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The Thrift Industry and The Community Reinvestment Act:
Assessing The Cost of Social Responsibility

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Abstract: a stochastic frontier cost function indicates that the annual cost of complying with the anti-redlining Community Reinvestment Act (CRA) is \$171,000 per thrift institution, roughly 2.3 percent of variable costs. But compliance cost is significantly less than the estimated 21 percent cost inefficiency. Based on published estimates of the incremental number of mortgage loans induced by CRA, the marginal cost is \$38,000 per loan. The regulations whose compliance cost is estimated apply to about 80 percent of all U.S. banks.

JEL Codes: G28 (Government Policy and Regulation); G21 (Banks); M14 (Social Responsibility).

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Introduction

The Community Reinvestment Act (CRA) of 1977 came into effect in response to charges that mortgage lenders were systematically restricting the amount of credit available to low income neighborhoods (so-called “redlining”). It remains a landmark piece of social legislation, designed to require lending institutions to behave in a “socially responsible” manner. Banking institutions subject to the CRA undergo periodic examination in order to assess their compliance with the law’s stated objective of meeting the legitimate need for credit and deposit facilities within the geographic area where they conduct business, consistent with sound banking practices.¹ This paper estimates the compliance cost to thrift banks defined as “small” under CRA regulations (basically, assets less than \$250 million). About 80 percent of all types of banks subject to CRA fall into this size category [GAO (1995)]. The methodology employed is to fit a fixed effects panel stochastic frontier cost function to data related to 380 Savings and Loan Associations and Savings Banks located in Census defined metropolitan statistical areas, covering the period 1995 to 1998.² The technique permits disentangling CRA effects on cost from other confounding influences such as inefficiency and unmeasured and unmeasurable factors unique to each bank. It also permits us to determine if regulatory costs might be mitigated by greater efficiency.

Proponents of the Community Reinvestment Act claim that its purpose is to correct a form of market failure based on asymmetrical information. Lenders may consider low

¹ Only banks (commercial and thrifts) are subject to CRA. Mortgage Brokers and Credit Unions, for example, are not covered.

² Since 1999 the frequency of CRA audits is greatly reduced, thereby limiting the amount of useful data available for more recent years. The CRA ratings for each bank herein analyzed are assumed to remain the same during the period between bank audits. Thus the 1520 observations (380 banks over four years) cover 684 audits. In addition, starting January 1, 1999 most federal payments (e.g. monthly Social Security payments) were to be made via electronic transfer rather than with paper checks. It is estimated that as many as 10 million people did not have bank accounts and thus be able to receive electronic deposits. This sudden upsurge in bank activity would complicate estimation of CRA compliance costs in 1999.

income/minority borrowers as posing a greater risk of nonpayment and therefore engage in statistical discrimination, based on this perception. Charging higher fees and interest rates to low income or minority borrowers is considered infeasible because of fear of claims of racial or class bias. So banks simply limit lending to this entire class of persons, it is claimed. CRA proponents believe that among the groups denied credit are many who are actually creditworthy, if only the banks would more carefully evaluate their applications and credit history.

The principal object of CRA-related research during the twenty-five years since its enactment has been to try and assess its impact on the flow of credit to low income/minority neighborhoods, and to test for the existence of redlining itself. Holmes and Horvitz (1994), for example, examined census tract data in Houston and concluded that “...the data provide no evidence of racially based redlining in this period [1990-91]” (p. 89). And Phillips-Patrick, Malmquist and Rossi (1997) also found a lack of evidence in support of the hypothesis that lenders engage in discrimination. On the other hand, a study by the Boston Federal Reserve Bank found patterns of racial discrimination in the rejection rates of home mortgage loans (Munnell, et.al., 1996). The Harvard based Joint Center for Housing (2002) estimates that CRA has increased the flow of mortgage credit to lower income borrowers or neighborhoods by about 7 percent, compared to predicted lending patterns absent CRA (p.58). However, no effort was made to quantify the social costs or benefits of these CRA effects.³

The social costs of CRA consist of borrowers’ and lenders’ compliance costs, plus any foregone returns on investments *not* undertaken if capital is diverted from higher yielding

³ The Harvard study employed a linear probability model to estimate the effect of CRA on the proportion of conventional home mortgage loans made to CRA-eligible borrowers. The comparison group was non-CRA regulated lenders (e.g. credit unions and non-bank mortgage companies) and lending within and without the CRA assessment area (i.e. low income/minority neighborhood). A variety of control variables such as income, house prices, unemployment rates, racial composition were used. The period analyzed was 1993-2000. Basically, the Harvard study concluded that CRA increased the proportion of low income-minority loans from 30.3 percent to 32.4 percent of conventional loans (not government insured), a 7 percent rise (op. cit., p. 135). The effect diminished over time from 3.7 (1993) percentage points to 1.6 percentage points (2000), mostly due to the growth of non-CRA lenders.

investments to CRA-eligible projects. Social benefits include the private and social net return on additional housing investments in low income areas. CRA advocates claim that the shortage of mortgage funds in poor neighborhoods causes negative externalities in the form of under maintenance of housing, crime, bad schools, etc. If compliance costs prove to be negligible, the efficiency case for CRA is enhanced.⁴ Former Wisconsin Senator William Proxmire, who sponsored the original 1977 Community Reinvestment Act, considered its cost to banks as a trade-off against other government activities that benefit them, such as deposit insurance [Thomas, (2002), p. 3]. This view implicitly assumes that the cost of compliance reduces banks' profits, rather than increasing the prices of banking services. This is a testable hypothesis.

