The Southern Business and Economic Journal would like to thank the following individuals for their evaluation of articles in the current issue of the *Journal.*

TeWhan Hahn
Auburn University at Montgomery

Joeseph Newman
Auburn University at Montgomery

Mariano Runco
Auburn University at Montgomery

THE SOUTHERN BUSINESS AND ECONOMIC JOURNAL

Indexed in PAIS Bulletin and EBSCO Publishers Online ISSN: 0743779X

Volume 41, Number 2 2018

Articles

Published by the Auburn University at Montgomery College of Business

The Termination of Employee Stock Ownership Plans

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Abstract

Historically, employee stock ownership plans (ESOPs) were important components of corporate pension plan offerings, and remain popular among non-public firms. However, between 1992 and 2008, public-firm ESOP terminations outpaced adoptions. We examine plan terminations among publicly traded firms for evidence on the motivation to either terminate or retain an ESOP. We find that firms terminate ESOPs more frequently when they have higher idiosyncratic risk. This suggests that the costs of subjecting employees to high levels of firm-specific risk outweigh the benefits of stock-based incentives. We also find some evidence that ESOP terminations are more common when executives receive higher equity-based compensation, comprised largely of stock options. This suggests that ESOP costs are exacerbated when managers' incentives to increase firm risk are contrary to the interests of ESOP holders. Finally, the evidence shows firms are less likely to terminate ESOPs when the ESOP holds a larger proportion of the firm's outstanding stock. In these instances, the benefits of control accruing to firm insiders could provide a strong incentive to retain these plans, even if the plans are suboptimal for both rank-and-file employees and other stockholders.

Introduction

Employee Stock Ownership Plans (ESOPs) are retirement compensation arrangements that require corporations to invest at least 50 percent of plan assets in employer securities. Legislators endorsed the ESOP structure to increase employee wealth in the form of own-company equity (Kelso and Adler, 1958) and broaden the stock ownership base to include workers (GAO, 1987). As such, ESOP

shares can serve to align the interests of rank-and-file employees with those of the firm's shareholders. Plan adoptions peaked during the 1970s and 1980s, but after their use stagnated in the 1990s, plan terminations quickly eclipsed adoptions. In 1992, ESOPs comprised 33 percent of primary pension plans in public firms. These plans covered 54 percent of employees participating in primary pension plans and comprised 82 percent of the own-company stock held as pension assets. Sixteen years later, ESOPs represented just 26 percent of primary plans and covered only 33 percent of all participating employees.

Why did public firm ESOPs become so unpopular during this period of time? We answer this question by providing evidence on determinants of ESOP terminations, as a function of their relative merits and costs. The benefits of ESOPs to shareholders are straightforward. ESOPs benefit shareholders by better aligning shareholder and employee interests, and providing direct incentives for the workforce to maximize firm value (e.g., Kim and Patel, 2017). ESOPs can also provide personal benefits to managers because managers appoint the trustees who vote these shares (Borokhovich, Brunarski, Harman and Parrino, 2006).[1] Thus, ESOPs may increase managers' *de facto* voting influence within their firm. However, ESOPs can be costly to the firm, as they are the only pension plan component exempt from diversification requirements. Employees have undiversifiable human capital invested in their industry and in their firm stemming from their current and expected future compensation (Jensen and Meckling, 1976). As such, ESOP shares not only contradict portfolio diversification principles, they exacerbate employee risk by further concentrating wealth within the firm and industry. Because of the undiversifiable nature of this risk for employees, ESOP participants will discount the value of the ESOP shares. In efficient labor markets, firms would be required to provide greater total compensation and/or benefits to rank-and-file employees to compensate them for the implicit risk-based devaluation of their ESOP shares. ESOP shares can be particularly costly to firms that structure executive pay to include a large component of equity-based compensation. The value of executive stock options is an increasing function of firm risk. Thus, the net benefits of offering both executive options and ESOPs are unclear. As managers with high equity-based

[1] Borokhovich, *et al*., note that trustees have incentives to vote with management because they do not bear the full costs of these decisions, and could lose their positions by not doing so.

compensation increase firm risk, the perceived value of ESOP shares for the rank-and-file employee decreases, and the *de facto* costs of these plans increase.

The decision to offer an ESOP could have been optimal prior to the 1990s. However, subsequent changes in the pension marketplace made these plans riskier for employees and more costly for firms to maintain. First, a decline in pension offerings among public firms caused employees to bear more pension risk and left them with fewer alternatives. Private pension plans comprised a higher proportion of total retirement income than in prior periods (Munnell and Perun, 2006). In the U.S., retirees draw income from private pension plans, Social Security, and/or individual retirement accounts. When employees are limited in their choice of pension offerings, their ability to diversify risk is likewise limited. Second, the increasing popularity of defined contribution plans enabled firms to shift pension risk from employer to employee (Kruse, 1994; Munnell and Perun, 2006), further exacerbating risk exposure for rank-and-file employees. Third, litigation initiated by ESOP participants in the early 2000s brought public attention to the risks inherent in these plans.[2] Most of these cases resulted in large settlements, which created substantial firm liabilities and increased firms' pension insurance costs (Martin and Fine, 2005; Cole and Fier, 2011).[3] Finally, in the early 1990s, firms began offering substitute plans that, like the ESOP, aligned shareholder and employee interests without limiting the participant's ability to diversify risk. Interest in these alternative plans could account for some of the ESOP attrition (Perun, 2000).[4]

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[2] The plaintiffs alleged that the firm's officers, who were also plan fiduciaries, did not perform their fiduciary duty to disclose material information about the firm's risk. As such, plan participants were unable to avoid pension fund losses associated with the decline in stock price. Public companies subject to these lawsuits included GM, Enron, Royal Dutch Shell, Honeywell, Textron, McKesson, Sears Roebuck, Fifth Third Bancorp, Polaroid, Keycorp, Medtronic, McDonnell Douglas, WR Grace, Reynolds, EDS, Morrison Knudson, Corning, and International Paper, among others.

[3] For example, Honeywell settled with plan participants for a total of $14 million in 2005. In 2007, Krispy Kreme Donuts settled its lawsuit for $8.27 million.

[4] Substitute plans included employee stock purchase plans, equity grant plans, and option grant plans. In July of 1988, PepsiCo became the first Fortune 500 firm to offer employees stock option grants, and a number of public firms followed suit (Nasar, 1989). From 1995 to 1999, the share of US firms offering stock option plans more than doubled from 13 percent to 31

Previous research has explored the determinants of decisions to adopt ESOPs, but not the factors motivating the decisions to terminate these plans. Our study provides evidence on the determinants of ESOP termination decisions using a sample of publicly traded firms with existing ESOPs. Our observations are limited to the period prior to 2009 to mitigate the effects of the abrupt shift in perceptions of market volatility and ESOP risk during the Great Recession. We estimate probit regressions to model the ESOP termination decision as a function of the ESOP's investment risk, the conflicts created by executive equity compensation, and the voting power of ESOP shares that can facilitate entrenchment. Our models also control for other factors suggested to affect the costs and benefits of ESOPs. Finally, we model the likelihood of plan termination using a two-stage instrumental variable approach to account for endogeneity in the executive pay and ESOP termination decisions.

Our results indicate that investment risk influences the ESOP termination decision. Specifically, both the firm's idiosyncratic risk and the ESOP's exposure to same-firm equity increases the likelihood of ESOP termination. The magnitude of these relations increases after the well-publicized Enron failure and its resulting ESOP losses in 2001. Firms that offer alternative equity-based pension plans that permit diversification are between 2.2 percent and 4.5 percent more likely to terminate their ESOP. When we model the compensation and ESOP decisions using an instrumental variable to account for endogeneity in board decision making, the evidence suggests that conflicting risk incentives between executives with high equity compensation and ESOP stockholders contribute to ESOP termination decisions. Finally, our evidence suggests that the voting control of the firm attributed to the ESOP affects its termination decisions. That is, we find firms tend to retain ESOPs when these shares comprise a larger stake in that firm's equity ownership which could provide managers with substantially greater voting control of the firm. For these firms, the discontinuation of an ESOP may or may not be shareholder-optimal, depending on the relative benefits that accrue to shareholders from higher levels of inside control of the firm.

ESOPs remain popular among non-public U.S. firms, despite the sharp decline in the popularity of public firm ESOPs during the period of our study. According to the National Center for Employee

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percent (Fields, "A Wealth of Options" *Fort Worth Star Telegram* 8/8/1999). Department of Labor data indicates that the number of 401(k) plans per year grew at an average annual rate of 16 percent from 1984-2008.

Ownership (NCEU), by 2015, there were 5,505 stand-alone, non-public ESOPs in the U.S. with a combined market value of about $119.1 billion in same-firm equities. However, in 2015, only 129 such plans remained among U.S. public companies. Our results provide policy implications for managers and directors of public or private firms who are considering changes to an existing ESOP or the adoption of a new ESOP. Our models suggest that firms are more likely to discontinue ESOPs when they have highly focused lines of business, implying that the costs of ESOPs can outweigh the benefits for such firms. Our evidence also shows that firms with high levels of executive equity compensation (restricted stock plans and stock options)[5] are more likely to terminate their ESOPs. Thus, directors of firms with existing ESOPs should weigh the benefits of providing managers with equity-based pay against the implied devaluation of ESOP shares.

Review of Related Literature

Pension plans are either *defined benefit* or *defined contribution* plans. Defined benefit plans specify future payouts. For these plans, the employer or a trustee controls the investment policy and the firm bears the risk of fund performance. Defined contribution plans specify employee contributions. For these plans, the employee selects the investment policy, choosing among a set of funds provided by the firm, and the employee bears the risk of investment performance.[6] Although employee stock ownership plans have existed in public corporations since 1879, federal statutes did not define them as defined contribution pension plans until the U.S. Congress passed the Employee Retirement Security Act (ERISA) of 1974 (Friedman, 1983). This legislation created ESOP standards. Between 1975 and 1987, the number of ESOPs increased exponentially. Specifically, the number of ESOPs more than doubled from 1975 to 1986, and, just two years later, ESOPs doubled in number again.[7] By the early 1990s, the

[5] Restricted stock is a grant of firm shares, exercisable at a future date. Thus, restricted stock is analogous to a stock option with an exercise price of zero. Some restricted stock requires executives meet specified performance criteria before vesting.

[6] Common examples of defined contribution plans include stock-purchase plans, profit-sharing plans, and 401(k) plans.

[7] ERISA's passage led to an abundance of plans, and the Department of Labor data indicates that 1,601 plans were maintained in 1975 (Murphy, 2005). By 1986, the number of plans more than doubled to 4,174, according to a GAO

number of existing ESOPs leveled off, varying between 6,000 and 8,000 plans. By the late 1990s, ESOP terminations increased sharply.

Research documents how firms benefit from ESOPs. By compensating employees with equity, ESOPs align employee incentives with those of shareholders, reducing agency costs and improving firm performance (e.g., Chang, 1990; Conte, Blasi, Kruse and Jampani, 1996; Borstadt and Zwirlein, 1998; Yeo, Chen, Ho and Lee, 1999; Pugh, Jahera and Oswald, 2000; O'Boyle, Patel and Gonzoles-Mule, 2016). In a sample of European firms, Kim and Patel (2017) note that employee ownership improves firm performance, but its influence is small. Kruse, Blasi and Park (2010) report that employee ownership is directly linked to greater participation in decision making and monitoring of coworkers. ESOPs can also provide firms with substantial tax incentives (Chaplinsky and Niehaus, 1990; Gordon and Pound, 1990; Beatty, 1995)[8] and allow firms to substitute cash wages with employer shares to conserve cash (Kim and Ouimet, 2014). Finally, ESOPs can increase the voting control of managers and employees (Chaplinsky and Niehaus, 1994; Beatty, 1995; Pugh, Jahera and Oswald, 1999; Rauh, 2006). This protection could benefit shareholders by increasing the bargaining power of takeover targets, allowing a greater proportion of the takeover gains to accrue to target firm shareholders. Conversely, greater insider voting control could result in fewer takeover bids and entrench managers.

