative of the true process. However, for the data that are available, the insurance ratio of BIF deposits is a good linear predictor of SAIF deposits (correlation 0.87), and a regression can give us at least a point of departure.

Figure 1

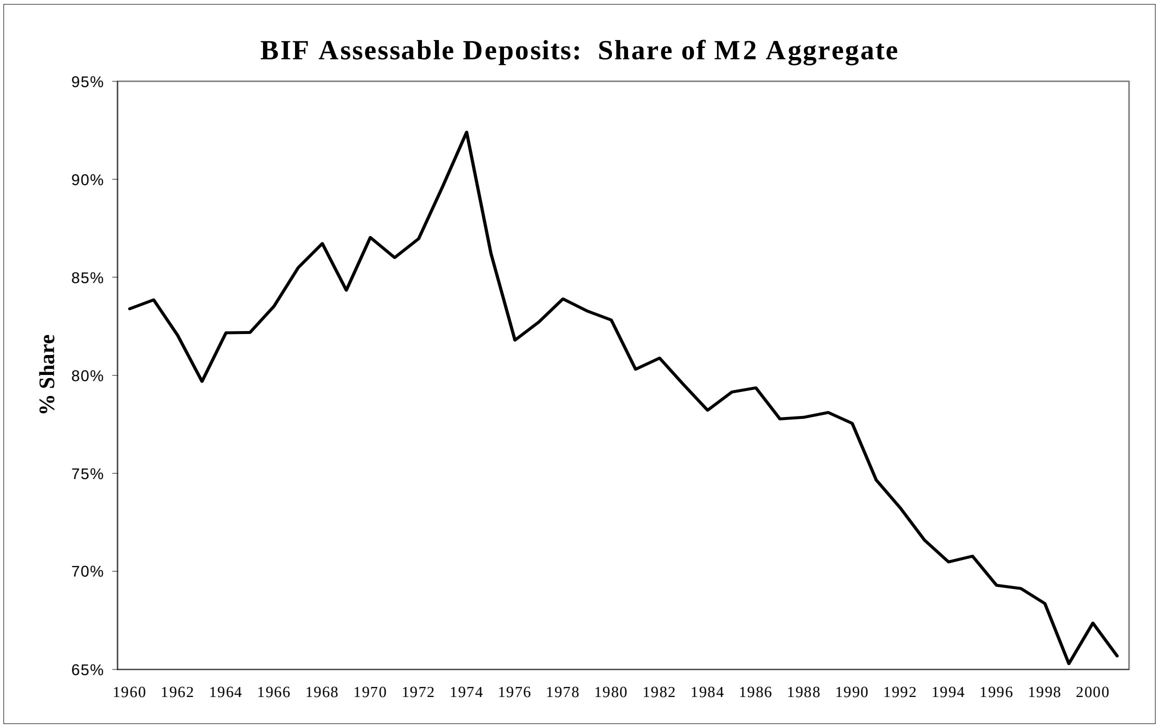


Figure 2