Corporate Social Responsibility

The idea that managers of firms should seek to achieve goals beyond maximizing shareholder wealth has come to be known as the theory of Corporate Social Responsibility (CSR) [McWilliams and Siegel (2001)]. CSR is defined as taking *voluntary* actions designed to further some social agenda, *beyond what is required by law*. This implies that there is a demand (willingness to pay) for socially responsible firm behavior, which optimizing managers should treat like any other resource allocation decision: invest in CSR until its marginal cost equals marginal revenue. An example might involve use of organic ingredients by a food producer. In equilibrium, profits rates should be equalized across firms observed to undertake varying degrees of investment in CSR. The Community Reinvestment Act thus appears to fall outside this definition of CSR since it involves a degree of legal compulsion. However, banks are free to determine the extent to which they promote the goals of CRA, and thus the grade assigned them by regulators. And CRA advocates deem its major enforcement mechanism to be adverse

⁴ However, it should also be pointed out that CRA may operate as a form of in-kind redistribution of income, away from non-CRA bank depositors, shareholders and borrowers towards low income persons. In this case, any net social inefficiency must be viewed as a type of excess burden or “leaky bucket” in transferring income.

publicity, since CRA ratings are made public, whereas the legal penalty for noncompliance is the possibility of delays or denial of branching or merger applications.

There are several strands of the CSR literature that are relevant to the analysis of the thrift industry and the CRA. Traditionally, minority and community groups have been the staunchest advocates of CRA. Considering all consumers, CRA is something of a zero-sum activity because the goal of CRA is to divert mortgage loans and other types of financial credit from one class of borrower to another. So while low income/minority borrowers may view CRA favorably, other potential borrowers may view themselves as being negatively impacted, unless there is a element of benevolence (Hochman and Nitzan (1985)]. This tradeoff may account for the fact that legislation was judged necessary to prod the banking industry to behave responsibly.

McWilliams and Siegel (*op. cit.*) note that so-called search goods, whose attributes can be identified prior to purchase, are less likely to be associated with a willingness to pay for socially responsible behavior because the reputation of a firm as fair-dealing and reliable is less important than for experience goods which must actually be consumed to be evaluated accurately (e.g., a restaurant meal or medical care) . Thus the value of CSR as a positive indicator to potential customers is less for search goods than experience goods. Home mortgage lending would appear to be a search good since the consumer is not faced with unobserved quality differences (a dollar is a dollar when borrowed), and the terms and conditions of the loan are relatively transparent due to consumer protection laws. It turns out that fully eighty percent of banks receive only a Satisfactory rating, the minimal passing grade, which suggests a desire to avoid negative publicity but little incentive to go beyond.

Bank Compliance Costs

The structure of the Community Reinvestment Act reveals it to be the product of the era in which it was enacted. CRA focuses on the geographic pattern of lending by depository institutions. Historically, home mortgage lending was predominantly the function of the home town thrift industry, which took in deposits and made mortgage loans and investments in local

markets.⁵ The growth of national credit markets and the development of credit analysis software may mean that the original sources of potential market failure have been diminished: banks can now cheaply process credit histories and riskier loans can be sold off to intermediaries to limit exposure.

CRA requires banks subject to its provisions to define a geographic assessment area, which is basically the territory within which the bank has its offices or automated teller machines, plus surrounding areas where it engages in a substantial amount of lending. Within this assessment area, the bank's pattern of lending, investment and community development activities are supposed to be consistent with the goals of CRA. Each bank is examined by the federal banking regulatory agency under whose jurisdiction it falls.⁶ In order to satisfy the mandates of the CRA, banks must maintain records, engage in community outreach and service, and make loans and investments that may be marginally profitable or even unprofitable. Since the regulatory changes which took effect in 1995, banks with assets under \$250 million or part of a holding company with \$1 billion or less in assets are subject to a "Small Bank" audit, while banks with larger amounts of deposits fall under a "Large Bank" set of criteria for CRA compliance. Basically, small banks are examined as to the pattern of loans to low income and small business borrowers in their assessment areas.⁷ The audit team examines the bank's

⁵ Although the term "bank" is technically reserved for commercial banks while the label "thrifts" is used to describe Savings and Loan Associations and Savings Banks, we use the terms interchangeably, since nonspecialists tend to regard them all as banks.