Although ESOPs can benefit sponsoring firms, they can also increase firm costs. ESOPs are the only qualified pension plan exempted from ERISA's requirement that pensions diversify across investment type, geographic area, business sector, and asset maturity to reduce the probability of large, correlated losses (Mitchell and Utkus, 2002). ERISA restricts all defined benefit plans and most defined contribution plans from investing more than 10 percent of fund assets in same-firm securities. Under ERISA, firms must also provide diversification advice to employees. However, neither requirement applies to ESOPs. To the extent that risk-averse participants bear increased uncertainty, they will demand a risk premium in compensation (Mitchell and Utkus, 2002) and firms can

study. Conte and Lawrence (1992) report that the total number of ESOPs in 1988 was 8,543.

[8] These tax incentives can be significant, equating to 0.3 percent of firm value. Mitchell and Utkus (2002) estimated that ESOPs provided $1.3 billion in aggregate tax savings to U.S. firms in 2002.

choose from viable substitute plans that encourage employee ownership without limiting asset diversification. For instance, firms are increasingly using ESOP alternatives, such as 401(k) plans with stock provisions and profit-sharing plans, as instruments to better align shareholder and employee interests.[9] Perun (2000) suggests that the availability of these substitutes undoubtedly accounts for some ESOP attrition since the early 1990s.

When firms fail to diversity pension assets, it can be especially costly for employees. Compared to employees with well-diversified pensions, studies show employees invested in single pension ESOPs within the highest quintile of own-company ownership lose from 42 percent to 55 percent of their wealth due to improper diversification.[10] However, even employees with hybrid ESOPs bear risk-related costs. Specifically, hybrid plan values are 25 percent to 33 percent lower than diversified fund values (Poterba, 2003; Meulbroek, 2005). Of course, employees could reduce ESOP risk by investing other wealth in diversified investments. However, studies document that the average employee tends to lack financial literacy and possesses loyalty-based investment tendencies (Cohen, 2009; Liang and Weisbenner, 2002).[11] Studies further note that investors tend to adopt naïve approaches to diversification. For instance, Bernartzi and Thaler (2001) find that investors diversify based primarily on the number of investments offered, and not on asset types or return correlations. Taken together, the evidence suggests that ESOP holders are either unwilling to diversify, or lack the financial sophistication or wealth to diversify pension risk effectively.

ESOPs can impose costs other than those related to diversification. For instance, managers' compensation contracts can provide risk-taking incentives that exacerbate the risk borne by rank-and-file

[9] Other common ESOP alternatives include stock option plans, stock bonus plans, money purchase plans with stock provisions and employee stock purchase plans. ESOPs prohibit fund diversification, require all eligible employees to participate at mandatory levels, and, until and unless the employee departs the firm or becomes fully vested, restricts their access to plan funds. ESOP alternatives can encourage diversification and allow access to benefits prior to termination, retirement or death (Perun, 2000).

[10] Meulbroek (2002) finds the firm's costs of failing to diversify are substantial. She notes that a pension contribution of diversified assets of $42,000 is equivalent to a $100,000 pension contribution in same-firm stock.

[11] Liang and Weisbenner (2002) note that investors surveyed by *Vanguard* consider same-firm stock to be safer than a diversified portfolio and safer than single shares in any other firm.

employees. The National Center for Employee Ownership specifically recognizes the potential for such conflicts of interest and charges ESOP trustees with monitoring whether executive compensation adversely affects the ESOP's stock value. Bova, Kolev, Thomas and Zhang (2015) investigate the impact of granting equity-based compensation to non-executive employees. They document that awarding equity-based pay increases both the risk aversion of rank-and-file employees and these employees' influence on corporate decision-making. Further, Bova *et al*. (2015) show that firms limit risk after granting equity to non-executives.

Conversely, studies document that managers tend to pursue risky investments when granted equity-based compensation (e.g., Smith and Stulz, 1985; Agrawal and Mendelker, 1987; Tufano, 1996; Rajgopal and Shevlin, 2002; Chen, Steiner and Whyte, 2006). This strategy is particularly detrimental to the wealth of non-executive employees because their wealth is subject to idiosyncratic volatility, which is largely undiversifiable (Bova *et al.*, 2015).[12] This dynamic creates a conflict of interest between top managers and lower level employees. Evidence suggests that when non-executive employees control a significant portion of the firm's equity, firms award less equity as compensation to executives, in general,[13] and CEOs in particular (Zhang, 2011).

Testable Hypotheses and Variable Definitions

Hypotheses

ESOPs can be value-increasing for the firm in that they can reduce agency costs, provide protection from unwanted takeover bids, decrease corporate tax liability, and conserve cash by substituting equity for wages. On the other hand, ESOPs can be costly because they subject employees to firm-specific risk that employees are largely unable to diversify (Mitchell and Utkus, 2002; Meulbroek, 2005). *Therefore, we predict firms will be more likely to terminate their ESOPs when the firm has higher idiosyncratic risk and when the ESOP has a higher proportion of same-firm assets (i.e., the fund is*

[12] The NCEO notes that seven of thirty firms cited diversification of employee retirement benefits as a reason to terminate their ESOPs (NCEO, ESOP *Termination Phase I*. April 18, 2007).

[13] The NCEO documents that five of thirty firms with recently terminated ESOPs cited executive equity compensation as a reason to terminate their ESOPs (NCEO, ESOP *Termination Phase I*. April 18, 2007).

less diversified). Substitute plans such as 401(k) plans with stock provisions, stock option plans, and stock bonus plans can provide employees the opportunity to invest in the firm's stock without barring them from diversifying. *Accordingly, we predict that firms with substitute plans will be more likely to terminate their ESOPs.*

ESOP ownership makes employees more sensitive to the firm's idiosyncratic risk. Granting restricted shares and stock options to executives encourages managerial risk-taking, further exacerbating the risk exposure of ESOP stockholders. As a result, ESOP shares are further devalued by rank-and-file employees, making the ESOP more costly for the firm. *Thus, we expect that firms with higher levels of executive equity compensation will be more likely to terminate ESOPs.*

Firms can use ESOPs as a tool to deter hostile takeover attempts and to entrench managers. Thus, boards concerned with potential takeover attempts and/or managers seeking to entrench could choose to retain their ESOPs. ESOPs that comprise a larger proportion of the total outstanding equity will be more effective in deterring takeovers and facilitating entrenchment. *Thus, we predict firms with ESOPs that comprise a larger proportion of voting shares will be less likely to terminate their ESOPs*.

Variables of Interest

We use three proxies to measure the impact of investment risk on ESOP termination in our multivariate models. Our first measure of investment risk is firm-specific risk (*idiosyncratic risk*). We model idiosyncratic risk as the natural log of one plus the percent of the firm's idiosyncratic risk from the year prior to the observation year.[14,15] Our second proxy for investment risk measures the extent to which the ESOP is diversified, and thus reflects the employee's exposure to same-firm risk. This variable *(own-firm concentration*) is defined as the natural log of one plus the percent of plan assets invested in own-company stock, where the percent of plan assets invested in own-company stock is the market value of same-firm equity in pension assets scaled by the total market value of plan assets. Third, we define an indicator variable equal to one if the firm offers

[14] Idiosyncratic risk is defined as the firm's total risk less market risk, where market risk is calculated using a value-weighted market model with beta estimated over the *two years* prior to the observation year.

[15] Natural log transformations reduce variable skewness and limit regression heteroskedasticity.

at least one alternative stock ownership plan (*substitute plan indicator*). These alternative plans include the following: a 401(k) with an employer stock provision, an employee stock purchase plan, a profit sharing plan, and a stock bonus plan.[16] Each of these substitute plans allows firms to reward employees with equity ownership. However, unlike ESOPS, these plans allow participants to determine how much to invest in the plan and to diversify. The alternative plans also allow participants to access their benefits prior to termination, retirement or death.

We proxy for insider control attributable to the ESOP using the market value of same-firm ESOP assets scaled by the market value of total firm equity (*entrenchment*). We add this percentage to one and transform it using the natural log function. Next, we model the risk-taking incentives inherent in executive compensation (*executive equity pay*) as the sum of the market value of new restricted stock grants and new options, averaged for the five highest-ranking executives. Equity-based pay is expressed in thousands of dollars, and transformed using the natural log function.

Instrumental and Control Variables

In our models, we account for potential endogeneity in the board's executive contracting decision and ESOP termination decision. Specifically, we use average executive age and average executive tenure as instrumental variables to model the expected level of average executive equity pay. Average executive age (tenure) is the mean of the ages (tenure) of the five top-ranked executives in the year prior to the event year.

Our control variables incorporate factors established in the literature as driving ESOP adoptions because these same factors are likely to influence terminations.[17] Since size can serve as a takeover

[16] A 401(k) plan is a type of profit sharing or stock bonus plan that allows employees to receive employer payments either in cash or as contributions to the plan. An employee stock purchase plan (ESPP) is a benefit plan that allows employees to purchase company stock with their own after-tax dollars, often through payroll deductions. Unlike ESOPs, ESPPs give participants access to the shares once the employees vest. In a profit-sharing plan, the employer makes regular contributions to a trust set up to allow employees to earn a share of the firm's profits. A stock bonus plan is similar to a profit-sharing plan, except that the benefits are distributed as own-company stock.

[17] The factors that motivate ESOP adoptions are unlikely to apply symmetrically to terminations. For instance, if we assume ESOPs are adopted

deterrent, we control for the firm's size using the natural log of total assets. Next, we control for firm performance using the firm's return on assets (ROA), defined as net income scaled by book assets. ESOPs allow cash-constrained firms to substitute shares for cash compensation. Thus, we control for the firm's liquidity using the firm's total working capital scaled by the book value of assets. ESOPs can allow firms to obtain low-cost equity capital. As such, we control for leverage using the book value of the firm's debt as a proportion of the market value of their equity. Two variables control for the degree to which firms benefit from ESOPs' alignment of employee and shareholder incentives. The first of these is a measure of the firm's free cash flow. We calculate free cash flow as in Lehn and Poulsen (1989) scaled by total assets, as a proxy for agency costs. The second agency cost variable, sales per employee, measures the impact of employee effort on productivity since incentive-alignment through ESOP holdings is most effective when employees expect their efforts to affect stock value. We use the firm's marginal tax rate to proxy for the firm's tax liabilities since ESOPs provide corporate tax benefits (Graham, 1996). Finally, we control for the entrenchment benefit managers could derive from voting control of ESOP shares using an indicator variable equal to one if the firm received a takeover bid in the prior year.

Data

We obtain our sample from two primary sources. First, we obtain firm-level pension plan information from the IRS Form 5500 for years 1992 through 2008. We limit our sample to data preceding 2009 to limit the profound impact of the financial crisis on share values and changes in the perceptions of ESOP risk, employment risk, and the probability of firm bankruptcy around this event. We obtain IRS data from two sources: The Department of Labor website and Boston College's Center for Retirement Research Data Enclave website.[18] Firms complete up to ten IRS schedules that provide details on pension plan history, design, participation, and registration. Firms also report plan funding and plan contributions, as well as financial and

to reduce agency costs and/or reduce tax liabilities, by symmetry, they would also predict that firms terminate ESOPs to increase agency costs and increase tax liabilities.