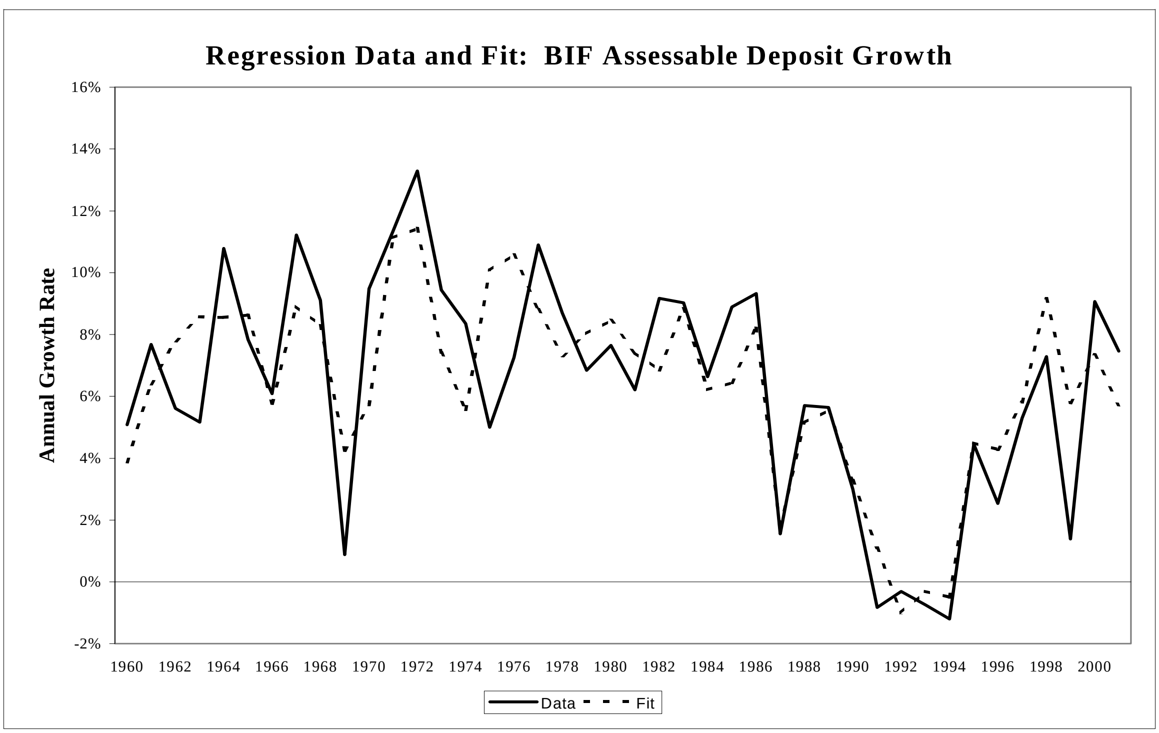


Figure 3

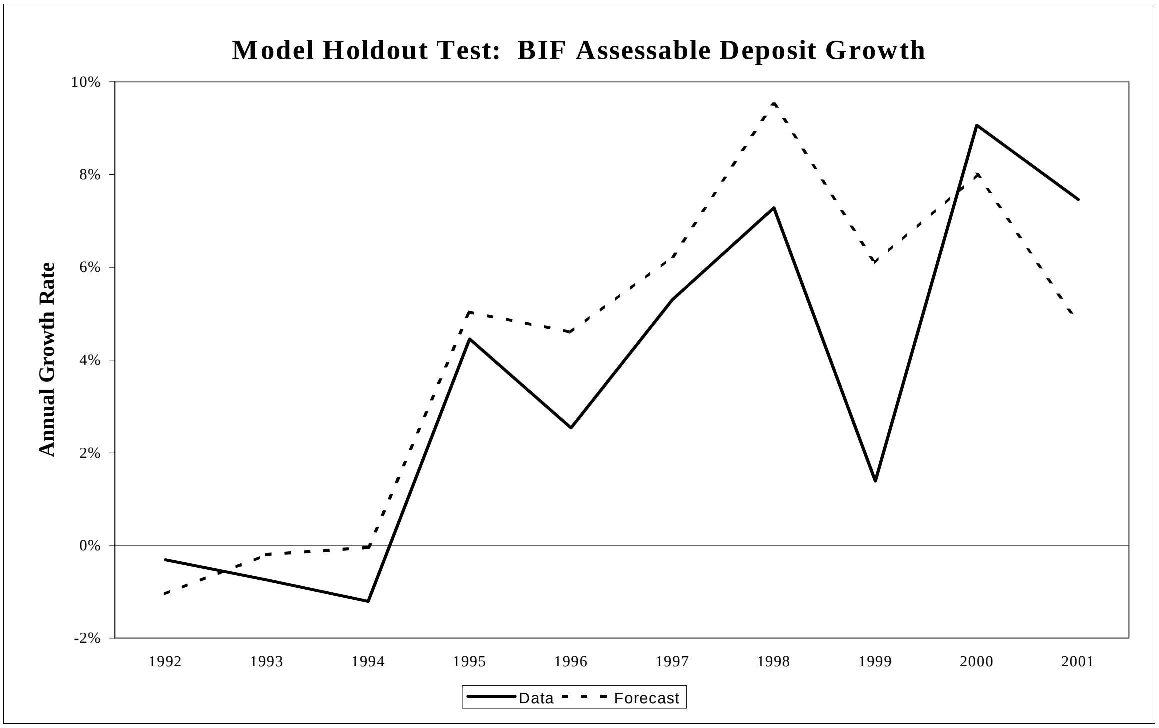


Figure 4

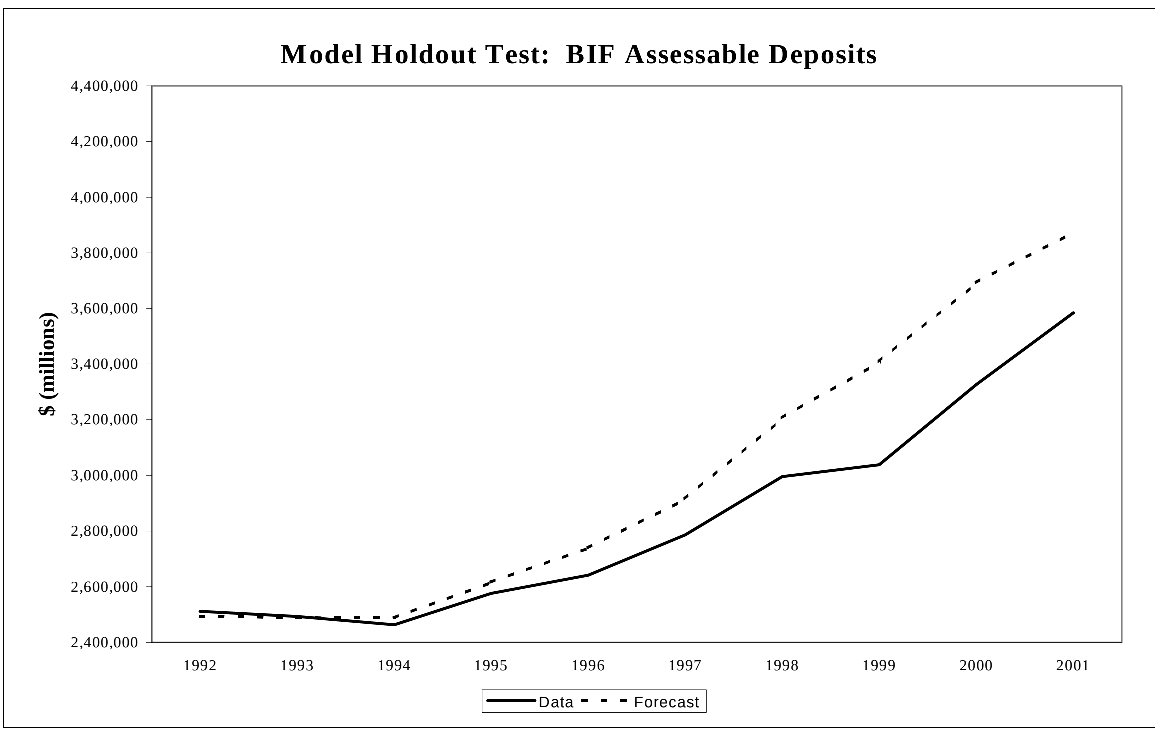


Figure 5