⁶ The four agencies are the Federal Reserve Bank, The Office of Thrift Supervision, The Comptroller of the Currency and the Federal Deposit Insurance Corporation. The frequency of examination has changed over the years, becoming less frequent. Banks rated Satisfactory (80 percent of the total) are now audited every four years, Outstanding banks every five years, and the rest on an as needed basis.

⁷ The vast majority of small banks elect the new "streamlined" examination, the core of which is based on four criteria, with optional service and investment tests to upgrade a Satisfactory rating to an Outstanding. The four criteria are the loans-to-deposits ratio, activity inside versus outside the bank's geographic assessment area, heterogeneity of the bank's borrowers, and the geographic dispersion of its lending. The latter most directly influences the assessment about redlining. A small bank could instead elect to be evaluated based on a Strategic Plan, developed

records and assigns one of the following four grades [Dallas FRB (1999)]:

- 1 = Outstanding record of meeting community credit needs.
- 2 = Satisfactory record of meeting community credit needs.
- 3 = Needs to improve record of meeting community credit needs.
- 4 = Substantial noncompliance in meeting community credit needs.

Apart from adverse publicity, possible delays or denial of proposed banking mergers is the other consequence of a poor CRA rating since regulators are supposed to consider CRA performance when evaluating bank mergers.⁸ Thomas [(2002), p. 9] points out that only 31 out of more than 100,000 branch or merger applications have been denied due to the CRA during the period 1977-1996. Most observers view the 1995 revisions (and the further changes in 1999 under the Gramm-Leach-Bliley Act) as reducing the regulatory burden on banks. For example, banks now receive credit for loans made to lower income persons in higher income areas –a lending category that has accounted for two-thirds of the growth in CRA eligible home mortgage lending between 1995 - 2000. [Joint Center for Housing , *op. cit.*, pp. 22-23].

During the 1990s there was rapid growth in mortgage lending to low income and minority persons. But much of this growth has been funded by non-CRA institutions, such as non-depository mortgage banking operations, finance companies and credit unions, often lending at sub prime (i.e., higher) interest rates. Such growth poses a potential problem for traditional deposit-based CRA lenders because non-traditional lenders may be skimming off the best risks and leaving CRA regulated institutions with a less attractive pool of potential borrowers. By

with community input, to satisfy the goals of the CRA. If it fails to meet its planned goals, an “Alternative” test is available. It is estimated that the streamlined report for small banks covers 81 percent of all banks in the U.S., but only 14 percent of bank assets [GAO (1995), p. 39].

⁸ Large Banks are subject to a more structured evaluation, with points being assigned to three areas of activity: lending, investments and service, with lending given the greatest weight (50%). Composite scores range from 0 to 24 points, which map into the four ratings listed above. For example, a total point score of 20 points or more constitutes an Outstanding rating, whereas a total of 0 to 4 yields a grade of Unsatisfactory.

1997, the thrift industry which is the subject of this paper originated only 18 percent of home mortgage loans (1 to 4 family dwellings), while non-traditional lenders originated 56 percent (*ibid.*, p. 13).

Each regulated lender sets up its own internal system to address, staff and monitor compliance activities. The Joint Center report (p.108) notes that CRA related activities and deals are more resource intensive: “In sum, the amount of energy devoted to structuring, staffing, and tracking CRA performance leaves little doubt about the fact that lenders expend resources in adapting to the regulatory environment.” Reduced lending rates and fees to target borrowers is a possible, but less likely, compliance strategy. More probable are increases in marketing and outreach efforts, relaxed borrowing standards (e.g. loan to value ratio, credit history), accompanied by more careful (and expensive) monitoring-- while charging the same prices. CRA advocates like Thomas claim that, “A final CRA legend is that compliance with the law is very costly. While this may have been true in the early 90s, the situation greatly improved for most banks with the law’s 1995 reform” (*op.cit.*, p. 9).

The Independent Community Bankers of America (2002), an industry trade group, surveyed 276 of its members and concluded that average *personnel costs* related to CRA compliance activity is \$85,000 per year for banks subject to the small bank test and \$115,000 for Large Banks. Apart from the limitations of a survey (e.g. non response bias), no effort was made to measure non-labor costs such as office space, computer time or foregone lending and investment opportunities. And the bankers’ study ignores the degree of bank compliance with CRA, i.e., what does it cost to earn an Outstanding grade as compared to a Satisfactory grade?

The Econometric Model

Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977) are widely credited with seminal contributions to the now well-established field of stochastic frontier regression [Kumbhakar and Lovell (2000)]. The method is remarkable for its ingenuity and simplicity:

$$\ln VC = \ln VC(Y, w, K; \beta) + v + u \quad (1).$$

A two-part error term is appended to a conventional cost (production, or profit) regression model, with v the usual random error term and u the inefficiency parameter to be estimated. VC is variable cost (\ln = natural log), Y is an output vector, w an input price vector, K is the fixed input, and β is a parameter vector to be estimated.⁹ If firms are cost minimizers, any observed departures from least cost will be purely random “mistakes” that on average cancel each other across firms. But if firms systematically fail to minimize costs, the composed error term $e = v + u$ will not be normally distributed with zero mean, it will be asymmetrically skewed because the “mistakes” will not cancel each other.¹⁰ Cost inefficiency occurs when firms or decision making units use more inputs than necessary to produce a given output or use inputs in the wrong proportions, thus firms may operate above the relevant production isoquant or at the wrong position on the isoquant. Econometric estimation involves maximum likelihood estimation of model parameters and decomposing the resulting error term into the noise and inefficiency components [Econometric Software, Inc (2002)].