[18] Department of Labor: http://www.dol.gov/ebsa/foia/foia-5500.html and Center for Retirement Research: http://crr.bc.edu/

actuarial transactions. We restrict our study to single-employer plans and plans not part of a collective trust.[19] We then match Form 5500 pension data to firm-level accounting data from Compustat for the period from 1992 through 2008. In Table 1, we report the quantity of ESOP adoptions and ESOP terminations, by year. The unconditional probability of ESOP termination for the period from 1992 through 2008 is 7 percent.

We obtain stock price data from the Center for Research on Security Prices (CRSP), public firm takeover incidence from Thomson-Reuters' SDC Platinum database, and executive characteristics from Compustat's *Execucomp* database. Our initial sample consists of 20,154 firm-year observations. Restricting the sample to firms with ESOPs leaves 5,276 firm-year observations for 791 unique firms. We exclude plans that list multiple termination years, plans in newly acquired firms, and plans with missing data. This results in a sample of 366 ESOP terminations.

Descriptive Statistics

In Table 2, we report descriptive statistics for firms that terminate their ESOP and firms that choose to retain them. Terminating firms tend to have greater idiosyncratic risk, higher plan exposure to same-firm stocks, and are more likely to offer substitute equity-based plans than non-terminating firms. The data also show that terminating firms tend to offer less executive equity-based pay and have ESOPs that represent a smaller proportion of outstanding equity. Finally, terminating firms are, on average, smaller, more highly leveraged and less profitable than firms that retain ESOPs.

Determinants of ESOP terminations

Probit Models

We test our hypotheses using a sample of publicly traded firms with ESOPs, from 1992 through 2008. The dependent variable in our probit models is the decision to terminate an existing ESOP. Variables of interest include three proxies for investment risk, executive equity pay, and entrenchment. Our regression specification is

$$Term_{it} = \Phi(\beta' Risk_{it-1} + \delta ExComp_{it-1} + \lambda Entrench_{it-1} + \Gamma' Control_{it-1} + \theta_t + \varepsilon_{it})$$

[19] Excluding multi-employer plans eliminates fewer than 50 plans per observation year.

where $Term_{it}$ equals one if firm i terminates its ESOP in year t and zero otherwise. $Risk_{it-1}$ is a matrix of firm and plan-level risk variables for firm i in year t-1, $ExComp_{it-1}$ is a variable measuring executive equity pay in the prior year, $Entrench_{it-1}$ measures insider voting control in year t-1, and $Control_{it-1}$ is a matrix of firm-level tax, incentive alignment, takeover interest and financial control variables. θ_t measures year fixed effects, and ε_{it} is an error term. The regression models the decision to terminate an ESOP, and only firms with existing ESOPs can make this decision. Thus, our analysis contrasts terminating firms with control firms that have chosen not to terminate their ESOPs in year t. Each observation appears in the sample until the ESOP terminates.[20] Thus, terminations are not repeatable.

In Table 3, we report the results of our probit models to test the determinants of the decision to terminate an ESOP. Model 1 in Table 3 includes only the proxies for our variables of interest: investment risk, entrenchment, and executive equity compensation. In Models 2 through 4, we include the control variables and separately model the decision to terminate an ESOP as a function of investment risk (Model 2), entrenchment (Model 3) and executive equity pay (Model 4). Model 5 includes all of our variables of interest and control variables. All of the models include time fixed effects to address the concern that unobservable or unmeasured time-variant factors could influence the firm's decision to terminate its ESOP.

The results in Table 3 suggest that investment risk, as measured by all three risk proxies, contributes to the likelihood of ESOP termination. Models 1 and 5 show that a one unit increase in *idiosyncratic risk* increases the likelihood of plan termination by 9.2 percent and 8.1 percent, respectively. We also find evidence that plan exposure to same-firm stocks increases the likelihood of ESOP termination. Specifically, Models 1 and 5 show that a one unit increase in *own-firm concentration* increases termination likelihood by 5.7 percent and 5.4 percent, respectively. Further, the availability of substitute equity-based plans increases the likelihood of ESOP termination by between 2.2 percent and 4.5 percent. Also consistent with our expectation, our models show firms are less likely to eliminate the ESOP when it comprises a larger proportion of the firm's voting stock. That is, the models show that a one unit increase in *entrenchment* decreases the likelihood of plan termination by between

[20] Firms that decide not to terminate their ESOPs remain in the sample for the duration of the sample period.

59.9 percent and 99.6 percent. This suggests that managers tend to retain ESOPs when they provide *de facto* control benefits to managers. However, we find little evidence that executive equity-based pay increases the likelihood of ESOP termination. Only one regression (Model 1) shows a significant relation, and the coefficient sign is contrary to our expectation.[21] Of the control variables, we find some evidence that larger firms and more profitable firms are less likely to terminate their ESOPs. Interestingly, the models also show firms receiving a prior takeover bid are more likely to terminate their ESOP.

Two-stage Instrumental Variable Models

We hypothesize that the conflict of interest created by executive equity compensation affects the board's decision to terminate an ESOP. However, it is possible directors consider executive compensation and ESOP termination at the same time.[22] Alternatively, the board may decide to terminate the firm's ESOP and *subsequently* increase equity compensation for executives. Thus, we use an instrumental variable two-stage approach to account for potential endogeneity in these two decisions, employing instruments that affect the executive equity pay decision, but not the ESOP termination decision. Numerous studies suggest that either executive age or tenure should affect the composition of executive pay. For instance, Smith and Watts (1982) note that managers have few long-range performance incentives as they approach retirement, as incentives stemming from future salary adjustments are rendered moot. This problem could be mitigated if boards award managers performance-based compensation that vests during their retirement period. Thus, Smith and Watts suggest that older CEOs should receive higher equity-based deferred compensation. Conversely, numerous studies suggest the relationship between age/tenure and equity-based compensation should be negative. Chourou, Abaoub, and Saadi (2008) propose that CEOs need fewer performance incentives as they amass more stock during their tenure with the firm. Knoeber (1985) notes that shareholders benefit from the use of deferred compensation when less is known about managerial abilities relative to information that will become available later. Ryan and Wiggins (2001)

[21] This result could be an artifact of omitted control variables that reflect risk, or the failure to model the compensation and ESOP decisions endogenously.
[22] Boards of directors approve both of these decisions. As boards meet only a few times each year, the likelihood these decisions are discussed in the same meeting is high (Zhang, 2011).

hypothesize that young CEOs have personal incentives to hold more stock options to enhance their reputations in the labor market, and report empirical evidence of a negative relation between tenure and stock option awards.

We use both age and tenure as instrumental variables to model the impact of executive equity compensation on the firm's ESOP termination decision.[23] We estimate two-stage maximum likelihood models. The first stage is an OLS regression on executive equity pay in year t-1, defined as the natural log of equity compensation, in thousands of dollars. The independent variables in the first-stage model are the same as those used to model the ESOP termination decision in Model 5 of Table 3, except that the instrumental variable replaces executive equity pay. The second-stage model is a probit regression on the decision to terminate an ESOP. The dependent variable is an indicator equal to one if the firm terminates the ESOP in year t, and zero otherwise. The second stage model includes the same independent variables used the first stage model, except that the predicted value of *executive equity pay* from the first stage regression replaces the instrumental variable. Although not reported in a table, we conduct a Wald chi-square test of the exogeneity of the executive equity pay and ESOP termination decisions. Our chi-square test statistics suggest that our instrumental variable approach is appropriate.[24] That is, the executive equity compensation and ESOP termination decisions are endogenous, and appropriately modeled using the two-stage approach with age and tenure as separate instruments for executive equity-based pay.

In Table 4, we report our first-stage OLS regressions and the second-stage probit models. The first stage models show significant negative relations between executive equity compensation and both age (Model 1) and tenure (Model 2). Our second-stage probit models, which test our variables of interest, shows that investment risk affects the decision to terminate an ESOP. Specifically, the models in Table 4 show that a one unit increase in *idiosyncratic risk* increases the probability of plan termination by between 6.2 percent and 6.7 percent, while a one unit increase in *own-firm concentration* increases

[23] We include age and tenure as instruments in separate models because these variables are correlated with each other, introducing muticollinearity when used in the same regression.

[24] The Wald chi-square test statistic is 5.54 (3.36), with a p-value of 0.019 (0.067), for age (tenure). Thus, for both sets of models, we reject the null hypothesis of no endogeneity.

the likelihood of plan termination by between 10.5 percent and 11.7 percent. Firms are between 66.9 percent and 79.1 percent less likely to terminate their ESOP for every unit increase in *entrenchment*. Finally, a one unit increase in *executive equity pay* increases a firm's likelihood of ESOP termination by almost 20 percent. Overall, the results support our predictions. That is, both investment risk and executive equity-based pay increase the likelihood of ESOP termination. On the other hand, the ESOP's potential to facilitate entrenchment reduces the likelihood that a firm will terminate its ESOP.

Although not reported in a table, we conduct additional tests to ensure that our results are robust to our choice of model specification. First, we re-estimate our models using a sample of stand-alone ESOPs (non-hybrid plans) to mitigate the concern that our results are due to aspects of hybrid plans unrelated to same-firm shares. Although this reduces our sample size by about 40 percent, our results are largely unchanged. Additionally, we include lagged raw returns and average daily abnormal returns for the five years prior to the observation year (Brown and Warner, 1985) to address the possibility that a firm's recent stock price performance drives ESOP terminations. Again, the results are unchanged, and the coefficient estimates for the additional variables are not significant at conventional levels.

The Enron Bankruptcy and ESOP Terminations

Since the late 1980s, a weakening of the U.S. Social Security system and changes in the private pension marketplace have underscored the costs of improper diversification of retirement assets. We next examine the notion that the ESOP failure at Enron increased public awareness of the extreme consequences of improper pension fund diversification (Maggs, 2003), thus driving the results of our tests. As such, we segment our sample into two subsets: firm filings prior to the 2001 Enron ESOP failure and firm filings in the post-Enron period. We then re-estimate our probit models with and without time fixed effects for each of these subsamples to examine whether the ESOP termination decision became more or less sensitive to idiosyncratic risk factors following the highly publicized Enron ESOP failure. If the Enron failure highlighted the costs of improper diversification, we expect the observed relations for the risk factors to be stronger in the post-Enron subsample.

In Table 5, we report our probit regression models for the two subsets of firms.[25] The results suggest that higher levels of both idiosyncratic risk and plan exposure to same-firm assets result in a greater likelihood of ESOP termination in the post-Enron period (Models 3 and 4). Specifically, in the post-Enron period, a one unit increase in *idiosyncratic risk* suggests a firm is between 8.5 percent and 10.5 percent more likely to terminate their ESOP. However, the results show that plan exposure to same-firm assets significantly predicts plan termination *even before Enron's failure,* although the magnitude of this relation is greater in the post-Enron period. We find a one unit increase in *own-firm concentration* suggests that a firm is between 6.2 percent and 7.1 percent more likely to terminate the ESOP in the post-Enron period, and 4.5 percent more likely to terminate the ESOP in the pre-Enron period. Interestingly, the availability of substitute plans is only significant in predicting ESOP termination in the pre-Enron period. Thus, the results suggest that losses suffered by Enron employees affected the perceived risk of ESOPs. However, both the ESOP's concentration in own-firm assets and the availability of substitute plans contributed to ESOP termination decisions, even before the Enron debacle.