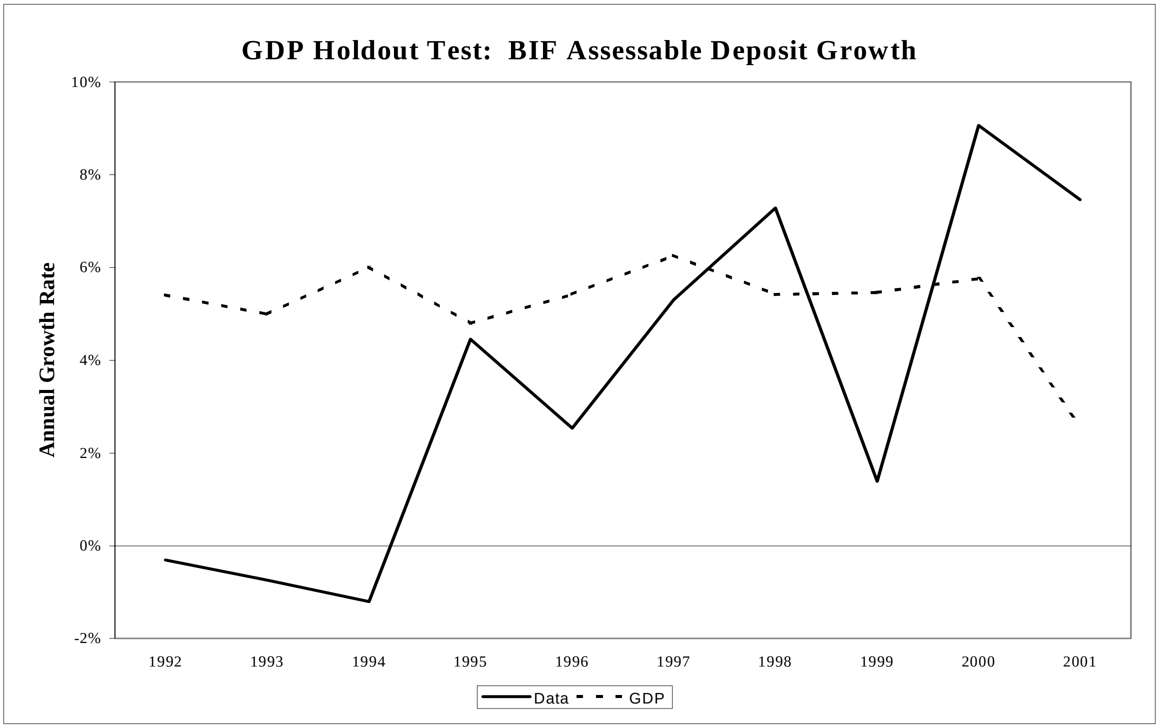
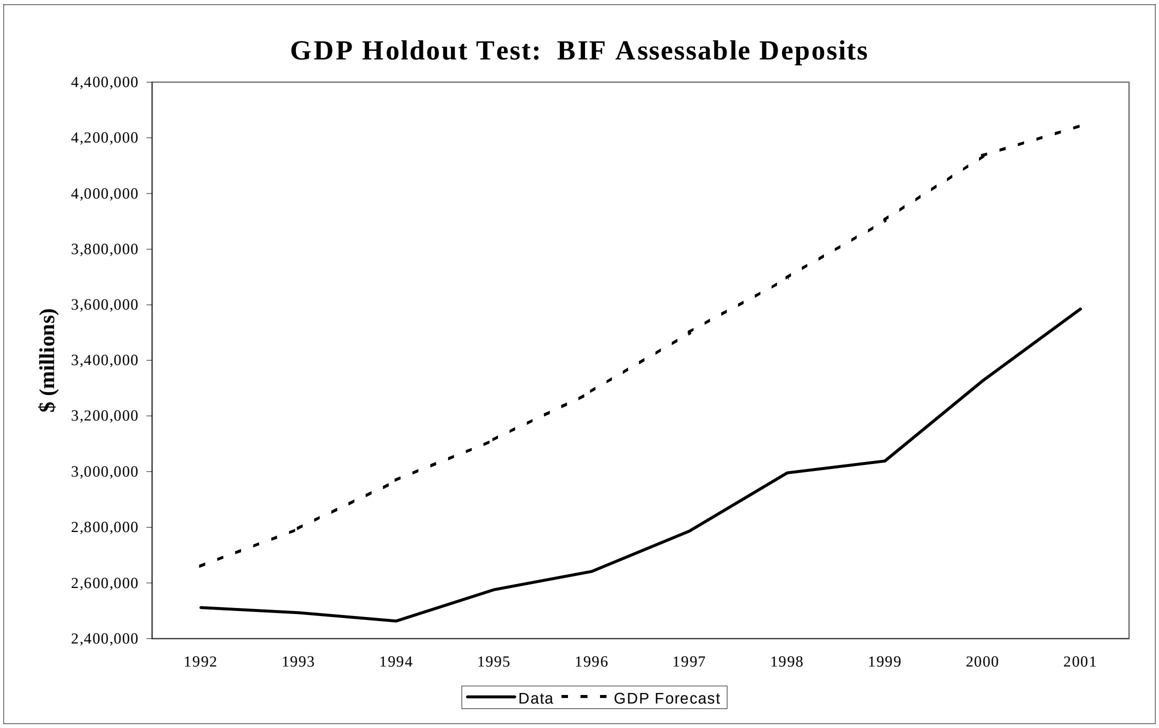


Figure 6



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