The stochastic frontier model is closed by assuming a frequency distribution of the u inefficiency parameter. The earliest formulation (and still the most common) assumes u is a half-normal distribution, thus employing a highly tractable and well-understood probability distribution for both parts of the error term. An attractive feature of the stochastic frontier model is that the estimated inefficiency is firm-specific, not merely an overall average. This allows the researcher to identify good and bad performers and perhaps identify the causes of their superior

⁹ A cost rather than a production frontier is most suitable for estimating compliance cost, and it easily accommodates multiple outputs and permits derivation of the shadow rate of return on the fixed input. Because numerous papers analyzing bank efficiency have appeared in the literature, we do not focus on the decomposition of efficiency [see the special issue of the *Journal of Banking and Finance* (April, 1993)].

¹⁰ A natural test of the appropriateness of the frontier model is that the composed error term be properly skewed. This is automatically done by the Limdep 8.0 software before estimation proceeds.

or inferior outcomes.¹¹ Among the reasons for estimating compliance cost with a frontier model is that it allows judging the extent to which better management might reduce or offset the social cost of CRA

A recent extension of the stochastic frontier model is to include panel data formulations, which allows for a richer array of results:

$$\ln VC_{it} = \ln VC(Y_{it}, w_{it}, K_{it}; \beta_i) + v_{it} + u_{it} \quad (2),$$

where the subscript t denotes time and i denotes the ith firm. As before, $VC(\bullet)$ represents the deterministic (least cost) kernel of the cost function, v is the normally distributed random error and $u \geq 0$ is the inefficiency parameter.

A significant advantage of the variable cost formulation is that it allows us to infer the shadow price S of the fixed input equity capital, thus permitting evaluation of the impact of CRA on profits:

$$S_i = - \partial VC_i / \partial K_i \bullet (\exp - u_i) \quad (3),$$

where S_i is the bank specific shadow price of the fixed capital input, adjusted for estimated inefficiency (Kumbhakar and Lovell, *op. cit.*, p. 145).¹²

Data

The Office of Thrift Supervision compiles comprehensive income and balance sheet

¹¹ It has been common practice to employ a two stage approach to efficiency analysis, with the first step using a stochastic frontier and a second step taking the resulting estimated inefficiencies as the dependent variable in a second step OLS or tobit regression designed to “explain” the inefficiency. Strictly speaking, this violates the assumption that omitted (from the frontier) variables are uncorrelated with included variables. Vitaliano (2002) used a second frontier to further analyze inefficiency to overcome this objection. A unified one-step approach is possible, but it requires one to assume that economic agents are guilty of only proportional overuse of inputs, i.e., that they employ inputs in appropriate relative proportions.

¹² Short run total cost is the sum of variable cost plus fixed costs: $STC = VC + \rho K$, where ρ is the market rental price of capital (K). The fixed input is at its long-run least cost amount only if the cost reduction it generates (the shadow price) equals the market rental rate ρ : $\partial STC / \partial K = \partial VC / \partial K + \rho = 0$ or, $-\partial VC / \partial K = \rho$. If $-\partial VC / \partial K < \rho$, capital is over utilized, and vice versa. All of this follows from the envelope theorem which assumes that the firm minimizes short and long-run costs, hence the need to adjust variable cost for the estimated u_i inefficiency prior to making this comparison. The predicted sign of the fixed input coefficient is negative.

statistics for Savings and Loans and Savings Banks subject to its jurisdiction.¹³ From this file, we have selected 1520 observations on 380 banks subject to the small bank CRA audit covering the years 1995-98; all are thrifts operating in metropolitan statistical areas (MSAs) for which complete data was available and for which there are no zero entries (since variables will be in natural log form for econometric estimation).¹⁴ These years are selected because 1995 represents the first major change in CRA regulations since 1977. Focusing on just the thrift industry avoids complications due to the fact that four different federal regulatory agencies conduct CRA examinations. Moreover, small firms may bear a relatively heavy regulatory burden because many of the costs of complying with government regulations are fixed. It is for this reason that the small thrifts are subject to a “streamlined” CRA examination. A common complaint is that a good deal of subjectivity exists in the examination and grading process. The bank specific intercepts of the panel data model are intended to allow for this heterogeneity.