Conclusions

ESOPs became a common component of pension plans for public firms following the 1974 passage of ERISA. Over the next twenty years, firms established ESOPs because they provided firms with tax benefits, they aligned employee and shareholder incentives, and they provided a *de facto* takeover defense for the firm. However, ESOPs can be costly. For instance, ESOPs expose participants to idiosyncratic risk that they are unable to diversify, which implicitly devalues the shares for rank-and-file employees. ESOPs also create conflicts of interest between plan participants and executives who, through equity-based compensation, can have incentives to increase firm risk. The popularity of the ESOP among public firms waned in the 1990s, and ESOP terminations soon eclipsed adoptions. However, ESOPs currently remain popular with non-public firms. We

[25] The probit models in Table 5 include all of the variables of interest and control variables. The consistency of the coefficient estimates for the two models in each regime suggests that our results are not driven by the decision to include time fixed effects in our models.

investigate the determinants of ESOP terminations in public corporations by examining their relative costs and benefits.

Our evidence shows the probability of ESOP termination is positively related to the firm's idiosyncratic risk and the ESOP's limits on diversification. Firms with alternative equity-based plans, which both encourage employee ownership and allow for diversification, are more likely to terminate their ESOPs. Because boards can make ESOP and executive compensation decisions concurrently, we model the decision to award equity-based pay and terminate ESOPs using a two-stage instrumental variable approach. These models show evidence that firms are more likely to terminate their ESOP when boards award executives higher equity-based pay. This result implies that ESOPs are more costly when executives have incentives to increase firm risk. Despite their costs, some firms choose to maintain ESOPs, particularly when the ESOP shares comprise a larger component of the firm's voting stock. Because managers appoint trustees who vote ESOP shares, these shares can provide firms with a strong *de facto* takeover defense and entrench managers. Consistent with this notion, we find that as the ESOP's ownership stake in the firm increases, the probability that the board will terminate the ESOP decreases.

Our study has broad implications for corporate governance and agency costs. First, our evidence suggests that the benefits that accrue to firm insiders can exceed the costs of ESOPs when the plans provide an effective takeover deterrent. However, whether it is in the best interests of non-employee shareholders to maintain an ESOP as a takeover deterrent is ultimately an empirical issue and merits further study. Second, our evidence suggests that ESOPs can be particularly costly when there is a conflict between the risk incentives created by executive equity compensation and those of ESOP stockholders. As such, boards should consider the impact of incentive-based managerial compensation on other employees. Finally, firms that offer alternative pension plans that both align employee and shareholder incentives and allow diversification are more likely to eliminate their ESOP. This suggests that the inability to diversity imposes high costs on ESOP participants, and the availability of substitute plans that permit diversification calls into question a firm's decision to maintain a costly ESOP.

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Table 1: Public ESOPs, Adoptions and Terminations, By Year

Year	Total Public ESOPs (N)	ESOPs Adopted (N)	% Total ESOPs	ESOPs Terminated (N)	% Total ESOPs
1992	332	23	6.93%	25	7.53%
1993	331	12	3.63%	21	6.34%
1994	307	11	3.58%	19	6.19%
1995	294	18	6.12%	27	9.18%
1996	280	11	3.93%	16	5.71%
1997	270	11	4.07%	20	7.41%
1998	232	16	6.90%	14	6.03%
1999	251	6	2.39%	16	6.37%
2000	294	10	3.40%	26	8.84%
2001	318	5	1.57%	37	11.64%
2002	343	4	1.17%	28	8.16%
2003	348	0	0.00%	23	6.61%
2004	348	2	0.57%	27	7.76%
2005	349	2	0.57%	20	5.73%
2006	341	3	0.88%	17	4.99%
2007	330	6	1.82%	16	4.85%
2008	307	0	0.00%	14	4.56%
Total	5275	140		366	

Table 2: Descriptive Statistics

	ESOP-Terminating Firms		ESOP-Retaining Firms	
	(N)	Mean	(N)	Mean
Panel A – Model Variables				
Risk, Entrenchment and Executive Equity-Pay				
Idiosyncratic risk (%)	351	17.56	4,812	13.33
Own-firm concentration (%)	361	57.26	4,870	50.02
Substitute plan indicator (%)	366	70.49	4,910	51.96
Entrenchment (%)	362	0.89	4,879	4.50
Executive eq pay ($1000s)	252	7,853	3,638	10,066
Instrumental Variable for Executive Equity Compensation				
Average executive age (yrs)	253	60.86	3,678	61.27
Average executive tenure (yrs)	176	11.93	2,799	14.27
Control Variables				
Total assets ($ millions)	366	16,523	4,910	25,654
ROA	359	0.01	4,834	0.03
Liquidity	366	0.11	4,836	0.11
Leverage	366	4.51	4,903	3.75
Free cash flow / book assets	366	0.09	4,910	0.10
Sales / employee ($)	363	1,603,471	4,904	223,486
Marginal tax rate	366	31.40	4,907	32.52
Takeover interest	366	0.12	4,910	0.08

Table 3: Maximum Likelihood Probit Models of ESOP Terminations

	Model				
	(1)	(2)	(3)	(4)	(5)
Variables of Interest					
Idiosyncratic risk	0.092***	0.006			0.081***
	(0.002)	(0.195)			(0.008)
Own-firm concentration	0.057***	0.005			0.054***
	(0.000)	(0.578)			(0.000)
Substitute plan indicator	0.023***	0.045***			0.022***
	(0.008)	(0.000)			(0.009)
Entrenchment	-0.996***		-0.599***		-0.901***
	(0.000)		(0.000)		(0.000)
Executive equity pay	-0.011***			0.001	-0.003
	(0.000)			(0.899)	(0.442)
Control Variables					
Ln[Total assets ($ millions)]		-0.003	-0.010***	-0.009**	-0.009**
		(0.213)	(0.000)	(0.017)	(0.015)
ROA		-0.019***	-0.025***	-0.018**	-0.021***
		(0.005)	(0.000)	(0.028)	(0.006)
Liquidity		-0.032	-0.001	-0.040	-0.039
		(0.198)	(0.961)	(0.252)	(0.261)
Leverage		-0.005	0.006*	0.011**	0.007
		(0.185)	(0.054)	(0.023)	(0.111)
Free cash flow / assets		0.025	0.021	-0.011	-0.019
		(0.625)	(0.648)	(0.860)	(0.762)
Sales / employee		-0.004	-0.005	-0.004	-0.006*
		(0.251)	(0.142)	(0.329)	(0.090)
Marginal tax rate		0.008	-0.032	-0.024	0.017
		(0.776)	(0.247)	(0.470)	(0.596)
Takeover interest indicator		0.033***	0.033***	0.030**	0.034**
		(0.007)	(0.005)	(0.032)	(0.011)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Chi-square	304.75	101.38	331.08	61.57	333.55
Correctly pred.	93.69%	93.37%	93.23%	93.66%	93.78%
Outcomes = 1	222	331	345	222	219
Outcomes = 0	3,265	4,665	4,751	3,281	3,470
N Obs	3,487	4,996	5,096	3,503	3,689

P-values are in parenthesis. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

Table 4: Two-Stage Instrumental Variable Regressions

Models	1		2	
Dependent variable	*OLS* Ln (Executive equity pay)	*Probit* 1 if firm terminates ESOP	*OLS* Ln (Executive equity pay)	*Probit* 1 if firm terminates ESOP
Variables of Interest				
Idiosyncratic risk	0.312***	0.062**	0.338***	0.067*
	(0.000)	(0.035)	(0.000)	(0.077)
Own-firm concentration	-0.274***	0.117***	-0.239***	0.105***
	(0.000)	(0.000)	(0.000)	(0.000)
Substitute plan indicator	0.058	0.016	0.023	0.018
	(0.119)	(0.349)	(0.563)	(0.259)
Entrenchment	-0.437	-0.791***	-0.582	-0.669***
	(0.216)	(0.001)	(0.155)	(0.009)
Executive equity pay		0.198**		0.195*
		(0.023)		(0.070)
Control Variables				
Ln[total assets ($ millions)]	0.625***	-0.136***	0.594***	-0.124**
	(0.000)	(0.008)	(0.000)	(0.040)
ROA	0.537*	-0.301***	1.723***	-0.416*
	(0.084)	(0.008)	(0.000)	(0.059)
Liquidity	0.419***	-0.128**	0.289*	-0.069
	(0.000)	(0.029)	(0.097)	(0.278)
Leverage	-0.295***	-0.073***	-0.288***	0.074***
	(0.000)	(0.001)	(0.000)	(0.004)
Free cash flow / assets	1.403***	-0.327**	0.954***	-0.229*
	(0.000)	(0.023)	(0.003)	(0.090)
Sales / employee	-0.057***	0.006	-0.064***	0.009
	(0.001)	(0.450)	(0.000)	(0.387)
Marginal tax rate	-0.191	0.050	-0.184	0.054
	(0.203)	(0.318)	(0.260)	(0.324)
Takeover interest indicator	-0.019	0.046**	-0.021	0.039
	(0.781)	(0.048)	(0.768)	(0.106)
Avg. exec. Age	-0.009**			
	(0.019)			
Avg exec. Tenure			-0.003**	
			(0.048)	
Time fixed effects	Yes	Yes	Yes	Yes
F-test	111.92		91.32	
(p-value)	(0.000)		(0.000)	
Adj R-squared	0.502		0.496	
Wald Chi-square		1384.41		1016.97
(p-value)		(0.000)		(0.000)
% Predicted correctly		84.25%		84.31%
Outcomes = 1		199		156
Outcomes = 0		2,994		2,502
N Obs	3,193	3,193	2,658	2,658

P-values are in parenthesis. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

Table 5: Probit Models for the Pre- and Post-Enron Period

	Pre-Enron Sample		Post-Enron Sample	
	(1)	(2)	(3)	(4)
Variables of Interest				
Idiosyncratic risk	0.092	0.076	0.105***	0.085**
	(0.141)	(0.250)	(0.001)	(0.014)
Own-firm concentration	0.045***	0.045***	0.071***	0.062***
	(0.002)	(0.002)	(0.000)	(0.000)
Substitute plan indicator	0.031**	0.031**	0.017	0.015
	(0.025)	(0.024)	(0.126)	(0.163)
Entrenchment	-0.771***	-0.789***	-0.931***	-0.834***
	(0.000)	(0.000)	(0.000)	(0.000)
Executive equity pay	-0.002	0.001	-0.005	-0.006
	(0.719)	(0.867)	(0.275)	(0.198)
Control Variables				
Ln[total assets ($ millions)]	-0.016***	-0.016***	-0.004	-0.003
	(0.005)	(0.006)	(0.444)	(0.491)
ROA	-0.020	-0.021	-0.020**	-0.021**
	(0.131)	(0.108)	(0.034)	(0.025)
Liquidity	-0.057	-0.057	-0.053	-0.035
	(0.263)	(0.260)	(0.271)	(0.461)
Leverage	0.016**	0.015**	0.001	-0.001
	(0.041)	(0.047)	(0.912)	(0.997)
Free cash flow / assets	0.063	0.059	-0.052	-0.064
	(0.567)	(0.592)	(0.499)	(0.397)
Sales / employee	-0.010	-0.012	-0.006	-0.004
	(0.174)	(0.123)	(0.232)	(0.369)
Marginal tax rate	-0.021	-0.023	0.031	0.034
	(0.670)	(0.651)	(0.482)	(0.431)
Takeover interest indicator	0.016	0.019	0.058***	0.062***
	(0.337)	(0.291)	(0.007)	(0.004)
Time fixed effects	No	Yes	No	Yes
Chi-square	141.30	150.20	184.21	197.98
Correctly predicted	77.34%	79.34%	94.25%	96.98%
Outcomes = 1	106	106	113	113
Outcomes = 0	1,451	1,451	1,800	1,800
N Obs	1,557	1,557	1,913	1,913

P-values are in parenthesis. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, in two-tailed tests.

State Government Internal Auditing, Education Attainment, and Occupational Fraud Control

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Abstract

The financial cost of corruption and other forms of occupational fraud is enormous. The Association of Certified Fraud Examiners calculates that the financial loss caused by occupational fraud exceeds $7.1 billion worldwide. There are also economic, reputational, psychological, and social costs that are not easy to compute. This paper focuses on the effectiveness of public sector internal auditing in reducing public sector corruption. We use corruption as a proxy for occupational fraud in the public sector. We find that state internal auditing laws and practices have been ineffective in reducing public sector corruption. States should emphasize other ways of controlling corruption, such as improving the education standards, as states in which a higher percentage of the population holds a bachelor's degree have fewer conviction cases.

1. Introduction

The financial cost of occupational fraud is enormous. Using a survey of 2,690 known cases of occupational fraud worldwide, the Association of Certified Fraud Examiners (ACFE, 2018) calculates that the financial loss caused by occupational fraud exceeds $7.1 billion worldwide. For the public sector, the median loss per fraud case reported to the ACFE is $200,000 at the national level, $110,000 at the state level, and $92,000 at the local level (ACFE, 2018). By its nature, however, occupational fraud is secretive, so the known cases may represent a fraction of all occupational fraud. There are also reputational, psychological, and social costs associated with occupational fraud, which are not easy to compute (Institute of Internal Auditors, 2009).

With such an enormous cost to the world's economies, it seems logical that organizations should put in place occupational fraud

detection mechanisms. According to the Chartered Institute of Internal Auditors, internal auditing plays an important role in ensuring that management has effective systems in place to detect inappropriate, inefficient, illegal, fraudulent, or abusive acts that have already transpired. To the extent that the culprits face consequences, internal auditing potentially can also deter public employees from engaging in fraud, abuse, and other breaches of public trust (Henderson, 2011). Ridley (2008) claims that modern internal auditing is constructed upon three e's: effectiveness, efficiency, and economy. Effectiveness is viewed as the most important (Dittenhofer, 2001).

The primary goal of this paper is, therefore, to examine the effectiveness of public sector internal auditing laws and practices in reducing public sector occupational fraud. We contend that, contrary to people's expectations, internal auditing may not be as effective in reducing corruption as empowering the general public through education so that they can hold their elected officials accountable. The reason is that internal audit does not directly detect or prevent corrupt practices, but primarily promotes anti-corruption best practices (Chartered Institute of Internal Auditors, 2013). Lipset (1960), on the other hand, postulated that places with higher levels of education are less corrupt, and this postulation has been found to hold by researchers such as Beets (2005); Lederman, Loayza, and Soares (2005); Glaeser and Saks (2006); Cheung and Chan (2008); and Truex (2011). The rationale here is that voters with more education are more willing and able to monitor public employees and take action when public officials violate the law. Other researchers, however, have suggested that education increases participation in corrupt activities (Kaffenberger, 2012; Mocan, 2008. Thus, a secondary objective of this paper is to investigate which relationship holds for the United States.

To be able to examine this relationship we need a measure of public sector occupational fraud across states. The most obvious measure is the number of public sector occupational fraud cases. Unfortunately, such data is currently not available. As an alternative, we resort to using a proxy for public sector occupational fraud. Of the three categories of occupational fraud, namely asset misappropriation, corruption, and financial statement fraud, we have data on public corruption convictions that we use to proximate public sector occupational fraud. The Public Integrity Unit of the Department of Justice compiles aggregated data for public corruption cases by judicial district. While public sector corruption is only a proxy for public sector occupational fraud, its use can be justified if one

considers that public corruption is by far the most common occupational fraud scheme in government and public administration (ACFE, 2018). The ACFE estimates that 50 percent of the public sector cases are corruption schemes such as bribery and kickbacks.

We also need measures for our independent variables of interest, namely quality of internal auditing and education. For the quality of internal auditing, we use data obtained from the Center for Public Integrity. The center assigns a score between 0 and 100 to each state, with higher scores implying better auditing practices. Our measure for education attainment is the percentage of a state's population that is aged 25 or over and has a bachelor's degree or higher. The data on education attainment are obtained from the U.S. Census Bureau.

The remainder of the paper is organized as follows: The next section discusses the measure of states' internal auditing quality produced by the Center for Public Integrity. Section 3 provides the literature review. Section 4 provides the data description. Section 5 provides our methodology; section 6 concludes and provides policy recommendations.

2. Center for Public Integrity Measure of States' Internal Auditing Quality

The State Integrity Investigation Report by the Center for Public Integrity identified the following three major categories that reflect the quality of a state's internal auditing practices: (1) Is there an audit institution or equivalent agency covering the entire state's public sector? (2) Is the supreme audit institution effective? (3) Can citizens access reports of the supreme audit institution? Within each category, indicators were identified and analyzed for each state. The categories and the indicators cover the key concepts identified by the Chartered Institute of Internal Auditors for internal audits, namely accountability, integrity, and transparency of government entities. The scores assigned to the indicators within a category were averaged to arrive at the subcategory score. Each indicator was assigned either a score from 0 to 100 or a score of "yes," "moderate," or "no." A "yes" score translates to 100 points, a "moderate" score translates to 50 points, and a "no" score translates to 0 points. The category score was in turn averaged with the other category scores to arrive at the internal audit score. For a more detailed explanation of the measure, see the Appendix.

3. Literature Review

This section is divided into three subsections. The first subsection reviews research on the causes and effects of public corruption to establish the need to control it. The second subsection reviews research on the impact of internal auditing on corruption control, while the third subsection reviews research on the effect of education on corruption.

3.1 Effects and Causes of Corruption

Research on corruption can be divided into two broad categories. The first category examines the effects of corruption and the second category examines the causes. Voluminous research has investigated the effect of corruption on economic indicators, with most focusing on its effect on economic growth. The results range from showing a positive effect to showing a negative effect. The most common argument in support of corruption is the "grease the wheels" hypothesis. Corruption is seen as a means through which individuals and firms can avoid cumbersome bureaucratic processes and hence improve efficiency (Acemoglu & Verdier, 1998; Huntington, 1968; Leff, 1964). The majority of studies, however, show that corruption does indeed hurt development and economic growth by lowering the rate of investment (Brunetti, Kisunko, & Weder, 1998; Knack & Keefer, 1995; Mauro, 1995; Mo, 2001; Pellegrini & Gerlagh, 2004; Wei, 2000). There are two other channels through which corruption affects economic growth, namely the human capital channel and the political stability channel (Alesina, Özler, Roubini, & Swagel, 1996; Alesina & Perotti, 1996; Barro, 1991, 1996; Benhabib & Spiegel, 1994; Cohen & Soto, 2007; Gupta, 1990; Levine & Renelt, 1992; Mankiw, Romer, & Weil, 1992; Mo, 2001; Krueger & Lindahl, 2001).

Of particular interest to our study, however, are studies that examine the causes of corruption. In these studies, corruption enters the regression analysis as a dependent variable. The causes include, among others, too much government regulation (Goel & Nelson, 2010), less economic freedom (Paldam, 2002; Saha, Gounder, & Su, 2009), government size (Arvate, Curi, Rocha, & Miessi Sanches, 2010; Goel & Nelson, 1998), lack of transparency (Brunetti & Weder, 2003), and illiteracy (Glaeser & Saks, 2006). Our study addresses the question of what causes corruption by stating it in a different way: What factors are effective in curbing public sector corruption? Thus, in our study public sector corruption enters the regression analysis as a dependent variable.

3.2 Effectiveness of Internal Auditing in Detecting Occupational Fraud

One tool organizations use to control occupational fraud is internal auditing. Studies have looked at the effectiveness of internal auditing using indicators such as customer surveys of auditees, the impact of internal auditing findings on earnings before interest and depreciation, and discovery of fraud (Lenz & Hahn, 2015). Our interest is on the effect of internal auditing on public sector corruption, and we briefly review the scarce literature on this relationship.

Coram, Ferguson, and Moroney (2008) examine whether organizations that have an internal auditing function are more likely to detect and report fraud than those that do not. They find that internal auditing does help detect fraud. Their study uses self-reported fraud from the 2004 KPMG Fraud Survey and primarily relates to misappropriation of assets by employees or management. Rae and Subramaniam (2008) find a similar positive relationship between internal control quality and reported asset misappropriation. Szymanski (2007) argues that internal auditing activities assist in the detection and prevention of corruption by enhancing accountability and transparency. In addition, internal auditing minimizes the opportunities for corruption by ensuring the effective physical monitoring of capital items procured and their actual utilization to avoid fraud and abuse (Asare, 2009). Khan (2006) identifies the useful role internal auditing can play in the investigation of alleged corruption cases. Our study empirically tests whether, in practice, internal auditing is effective in reducing corruption. While the other studies focus on asset misappropriation and financial statement fraud, our study focuses on corruption in the public sector, which is the most common type of occupational fraud in government (ACFE, 2018). Thus, our study bridges the gap between the expectation of internal auditing and what happens in practice in the public sector.

3.3 Education and Corruption

There seems to be a general consensus that more education is associated with less corruption. Mauro (1997) found that countries that spend more on education experience a decline in corruption compared to those that spend less on education. Glaeser and Saks (2006), Lederman et al. (2005), and Cheung and Chan (2008) find that more educated economies are less corrupt than less educated ones. There are several explanations that have been suggested for why this is the case. Beets (2005) argues that less educated people end up in jobs that pay small wages and hence have an incentive to supplement

their earnings through corrupt means. In addition, well-educated individuals understand the detrimental effect of corruption on the society and are less likely to be tempted by corruption (Sweeney, 1999). Oreopoulos and Salvanes (2009) argue that, at an individual level, educated people have a lower propensity to engage in corruption because they are less likely to sacrifice their future by engaging in corruption today at the expense of their future. Truex (2011) suggests that access to education is responsible for changing the culture of corruption in developing countries.

Other researchers, such as Kaffenberger (2012) and Mocan (2008), however, point out that education increases the chances that people will participate in corrupt activities. In particular, Mocan (2004) shows that more educated people are more likely to be asked for bribes. It is this exposure to bribery that may make educated people very susceptible to corruption. Our study seeks to examine which of these effects is true using state-level data in the United States.

4. Data Description

We measure corruption as the number of federal convictions in a state using data from the Department of Justice. Figure 1 shows each state's level of corruption as measured by the number of corruption cases per 100,000 population. The darker the shade, the higher the number of convictions.

Our variable of interest is the quality of state internal auditing. Audit quality data are collected from the Center for Public Integrity, which assesses internal auditing practices in each state. This is part of the information the center uses to create a public integrity index. We are only interested in using the internal auditing score to examine whether states that score higher on internal auditing quality are more likely to control corruption. Figure 2 shows the quality of internal auditing across states. The darker the shade, the better the quality of internal auditing in the state.

A positive and significant relationship between internal auditing and corruption indicates that public sector internal auditing is able to detect corruption incidents. For the control variables, we follow Glaeser and Saks (2006), who include as control variables the level of education, real GDP per capita, population, and government size. Instead of controlling for government size only, we also control for government power. Education is measured by the percentage of the population that is aged 25 or above and has a bachelor's degree or higher. We hypothesize that more educated states will have fewer

corruption cases than less educated ones. Glaeser and Saks (2006) hypothesize a negative relationship between education and corruption because educated voters are willing to monitor the activities of government officials, leading to fewer corruption cases. Education data are obtained from the Census Bureau. Real per capita GDP data are obtained from the Bureau of Economic Analysis. States with higher real GDP per capita tend to have less corruption. Glaeser and Saks (2006) also hypothesize that voters with higher incomes can more easily monitor the activities of public officials. Adult population is measured as the population aged 18 and above, and the data are obtained from the Census Bureau. We include this variable as a control, considering that states with higher populations will tend to have more convictions.