Thrift banks are conceptualized as using deposits, equity capital, physical capital (bank premises and equipment) and labor as inputs to produce the financial product outputs loans and investments. We consider two broad loan categories: mortgage loans and non-mortgage loans. Investments consist of financial instruments such as government bonds.¹⁵ The implied production function maps into a variable cost function, where the variables are defined as follows (with subscripts suppressed):

$$\ln VC = \ln VC(Y, w, K, X; \beta) + v + u \quad (4).$$

¹³ Dr David Malmquist of the Office of Thrift Supervision (OTS) kindly provided the main data set used in this study. OTS supervises approximately 1100 thrift institutions. Of these, 840 had complete (nonzero) data for all four years, and 527 of those are located in MSAs. Our data consists of the 380 of the 527 thrifts subject to the small bank CRA regulations.

¹⁴ The original data is reported on a quarterly basis, but to avoid seasonality issues we have converted them to annual amounts by summing or averaging over each year. Moreover, the CRA ratings are not more frequent than once a year, so quarterly data adds nothing.

¹⁵ Investments consist of deposits at other institutions, investment securities and mortgage pool securities.

VC = interest expense + non interest expense.

Y = three outputs: mortgage loans, non mortgage loans, investments (dollar amounts).

w = three input prices: deposit interest rate, average labor cost, cost of premises.¹⁶

K = bank financial equity capital, the fixed input.

X = ownership type (stock vs mutual) and CRA ratings.

β = parameter vector to be estimated.

Analysis of Small Bank Efficiency and Compliance Costs.

In this part of the paper we present a fixed effects stochastic frontier Cobb-Douglas variable cost function, with the assumption that the inefficiency parameter u_{it} is half normally distributed.¹⁷ A fixed effects frontier model using other distributions of u is presently not available.

A Lagrange Multiplier test rejects the hypothesis of a single overall constant term (a classical regression model with pooled data) versus firm-specific individual effects; and the Hausman specification test favors a fixed effects over a random effects model [Greene (2000), p. 577].¹⁸ Generally, a fixed effects model views the differences across firms as parametric shifts

¹⁶ The deposit rate is total deposit interest paid divided by total deposits; average labor costs is total employee compensation divided by full time equivalent number of employees, and cost of bank premises is office expenses divided by the value of physical capital.

¹⁷ A translog variable cost function was also tried, but its higher order and cross product terms were typically insignificant or improperly signed, and we found that the likelihood function was unstable, possibly due to the more complex formulation of a fixed effects panel or the multicollinearity to which a single equation translog is prone.. According to Kumbhakar and Lovell (*op. cit.*) the single equation translog is rarely successful in a frontier setting, and the so-called “Greene Problem” of formulating and estimating a translog cost system that satisfactorily incorporates statistical noise remains unsolved (p. 162).

¹⁸ The Lagrange Multiplier test statistic of the null of a single overall intercept is 40.58 vs a critical value of 3.84 (.95, 1 d.f.); and the Hausman test statistic for the absence of correlation between the individual firm effects and the other regressors is 71.01 vs a 27.58 critical value (.95, 17 d.f.). The null is rejected in both instances, thus indicating that there are firm-specific effects that are correlated with the other regressors and thus a fixed effects panel is the preferred specification.

in the intercept term. A random effects model takes these firm specific effects as a random variable to be estimated, as for example when a sample of firms is used to analyze the entire population of firms, but it assumes these effects are uncorrelated with the other explanatory variables (the purpose of the Hausman test is to examine this assumption).

Three observations (two thrifts) in the data set are rated as Non Compliant (Rating = 4), so they are grouped together with the Needs to Improve category (Rating = 3). We select 1995 Old Test Satisfactory (205 observations) as the default category and use a set of indicator (dummy) variables to identify the year and CRA rating. Our first data year (1995) was a transition period, with some banks examined under the old set of CRA regulations, basically 12 assessment factors, and some under the new streamlined procedure. Table 1 shows the pattern of CRA ratings.¹⁹ These nine indicator variables capture the change in regulations, the time profile of CRA

ratings as well as the incremental cost of achieving an Outstanding rating versus a Satisfactory.

Table 1
Distribution of Thrift Banks by CRA Rating
(N = 1520)

Rating	1995	1996	1997	1998
Outstanding	75	69	67	65
Satisfactory	292†	298	306	304
Needs to Improve	13	13	7	11
Noncompliant	0	0	0	0
	380	380	380	380

†(205 of these are Old Test, the default category)

Contrary to *a priori* reasoning, estimation of the full panel results in large and positive coefficients on the dummy variables for the worst rating (Needs to Improve + Noncompliant), relative to a Satisfactory, averaging about a 20 percent cost increase. And the estimated overall compliance cost is almost 7 percent of variable cost. Omitting these 44 observations (3 percent) and instead estimating an unbalanced fixed effects frontier with 1476 observations yields almost

¹⁹ All examinations under the new regulatory regime actually occurred after January 1, 1996. If these audits were performed on 1995 operations they are here classified as 1995 New Test, in contrast to those banks examined in 1995 on 1995 operations, under the old test regime. Each year's rating is the most recent prior rating if that bank was not actually examined in that year.

identical coefficients on all the remaining variables and the same degree of inefficiency, but with significantly lower estimated compliance cost (about 4 percent). Only one bank is omitted. Table 2 presents this (our preferred) result.²⁰ The omitted thrifts are discussed later in the paper.