Government size and government power, are included as controls to account for differences across states in opportunities to engage in public corruption. Government size is measured as the number of government employees divided by the number of people aged 18 and above who are employed; it is calculated using data from the Census Bureau and the Bureau of Labor Statistics. Government power is measured as government's share of total state GDP and is calculated using data from the Bureau of Economic Analysis. States that rely heavily on government will tend to be more corrupt, as public officials are entrusted with a larger pool of resources. Following Dincer (2008), we also include dummy variables for the four census regions of the United States.

Table 1 provides the summary statistics for the variables used in the model. We have a panel of two years because our measure of audit quality was assessed in 2012 and 2015 only. The number of convictions given in Table 1 is the actual number of convictions, not a rate.

The overall mean of the dependent variable, number of convictions, is about 19. Based on the standard deviation, one can see that most of the variation in the variable is from between states rather than within states. There is also more variation between states than within for five of our independent variables, namely log of population, education, log of real per capita GDP, size of government, and government power. Audit quality almost equally varies across states, as it does within the state over time. The minimum number of convictions is zero. Minnesota has zero convictions in 2012, while five states (Colorado, Nevada, New Hampshire, Utah, and Wyoming) have zero corruption convictions in 2015. New Hampshire has zero convictions in both 2012 and 2015. These numbers may seem to imply

that these states are free of corruption, but they may result from a lack of effort to control corruption. Texas registered the highest number of convictions, at 101 in 2012.

5. Methodology

Recall that our dependent variable, the number of convictions by state, is a nonnegative integer. Count variables are usually nonlinear. Thus, the first step is to figure out the best nonlinear estimation technique to use. The natural beginning point to analyze count variables is the Poisson regression model, which assumes that the conditional variance is equal to the conditional mean. However, in practice, such a condition is difficult to meet. An alternative estimation technique is the negative binomial regression technique, which does not require that the conditional variance be equal to the conditional mean.

The second issue is that we have data for two years, 2012 and 2015. To take advantage of both the time and cross-sectional aspects of our data, we employ panel data estimation techniques. The third issue is the possibility that some of the zeros for our independent variables may have been generated purely by the state's lack of effort. To account for this possibility we use zero-truncated models. Table 2 provides the regression estimates for the various estimation techniques. For better comparison of the different models, we have provided average partial effects in Table 3.

The results show that public sector internal auditing is not effective at catching corruption, contrary to people's expectations that internal auditing is effective. Regardless of the estimation technique used, our results show an insignificant relationship between public sector internal auditing and the number of corruption convictions. Except for the pooled average negative binomial in column six of Table 3, the coefficient estimate and the standard errors are about the same. Thus, our results are robust to estimation techniques. The only control variables that are significant across all six models are population, level of education, and the dummy variable western states.

The more populous the state, the higher the number of convictions. States that have a higher percentage of educated people have lower levels of corruption convictions. Our results support the findings by researchers such as Beets (2005), Lederman et al. (2005), Glaeser and Saks (2006), and Cheung and Chan (2008), who also find that education is negatively related to corruption.

There are a couple of possible explanations for why education is negatively related to corruption convictions. Educated people are

more empowered to hold elected officials accountable for abuse of public office, which causes the elected officials to be more prudent in the way they manage public officials. On the other hand, it is possible that the educated people holding public offices are capable of engaging in more sophisticated corruption that is not easy to detect. The latter effect may, therefore, reinforce the negative effect of education on the number of convictions without necessarily reducing corruption. Corruption may remain undetected because the educated public sector workers are able to cover their trails. We, however, argue that the latter effect may not be as strong as the former because it is the whole state that is educated and not just the individuals that are working for the government. The other individuals are also educated enough to counter sophisticated corruption schemes. Thus the reduction in the number of convictions reflects a reduction in corruption.

Western states have about 10 fewer convictions than southern ones and the remaining variables are either insignificant (government size and the dummy variable northeastern states) or significant but not robust to the estimation technique (per capita GDP, government power, and dummy for midwestern states).

6. Conclusion and Policy Recommendations

We set out to test the effectiveness of internal auditing laws and practices in reducing public sector occupational fraud. We used the number of public sector convictions as a proxy for public sector occupational fraud. For our measure of internal auditing quality, we used a measure constructed by the Center for Public Integrity. We hypothesized that internal auditing is not as effective in reducing corruption as other factors, such as education. Using count regression techniques, we find no evidence to the contrary. Public sector internal auditing is not effective in reducing corruption. We acknowledge that the measure of corruption used does not fully capture the level of corruption because of the secretive nature of corruption. Our measure only looks at the corruption that was caught. We also did not distinguish the corruption detection method, and hence this is an area for future research. Despite these weaknesses, our results do not seem surprising. One possible explanation is that, contrary to the public perception, government internal auditing is not designed to detect corruption. The *Report to the Nations on Occupational Fraud and Abuse* (ACFE, 2018) finds that only 15 percent of fraud is discovered

through internal auditing; tips are the most common fraud detection method, at 40 percent.

We, however, find evidence that supports our hypothesis that education attainment is effective in reducing corruption rather than internal auditing. The negative relationship we find between the number of convictions and education attainment is robust to estimation techniques. We argue that more educated states are more capable of scrutinizing how public officials are managing public resources and are able to hold them accountable. Public officials become afraid that the chances of being caught are higher when people are watching them, and this deters them from engaging in corrupt activities. On the basis of our findings, we recommend that states focus on policies to improve education quality, since this is the only variable that is consistently negatively related to public sector corruption.

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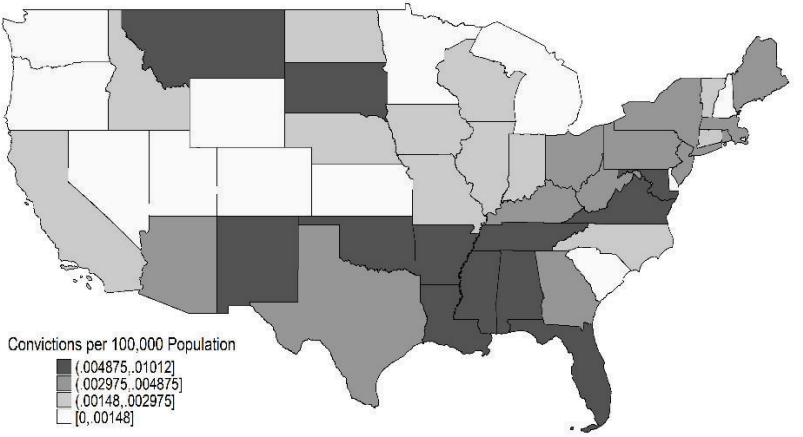
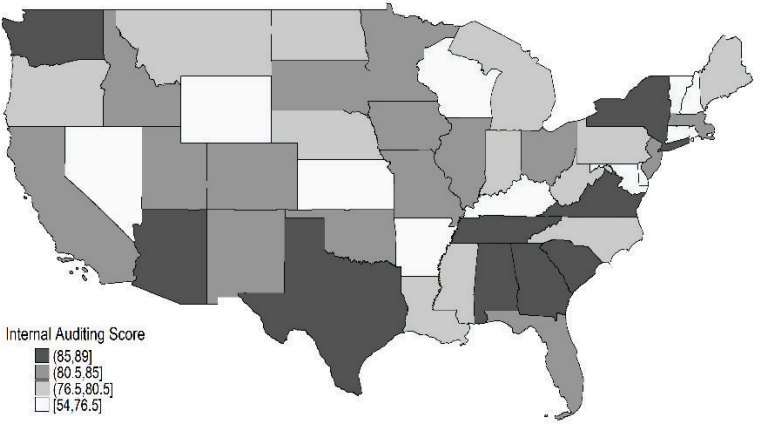
Figure 1: State-Level Corruption (2012 and 2015)



Note. Data were obtained from the Department of Justice and the U.S. Census Bureau.

Figure 2: State-Level Quality of Auditing



Note. Data were obtained from the Center for Public Integrity.

Table 1: Descriptive Statistics

Variable		Mean	Std. Dev.	Min.	Max.
Number of convictions	overall	18.540	22.727	0.000	101.000
	between		22.396	0.000	96.000
	within		4.474	6.040	31.040
Internal auditing	overall	83.937	10.230	39.583	98.958
	between		7.367	47.792	92.979
	within		7.136	66.666	101.208
Log of population	overall	3.383	1.013	1.454	5.678
	between		1.018	1.470	4.688
	within		0.016	3.353	4.696
Education (% with bachelor's or higher)	overall	28.391	4.891	17.900	40.500
	between		4.874	18.550	39.750
	within		0.641	27.491	29.291
Government size	overall	0.125	0.019	0.088	0.184
	between		0.019	0.093	0.182
	within		0.003	0.119	0.131
Government power	overall	0.134	0.031	0.088	0.240
	between		0.031	0.092	0.229
	within		0.005	0.123	0.146
Log of real per capita GDP	overall	3.877	0.190	3.450	4.297
	between		0.172	3.454	4.250
	within		0.083	3.641	4.113
Northeastern states	overall	0.180	0.386	0.000	1.000
	between		0.388	0.000	1.000
	within		0.000	0.180	0.180
Midwestern states	overall	0.240	0.429	0.000	1.000
	between		0.431	0.000	1.000
	within		0.000	0.240	0.240
Western states	overall	0.260	0.441	0.000	1.000
	between		0.443	0.000	1.000
	within		0.000	0.260	0.260
Southern states	overall	0.320	0.469	0.000	1.000
	between		0.471	0.000	1.000
	within		0.000	0.320	0.320

Note. $N = 100$, $n = 50$, $T = 2$.

Table 2: Regression Results

Variables	Pooled Poisson	Pooled Average Poisson	Zero Trunc. Poisson	Pooled Neg. Bin.	Pooled Average Neg. Bin.	Zero Trunc. Neg. Bin.
Internal auditing	0.007	0.007	0.008	0.007	0.002	0.006
	(0.007)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)
Log of population	1.051***	1.048***	0.993***	1.038***	1.020***	1.001***
	(0.075)	(0.073)	(0.074)	(0.107)	(0.118)	(0.100)
Education	−0.048***	−0.047***	−0.038***	−0.053**	−0.050**	−0.041**
	(0.015)	(0.016)	(0.014)	(0.021)	(0.023)	(0.017)
Government size	−0.035	−0.023	−0.042	0.008	0.033	−0.008
	(0.038)	(0.037)	(0.036)	(0.047)	(0.051)	(0.044)
Government power	0.060**	0.056*	0.044	0.064**	0.056**	0.042
	(0.027)	(0.030)	(0.027)	(0.027)	(0.028)	(0.028)
Log of real per capita GDP	0.596*	0.632**	0.486*	0.605	0.608	0.441
	(0.310)	(0.292)	(0.289)	(0.443)	(0.457)	(0.394)
Northeastern states	−0.036	−0.037	−0.097	−0.028	−0.067	−0.126
	(0.123)	(0.137)	(0.119)	(0.204)	(0.231)	(0.197)
Midwestern states	−0.496***	−0.469***	−0.536***	−0.365*	−0.304	−0.460**
	(0.152)	(0.151)	(0.144)	(0.195)	(0.199)	(0.186)
Western states	−0.544***	−0.531***	−0.500***	−0.533**	−0.520**	−0.463**
	(0.156)	(0.158)	(0.151)	(0.210)	(0.236)	(0.202)
Year effects						
2015		0.022			−0.091	
		(0.101)			(0.111)	
Observations	100	100	93	100	100	93
Number of id		50			50	
Wald chi 2	778.11	789.63	884.28	201.68	196.28	253.67