The coefficients on the three outputs, mortgage loans, non mortgage loans and investments are highly significant and sum to 1.05. All the other coefficients are statistically significant and of plausible sign and magnitude. Having estimated a variable cost function, the following expression is used to determine returns to scale (RTS) [Braeutigam and Daughety (1983)]:

$$RTS = \{1 - \partial \ln VC / \partial \ln K\} / \{\sum \partial \ln VC / \partial \ln Y\} = \{1 + 0.099\} / 1.05 = 1.047 \quad (5),$$

where K is the fixed input equity capital and Y denotes the three outputs. Thus there are mildly increasing returns to scale, a result similar to Mester (1993).²¹

The mean of the u inefficiency parameter is 0.191, which implies 21 percent cost inefficiency, also similar to Mester.²² One potential implication of this inefficiency is that the thrift industry could readily incur additional costs to satisfy CRA and CSR without impairing profitability or raising prices if managers were somehow able to operate in the most cost efficient manner.

²⁰ The dependent variable is total variable cost, normalized by the price of deposits (average deposit interest rate), in order to impose linear homogeneity, a theoretical requirement of a well-behaved cost function. Linear homogeneity means that if all input prices double, total costs must also double, holding output constant. Both input prices are also normalized by dividing by the price of deposits. Equity capital is the fixed input. The percentage of loans in default (no longer accruing interest) is a measure of the riskiness of the bank's portfolio, and an indicator variable is used to denote whether or not the bank issued stock versus being organized as a mutual institution. There are 658 stock bank observations and 862 mutual bank observations.

²¹ The standard error of the RTS parameter is 0.0064 and the hypothesis of constant returns to scale (RTS = 1) is easily rejected.

²² Since observed VC = minVC e^{.193} = minVC • 1.213, actual costs are 21.3 percent above least cost. Mester (1993) estimated a cross-section long-run translog cost frontier for Savings and Loans using 1991 data. Although a likelihood ratio test gave preference to the translog over the Cobb-Douglas, there were no important differences in the results she reported between the two specifications.

Contrary to agency theory, however, investor owned banks have higher costs. This may reflect unmeasured differences in quality (e.g. less waiting time to be served, more deluxe facilities, etc).

The shadow rate of return on each bank's equity capital may be estimated using the coefficient (or elasticity) of equity capital and adjusting observed variable cost for the estimated inefficiency:

$$S = -\partial VC / \partial K = -\beta_K (VC \cdot e^{-u}) / K \quad (6).$$

The resulting four year mean shadow rate of return on bank equity is 0.061, with a range of 0.0135 to 0.27. Fully 90 percent of the 1476 estimated profit rates are below 0.10. These profit rates are broadly consistent with aggregate rates of return on equity for thrifts with less than \$250 million assets during this period, as reported on the OTS website (2001 Fact Book). In its survey of the profitability of CRA lending, the Federal Reserve (2000) suppressed actual rates of return because of data inconsistencies, so we cannot compare those numbers with the ones generated in this paper.

Table 2
Fixed Effects Stochastic Frontier Cost Function

<i>Explanatory Variable</i>	<i>Coefficient</i>	<i>t-ratio</i>	<i>Mean Value</i>
ln(Mortgage Loans)	0.7243	113.65	\$67,791,000
ln(Non Mortgage Loans)	0.0849	40.36	\$5,846,000
ln(Investments)	0.2411	66.90	\$28,325,000
ln(Average Wage)	0.1638	20.69	\$42,520
ln(Premises Cost)	0.0099	3.14	1.92%
ln(Bank Equity)	-0.0990	-14.63	\$8,103,000
Percent Loans Defaulted	0.0035	15.63	5.58%
Investor Owned Bank	0.0620	11.07	43%
1995 Outstanding (Old Test)	0.0769	7.21	(51 Observations)
1995 Outstanding (New Test)	0.0570	3.29	(24 Observations)
1995 Satisfactory (Old Test)	default		(205 Observations)
1995 Satisfactory (New Test)	0.0343	3.65	(88 Observations)
1996 Outstanding	0.1077	8.55	(69 Observations)
1996 Satisfactory	0.0749	9.68	(298 Observations)
1997 Outstanding	0.0414	3.53	(67 Observations)
1997 Satisfactory	-0.0250	-3.10	(306 Observations)
1998 Outstanding	0.0403	3.67	(65 Observations)
1998 Satisfactory	-0.0149	-1.96	(304 Observations)

log-likelihood : 636.8. $\sigma = 0.434$ ($t = 116.67$); $\lambda = 5.06$ ($t = 19.2$); Mean $u = 0.191$.

Sigma is the variance parameter: $\sigma = (\sigma_u^2 + \sigma_v^2)^{1/2}$; Lambda is the asymmetry (skewness)

parameter: $\lambda = \sigma_u / \sigma_v$, and $\sigma_u = .42596$, $\sigma_v = .08411$. Number of groups (thrifts) = 379.

Following Suits (1984), the interpretation of a large number of dummy variables is facilitated by means of a simple re-centering transformation. Let $k = -(\beta_1 + \beta_2 + \beta_3 + \dots + \beta_9 + 0)/10$, where the betas are the coefficients on the dummy variables in Table 2. Adding k to each estimated dummy coefficient (including the omitted or default variable) and subtracting k from

the constant term preserves the statistical properties of the model. The standard errors of the transformed coefficients are readily determined since they are linear combinations of the original coefficients. By construction, the mean of the transformed dummy variable coefficients is zero, with each coefficient now measuring the effect relative to the overall mean rather than the (arbitrarily chosen) default. Using the Table 2 results, we find $k = -0.039$ ($t = 6.56$).

Subtracting this value from the firm specific constant term shifts up the cost function by .039. This is also the average cost of CRA compliance since it is the combined effect on cost of all the CRA dummies (Suits, *op.cit.*, p 178). It is also possible to dis-aggregate that average into the cost of a Satisfactory rating (1200 observations) and the 276 Outstanding ratings. First, we find that the mean of the differences in the five pairs of dummy variable coefficients for an Outstanding and a Satisfactory rating in Table 2 is 0.051 ($t = 8.18$), which is the incremental cost of an Outstanding rating. Given the overall mean compliance cost of .039, the mean cost of a Satisfactory rating is .0135 and the mean cost of an Outstanding is $.0135 + .051 = .0645$.²³

The (observed) four year mean variable cost of the 1200 Satisfactory thrifts is \$7 million, so these thrifts incurred annual CRA compliance cost of approximately \$95,000 per year. For the remaining 276 Outstanding thrifts, mean variable cost is \$7.64 million and their annual compliance cost is a whopping \$493,000 per year. The weighted average cost per thrift is about \$171,000 per year, or 2.3 percent.

If each thrift's actual variable cost is adjusted downward by its estimated amount of cost inefficiency, mean compliance cost for Satisfactory thrifts is \$77,000 and the cost of being Outstanding is reduced to \$408,000. One way to view the inefficiency estimates is to note that if thrifts were fully cost efficient, variable cost would fall by significantly more than the estimated CRA compliance cost. For Satisfactory thrifts, mean cost would fall from \$7 million to \$5.7

²³ Let X = the compliance cost for a Satisfactory rating. $[(X + .051) + X]/2 = .039$, $X = .0135$ and $X + .051 = .0645$, where $X + .051$ is the total cost of an Outstanding rating. Given the logarithmic specification, the precise percentage change in cost is $e^{.0135} - 1 = .014$ for a Satisfactory, .066 for an Outstanding. .

million, and for Outstanding thrifts cost would decline from \$7.64 million to \$6.32 million. In this case the weighted average cost of compliance is \$140,000 per year.

The Incremental Cost of CRA Regulations.

Having estimated the cost to the small thrift industry of complying with the Community Reinvestment Act, it is natural to ask how these costs compare with the estimated benefits. The Joint Center for Housing (*op cit.*) undertook a comprehensive study of the impact of CRA on home mortgage lending, which is the core of its *raison d'être*. The authors conclude that 42,000 home purchase loans were shifted to CRA-eligible borrowers from Non-CRA borrowers in the year 2000, about a 7 percent shift (*op. cit.*, Exhibit 21).²⁴ Since the entire thrift industry accounts for 41 percent of CRA-regulated lending (p. 13), about 17,000 of these shifted loans may be credited to it. And the 380 thrifts examined here accounted for about 10 percent of 1-4 family mortgage lending by all thrifts in 1998, so 1700 additional home loans are deemed to be made by our 380 thrifts due to CRA, or 4.5 extra loans per institution.²⁵ This implies a marginal cost of \$38,000 per extra loan; but if costs were minimized the marginal cost is about \$31,000.²⁶

An alternate interpretation of the results, more in keeping with the Corporate Social Responsibility literature, would maintain that the relevant compliance cost is the \$95,000 baseline cost of achieving a Satisfactory CRA rating, because the one-fifth of thrifts incurring the huge incremental cost of an Outstanding did so voluntarily, which implies they anticipate benefits to themselves of at least that amount. Thus CRA really “requires” at least the

²⁴ The Joint Center conceptual framework dovetails nicely with the methodology employed in this paper because it holds constant the total volume of mortgage loans, and assumes that CRA shifts the composition of the mortgage portfolio. This is equivalent to holding output constant in the cost function, thereby capturing the CRA effect with the regulatory dummy variables.

²⁵ The assumption that CRA lending is proportional to total 1-4 family mortgage lending is based on the Federal Reserve (2000, Table 1).