Note. Robust standard errors in parentheses. Av=average. Trunc = truncated. Neg= Negative & Bin= Binomial. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Table 3: Average Partial Effects

Variables	Pooled Poisson	Pooled Av. Poisson	Zero Trunc. Poisson	Pooled Neg. Bin.	Pooled Av. Neg. Bin.	Zero Trunc. Neg. Bin.
Internal Auditing	0.136	0.135	0.154	0.118	0.036	0.112
	(0.120)	(0.125)	(0.126)	(0.102)	(0.095)	(0.110)
Log of population	19.481***	19.427***	19.742***	18.764***	18.201***	19.679***
	(1.427)	(1.366)	(1.496)	(2.722)	(3.079)	(2.681)
Education	−0.881***	−0.877***	−0.755***	−0.964**	−0.891**	−0.794**
	(0.286)	(0.299)	(0.280)	(0.391)	(0.425)	(0.345)
Government size	−0.649	−0.417	−0.834	0.137	0.591	−0.156
	(0.665)	(0.682)	(0.706)	(0.853)	(0.916)	(0.861)
Government power	1.110**	1.065**	0.866	1.159**	1.005*	0.826
	(0.499)	(0.541)	(0.531)	(0.499)	(0.516)	(0.545)
Log of real per capita GDP	11.053*	11.717**	9.655*	10.943	10.847	8.609
	(5.838)	(5.545)	(5.869)	(8.081)	(8.292)	(7.781)
Northeastern states	−0.660	−0.683	−1.938	−0.511	−1.200	−2.455
	(2.305)	(2.559)	(2.416)	(3.698)	(4.133)	(3.921)
Midwestern states	−9.192***	−8.691***	−10.663***	−6.599*	−5.423	−8.985**
	(2.953)	(2.950)	(3.046)	(3.759)	(3.770)	(3.983)
Western states	−10.084***	−9.836***	−9.950***	−9.629**	−9.287**	−9.051**
	(3.019)	(3.054)	(3.106)	(3.942)	(4.286)	(4.061)
Year effects						
2015		0.405			−1.622	
		(1.870)			(1.984)	
Observations	100	100	93	100	100	93
Number of id		50			50	

Note. Robust standard errors in parentheses. Av=average. Trunc = truncated. Neg= Negative & Bin= Binomial. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

Appendix: Center for Public Integrity's Determination of Internal Auditing Quality.

The measure of the quality of internal auditing comprises three main categories. Below is an explanation of what specific issues are addressed in each category. Reference is made to states in Table A1.

(1) Is There an Independent Audit Institution or Equivalent Agency Covering the Entire State's Public Sector?

The states with the highest scores for internal audit all have an audit agency responsible for auditing all three branches of state government. By contrast, in the states with the lowest composite

scores (with the exception of Rhode Island), the audit agency does not have the authority to audit the legislative branch of government. (However, Kentucky's Auditor of Public Accounts lacks the authority to audit the finances of the legislative and judicial branches.) In Arkansas, for example, the House, Senate, and Bureau of Legislative Research are audited by a private entity, whereas in Kansas, the Legislative Post Auditor only performs audits requested by the Legislative Post Audit Committee of the Legislature (except the Legislative Post Auditor does not audit the legislature).

(2) Is the Supreme Audit Institution Effective?

The second category identifies six indicators. The first indicator is whether the leadership of the audit entity is protected from political interference in law. Under this indicator, the top states scored either a "yes" or a "moderate," whereas the states ranking 45th–50th scored either a "moderate" or a "no." States scored a "yes" if the leadership of the audit agency does not change after every state election and if the senior audit staff are long-term civil employees with who may not be arbitrarily dismissed; they scored a "moderate" if the leadership does change but the senior audit staff are long-term civil employees who may not be arbitrarily dismissed. Of the top-scoring states, New York, Alabama, and Washington all scored a "yes." In New York, the general public elects the head of the audit agency, and the senior staff are longstanding civil employees protected from arbitrary dismissal. In Alabama, a legislative committee appoints the head of the audit agency for a seven-year term, resulting in the head not being appointed every election cycle. Additionally, the head of the Alabama audit agency is protected from arbitrary dismissal.

The states scoring the lowest in this category include Rhode Island and Nevada. In Rhode Island, the head of the audit agency is appointed by and may also be terminated by the legislature. The civil employees comprising the staff are not protected in a manner similar to other Rhode Island civil employees.

The second indicator is whether the audit agency operates with independence and is protected from political interference in practice. Points were assigned on the basis of interviews with state officials and local experts on the state's governing practices. On this indicator, New York, Arizona, and Texas scored the highest. The interviews indicated there was no pressure on the audit entities to avoid investigations or ignore wrongdoing. Additionally, Arizona's auditor follows the generally accepted government auditing standards (GAGAS) and the American Institute of CPAs standards. The state scoring lowest was

Rhode Island. Since the agency head serves under the legislature, experts and commentators have noted that, given the structure, the agency cannot be free from political influence. Arkansas only received a score of 50 due to occasional restriction of the audit agency independence. It was noted by critics in Arkansas that the lawmakers have assigned special projects to the audit agency as a political tool on occasion.

The third indicator is whether the audit agency has sufficient staff to complete its work. In this category, Georgia, Tennessee, and Arizona each had a score of 100, as did Kentucky, Arkansas, and Maryland. While many audit agencies stated that they have to make decisions on the basis of the resources allocated, when assigning a grade as part of the study, these states appeared to timely report on their audits and have no apparent staff shortages. Of the lowest-scoring states, Nevada and Kansas were at the bottom. In Kansas, several audits were delayed due to lack of manpower, according to an interview with the head of the agency.

The fourth indicator is whether, in practice, the audit agency's management actions are based on cronyism, nepotism, or patronage. All states analyzed earned a perfect score in this category because there were no documented cases of nepotism, cronyism, or patronage.

The fifth indicator is whether, in practice, the government acts on the agency's findings. The score for this indicator is based on whether an audit report with negative findings results in corrective action. In the sample group, Washington and Arkansas scored 100 in this category. It was noted with respect to Arkansas that local government agencies do not always adopt corrective action. It was also noted that Arkansas does not make specific recommendations.

The last indicator is whether, in practice, the audit agent independently initiates investigations. The top-scoring states, along with Kentucky and Arkansas, scored 100, as these states conduct routine audits and act on tips, complaints, and audit irregularities. The only state to score a 0 was Kansas, because a legislative committee determines the state's audits.

(3) Can Citizens Access Reports of the Supreme Audit Institution?

There are four indicators in this subcategory. The first is whether the audit agency is required by law to report on its investigation activities and advisory opinions. The top-scoring states each received a perfect score. The practices varied among these states, but the common thread is that they were mandated to report at least annually on their investigations. Kentucky, Rhode Island, and Arkansas were

not required by statute to publish an annual report and received a "no" score. Rhode Island reports on the audit activities to its legislature, but the reports were not publicly available on the auditor's website at the time of our study. While Arkansas does publish the reports, and is required to publish them under statute, this is only done after a public meeting of the legislative audit committee, where the reports are presented.

The second indicator is, by law, whether citizens can access the audit reports. Of the states analyzed, only Maryland scored a "no." In Maryland, the reports are not immediately available, and a legislative committee has discretion to determine when the reports are released. The remaining states considered the information public record and made it available.

The third indicator is whether, in practice, the public can access audit reports within a reasonable time period at no cost. All states analyzed, except Nevada, earned a perfect score on this indicator, and Nevada scored a 75.

The final indicator is whether, in practice, audit reports are made available in open data format. All the states analyzed scored a 25 on this indicator. To earn a score of 100, a state must make its audit reports available online and downloadable in bulk in machine-readable format. A state earns a score of 50 if the audit reports are online and can be downloaded in bulk but cannot be downloaded in a machine-readable format. All states analyzed made the reports available online, but they were in a pdf format.

The final score for a state is obtained by taking the average of the three categories. Table A1 lists states with the highest internal audit scores (indicating the best internal audit controls) and states with the lowest internal audit scores (indicating the worst internal audit controls).

Table A1: States with Highest and Lowest Internal Audit Scores (2015)

Rank	State (Score)	Rank	State (Score)
1st	New York (89)	45th	Kentucky (65)
2nd	Georgia (88)		Rhode Island (65)
	Tennessee (88)	47th	Arkansas (63)
4th	Alabama (87)	48th	Nevada (56)
	Arizona (87)	49th	Maryland (55)
	Texas (87)	50th	Kansas (54)
	Washington (87)		

Go Big or Go Home – Corporate Governance

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Abstract

This study examines whether a CEO returning from an outside directorship brings substantial benefits to her home firm. We find gains to the home firm when CEOs 'comeback' from all outside board service, suggesting the opportunity cost of board service exceeds its benefits. Additionally, we find the impact on home firm value depends on the level of relative board compensation received by the CEO, for their outside board service. Board compensation is correlated to non-monetary board benefits, for example industry networks and professional mentoring, often associated with larger more influential firms. Our results show CEO directors returning from directorships with lower compensation and smaller firm size create positive long-term home firm stock performance, while directors returning from high compensation directorships create a neutral stock response. We conclude CEOs may wish to avoid directorships with less influential or small firms and lower relative compensation as these indicate lower benefits to the director and the firm. In contrast, CEOs should choose directorships at large firms with higher relative compensation to maintain or improve home firm value.

Introduction

In the corporate governance literature, many studies find a positive impact on the appointing firm, where CEOs are assigned as outside directors. The markets positive response is likely driven by outside CEO directors having substantive experience, executive leadership skills, industry expertise, and well-developed networks, consequently enhancing the shareholder wealth of an appointing firm. Additionally, a CEO accepting outside director service, may signal value in the appointing firm not yet included in the stock price (Fahlenbrach et al, 2010a). Further, some studies articulate a market for directors, suggesting key and substantial non-monetary benefits to CEOs serving as outside directors such as informal mentoring, exposure to

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industry expertise, political connections, and professional networks (Conyon and Read, 2006; Geletkanycz and Boyd, 2011).

The literature shows mixed results on the home firm when its CEO is assigned as an outside director. Although, benefits to the home firm may be realized through benefits received by a CEO as suggested, the opportunity costs of an outside directorship may exceed these benefits. Non-financial firm executives accepting outside directorships cause significant negative stock-price reaction, since shareholders believe that executives serving as outside board members may conflict with their role as a home firm executive (Rosenstein and Wyatt, 1994). These mixed findings may be due to differences between the opportunity cost of external board service and the benefits of outside directorships to the CEO and her home firm.

Our study fills a clear gap in the finance literature on executive directors as the first study that examines the impact on the home firm of a comeback CEO, a CEO that returns from her outside directorship to serve as the CEO only. The literature has examined the impact on both appointing and appointee firms from assigning new directors. The literature has also examined the impact on appointing firms, when directors self-terminate. By measuring buy and hold abnormal returns (BHAR) between comeback CEO firms and firms with CEOs maintaining outside directorships, we find that investors positively react to comeback CEO firms (i.e. home firms). Specifically, comeback CEO firms' BHAR are 4 percent in the first month following the CEO's return, suggesting the market assessed the cost of the directorship as exceeding its benefits.[2] Consistent with our results, opportunity cost is found as the most common stated motive for a CEO director departure from their outside directorships (Lorsch and Maciver, 1989 and Fahlenbrach, 2010b).