²⁶ This overestimates the number of loans (and thus underestimates the incremental cost) because our sample does not include all “small” thrifts; some institutions were deleted for having incomplete or zero entries, and state-regulated small thrifts are not part of the OTS database.

achievement of a Satisfactory. In this situation, marginal compliance cost is still a hefty \$21,000 per loan (\$17,000 under full efficiency). This understates the cost because all 1700 of the estimated incremental CRA loans are credited to the Satisfactory rating category whereas some are certainly attributable to the Outstanding rating, but there is no data that permits us to make the separation.

Although only a handful of institutions fall into the category Needs to Improve and Non Compliant, the lowest rating, they incur the highest compliance cost, by far. One possible explanation is that these banks operate in a harsh environment with few opportunities to comply with CRA. Alternately, if very steep CRA compliance costs are part of a general picture of a distressed institution, the results are consistent with Gunther (1999) who found evidence that a poor safety and soundness rating typically *precedes* a CRA downgrade, possibly due to efforts of the institution to repair its income statement and balance sheet by curtailing marginal lending.

Effect of CRA on Rates of Return

Whether or not the cost of complying with CRA is borne out of bank profits is a question of economic incidence. CRA advocates tend to assume that the regulatory cost burden does indeed come out of business profits. But incidence is a matter of market structure and the time period allowed for full adjustment, and the evidence is mixed. In addition, the relationship between bank profits and CRA ratings offers circumstantial evidence to test for the existence of discrimination in lending, which is the cornerstone of the pro-CRA case. Phillips-Patrick, Malmquist and Rossi (1997) tested for a relationship between thrift revenues, operating costs and profits (total after-tax net income) and the extent of low-income mortgage lending. They found that increased low income lending led to higher costs and revenues, by about the same amount, but had no effect on profits, which they interpret as evidence against discrimination in lending because there is no extra profit earned by those who provide additional low income loans, as is required by Gary Becker's classic model of discrimination in which some sellers voluntarily forego profits rather than serve the shunned group. The zero effect on profit is also consistent with the McWilliams and Siegel model of corporate responsibility. Phillips-Patrick, *et. al.* also found that the additional risk associated with low-income lending is not associated with higher defaults, but rather with higher costs for credit counseling or loan monitoring (*ibid.*, pp. 179-

180). Simpson and Kohers (2002), on the other hand, found a positive relationship between return on assets and CRA ratings of Outstanding vs Needs to Improve for a sample of 385 commercial banks during 1993-94.

The shadow rate of return derived from the variable cost frontier is regressed against a set of profit function variables (input and output prices, equity capital) and dummy variable indicating if the thrift was rated Outstanding and a for-profit dummy. Equity capital is included because this is a short-run (variable) profit function. Appendix Table 1 presents the results. Rate of return is a more satisfactory index of profitability because it avoids the scale issues when dollar amounts are used, and investors are focused on rates of return. A fixed effects non-frontier panel model is employed because the rate of return has already been adjusted for inefficiency. The coefficient on the Outstanding dummy is 0.0028 ($t = 1.62$, $\text{prob} = .10$), which may be compared to the mean rate of return of .061. Achieving an Outstanding level of Corporate Social Responsibility either has no effect or slightly enhances the profit rate of thrifts. This is contrary to the widely held view that CRA erodes profitability but is consistent with the model of McWilliams and Siegel, and also with the findings of Phillips-Patrick, *et.al.*

Summary

Government mandated Corporate Social Responsibility apparently comes at a hefty price. Thrift institutions whose size is representative of over 80 percent of U.S. banks incurred annual costs of \$95,000 per year, 1.35% of operating costs, to achieve a passing grade under the Community Reinvestment Act. Those thrifts rated Outstanding bear an annual cost of almost \$500,000 per year. However, estimated cost inefficiency is 21 percent, amounting to over \$1 million annually. Thus thrifts could readily bear the cost of CRA if they were to operate in a least cost manner. Depending on the assumption made about the extent of voluntary compliance, the cost per incremental loan induced by CRA is between \$21,000 and \$38,000. And there is evidence that thrifts rated Outstanding in achieving the goals of CRA do not earn lower rates of profit, which is consistent with the view that banks select the profit maximizing degree of compliance.

CRA proponents favor extending its coverage to credit unions and other financial and nonfinancial institutions (Thomas, *op. cit.*, Table 6). Doing so would seem to require extraordinary social benefits per additional loan if the costs are to be justified on the efficiency grounds of correcting market failure.

Appendix Table 1
Fixed Effects Profit Function
(Dependent Variable: Shadow Rate of Return)

<i>Variable</i>	<i>Coefficient</i>	<i>t -ratio</i>
Rated Outstanding	0.0028	1.62
Investor Owned Bank	0.0124	8.62
ln(Price Non Mortgage Loans)	0.0064	3.35
ln(Price Mortgage Loans)	0.0093	1.02
ln(Price Investments)	0.0011	0.53
ln(Wage)	-0.0146	5.16
ln(Price Deposits)	-0.0042	0.82
ln(Price Premises Capital)	0.0000	0.70
ln(Bank Equity)	-0.0116	12.8

N = 1476; Adjusted R² = .34.

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