Outside director compensation mirrors the non-monetary benefits of an outside directorship (Fahlenbrach et al., 2010a). Low board compensation is associated with smaller firms, while larger firms provide higher director compensation (Knyazeva, Knyazeva, and

[2] The long-run BAHR for comeback CEO firms are insignificant, but these may be convoluted by numerous spurious events affecting multiple firms within the sample. Also the comeback date is determined by financial year end, but the impact of the resignation may be blurry as the CEO may have disengaged from board service prior to her resignation.

Masulis, 2013; Linck, Netter, and Yang 2009). Further, directorships with lower compensation provide lower non-monetary benefits such that benefits received from the directorship may be less than the opportunity costs of the CEOs time. In contrast, directorships with higher compensation should provide benefits that offset the opportunity costs of the CEO's time. Therefore, we hypothesize that the market's expectations for firm performance under a CEO serving as an outside director depends on the amount of relative compensation received by the outside director, as it serves as a proxy for the non-monetary benefits of the directorship.

Consistent with our hypothesis, when we separate the sample of comeback CEOs into higher and lesser relative compensation, only comeback CEO firms with lesser compensated directorships show consistently significant and positive long-run BHAR. The findings imply that a home firm, characterized by a comeback CEO with lesser director compensation, consistently outperforms the market's expectations in the long term. In other words, the market actually has unfavorable expectations for the long-term performance of firms under CEOs serving outside directorships with lesser compensation, because the opportunity cost to the CEO serving as director exceeds the monetary and non-monetary benefits the outside directorship. Therefore, our findings in this study imply that outside CEO directorships with lesser relative compensation may not be valuable to home firms and CEOs should choose directorships carefully to maximize their home firm value. Section II continues with a review of the related literature. Section III includes explanations of data, methodology, and empirical test results. Section IV provides a conclusion.

Related Literature

In the literature on the outside directorships of executives, this is the first study examining the impact of a comeback CEO on her home firm. The majority of studies on executive external board service focus on how CEOs, accepting outside directorships, affect the receiving firms' performance and shareholder wealth. Some studies review the impact on the home firm of multiple executive outside directorships. Other studies assess why CEOs accept external directorships, why firms appoint CEOs as outside directors and why outside directors, including CEOs, leave directorship positions. In this section, we review prior literature in terms of appointee firm's

perspective (i.e. firms whose CEOs accept outside directorships) and appointing firm's perspective (i.e. firms that appoint CEOs as outside directors).

Executive ability is a scarce resource, and senior executives that hold outside board service must make decisions that maximize shareholder wealth. The benefits received from accepting an outside directorship must exceed the lost value of the executive's time spent serving as director. CEOs may gather unique firm knowledge and, upon application, may eventually improve their home firm performance (Bacon and Brown, 1974). In general, benefits of external board service outweigh the cost of holding outside directorships (Conyon and Read, 2006). However, they show that executives might hold more external directorships than necessary to maximize home firm value. A negative relationship exists between the number of outside directorships held by a CEO and her firm's growth opportunities (Booth and Deli, 1996). This may imply high costs of external CEO board service for CEOs with greater marginal productivity at their home firms.

Non-financial firm executives accepting outside directorships cause significant negative stock-price reaction (Rosenstein and Wyatt, 1994). Shareholders may believe executives serving as outside board members may conflict with their role as home firm executive. On the other hand, significant positive excess returns exist when an executive accepts external board service within the same industries (two-digit SIC) and if the executive's firm has high growth opportunities (Perry and Peyer, 2005). Also, shareholders' reactions are different across corporate governance cultures and firm characteristics when executives accept appointments in other boards. Abnormal negative stock returns exist when executives accept additional external directorship or if severe agency problems exist in the executive's firm. In addition, financial firms value networking and sharing information such that the market has a significant positive reaction when a financial firm executive accepts an outside directorship (Rosenstein and Wyatt, 1994 and Perry and Peyer, 2005).

The appointment of outside directors, on average, brings significant positive excess returns to appointing firm shareholders (Rosenstein and Wyatt, 1990), suggesting the expected benefits of outside guidance outweigh the potential costs of external directorship on the appointing firms. Board independence, provided by outside

directors, has a positive impact on firm value, operating performance, and increases CEO pay for performance sensitivity (Knyazeva, Knyazeva, and Masulis, 2013). Further, outside directors may reduce managerial entrenchment and inefficient decision making. Under the certification hypothesis, the appointment of CEOs as outside directors helps prove the quality of appointing firms and management, even though the appointment of CEO outside directors does not improve the appointing firms accounting performance or corporate policies (Fahlenbrach, Low, and Stulz, 2010a). Also, CEOs choose external board service in large and mature firms with low information asymmetry and avoid serving on external boards at failing firms that may damage their reputation.

Additionally, outside directors are more likely to leave the position to protect their reputation when they expect poor performance of the appointing firm (Fahlenbrach et al., 2010b). After outside directors quit, firms suffer worse stock and firm performance and are more likely to restate earnings or be sued by shareholders. CEOs may fail to fully exercise leadership in their home firm, if they have damaged their reputation while serving as an outside director (Yermack, 2004).

Data, Methodology and Results

Data and Summary Statistics

Director data is from Standard and Poor's Execucomp for the fiscal years 2006 to 2010. We define the comeback date as the year end of the current fiscal year in the Director Compensation dataset.[3] For example, Dr. Walden C. Rhines, CEO of Mentor Graphics, was an outside director at Cirrus Logic Inc. from fiscal years 2006 to 2008 and his name disappeared in the subsequent fiscal year of 2009. For Cirrus Logic, the fiscal year end is March, suggesting a date of departure for Dr. Rhines of March 31, 2010. Typically, directorships mature or terminate at the fiscal year end. However, directors may resign or disengage prior to the fiscal year-end, convoluting the

[3] For multiple external directorships held by CEOs, we treat them as CEOs still holding outside board service until they leave all outside board service. Even though the decreasing number of CEO outside directorship might have similar effects to home firms compared to comeback CEOs, only twenty one CEOs hold multiple external board service and two CEOs leave all multiple outside directorship and stay at their home firms at least one year from 2006 to 2011.

comeback date. Finally, we obtain the accounting data from Compustat and stocks' holding period returns from CRSP.

Panel A of Table I provides, in each calendar year for 2006 to 2010, the total number of firms where the CEO comes back from external board service and stays at least one year at her home firm (comeback CEO firms) and firms where the CEO continues as an outside director. During the sample period, 618 firms have CEOs that serve as outside board members of which 106 firm CEOs return from outside directorships. Since CEOs serve outside directorship in multiple years, the difference between total observations and total firms exists.

In Panel B of Table I, we present summary statistics for comeback CEO firms and firms of CEOs holding outside directorships. As is shown, total compensation of the CEO outside directorship, CEO's total compensation at her home firm and CEO relative compensation (total compensation of CEO outside directorship / CEO's total compensation at home firm) are significantly different between the two groups. The average CEO relative compensation of a comeback CEO and a CEO continuing outside board service is 1 percent and 4 percent, respectively.

Table I: Summary Statistics

Panel A

Calendar Year	Comeback CEO firms	Firms of CEO holding outside directorships	Total
2006	17	169	186
2007	31	355	386
2008	21	375	396
2009	23	355	378
2010	14	389	403
Total	106	1643	1749

Panel B

Variables	Comeback CEO firms Mean *(Median)*	Firms of CEO holding outside directorship Mean *(Median)*
Book Value of Equity (millions of dollars)	5,498.318 *(1,484.950)*	4,998.785 *(1,543.183)*

Market Capitalization (Size)	12,500.000	11,800.000
(millions of dollars)	*(3,372.179)*	*(2,383.214)*
Book-to-Market Ratio	0.58	0.66
	(0.44)	*(0.53)*
CEO's Total Compensation	8,447,440	7,498,310
at Home Firm	*(5,548,150)*	*(5,616,171)*
CEO relative compensation	0.01	0.04
	(0.02)	*(0.03)*
Total compensation of CEO	111,410	168,580
outside directorship	*(107,241)*	*(160,852)*

Methodology and Results

We apply the buy-and-hold abnormal returns (BHAR) to measure abnormal performance of comeback CEO firms compared to firms of CEOs continuing outside directorships. BHAR is the empirical standard for director announcements and Warner and Kothari (2004) explain that BHAR is similar to investors' actual investment experience. In Table II, we present the equal-weighted and value-weighted BHAR of two portfolios: comeback CEO firms and firms of CEOs holding outside directorship, for the following twelve months without matched characteristics (i.e. simple BHAR).

$$\text{BHAR}\ (1, 12) = \prod(1 + R\ comeback\ CEO\ firms) - \prod(1 + R\ \ firms\ of\ CEO\ holding\ oustside\ directorship)$$

Even though each BHAR of the next twelve months shows all positive abnormal returns, only the first month of both equal and value-weighted BHAR is statistically significant with the positive abnormal returns of two and three basis points, respectively.

Under the short-horizon event study, a positive BHAR for the first month shows the market's favorable response to comeback CEO firms, suggesting that investors believe the CEO provides more value to the firm when focused exclusively on the firm than when serving as an outside director. The results, in combination with other results showing investors' negative reaction to home firms where the CEOs accept outside board service (Rosenstein and Wyatt, 1994; Perry and Peyer, 2005), suggests the opportunity cost, of outside board directorships held by the CEO, exceeds the benefit to the firm. By defining the long horizon event study as an event window of six months or more, the sixth and ninth month of value-weighted BHAR

in Table II show statistically significant and positive abnormal returns of five and six percent, respectively. The higher economic response of the value weighted sample in short and long horizon tests may imply large firms benefit more from the CEO's return.

Table II: Simple Buy and Hold Abnormal Returns

	Equal-Weighted BHAR		Value-Weighted BHAR	
	Mean	*t-statistics*	Mean	*t-statistics*
1 Month	0.02*	*1.78*	0.03***	*2.78*
3 Month	0.02	*1.28*	0.03*	*1.75*
6 Month	0.04	*1.30*	0.05**	*1.99*
9 Month	0.04	*1.02*	0.06*	*1.72*
12 Month	0.02	*0.60*	0.05	*1.32*

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Additionally, the comeback firm sample may be distinguished by other characteristics. The propensity score matching methodology matches firms in multiple dimensions of characteristics simultaneously. In the propensity score matching model, we define control variables that may affect the CEOs' decision to leave external board service, including home firm size (market capitalization), book-to-market ratio, past four-quarter stock returns, total compensation of CEO outside directorship, CEO's total compensation at home firm and relative compensation of outside directorship called CEO relative compensations (total compensation of CEO outside directorship / CEO's total compensation at home firm). We implement local regression matching methods in the propensity score estimator. Local regression matching methods are an efficient estimator since it uses multiple data points and constructs a weighted portfolio (Li and Zhao, 2003).

Table III: Propensity Score Matching Abnormal Returns (BHAR)

		Abnormal Returns (BHAR)	Standard Errors	T-stat
1 Month	*Unmatched*	*0.03***	*0.01*	*2.36*

	ATT [1]	0.04 ***	0.01	3.17
3 Month	*Unmatched*	*0.00*	*0.02*	*-0.03*
	ATT	0.02	0.02	0.9
6 Month	*Unmatched*	*0.02*	*0.03*	*0.63*
	ATT	0.01	0.03	0.29
9 Month	*Unmatched*	*-0.02*	*0.05*	*-0.34*
	ATT	0.02	0.05	0.5
12 Month	*Unmatched*	*-0.06*	*0.06*	*-0.99*
	ATT	0.02	0.06	0.38

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively. 1. ATT : Average Treatment Effect on the Treated

Table III reports BHAR for up to twelve months by applying local regression matching methods. Only the first month of BAHR shows statistically significant positive abnormal returns of four basis points in the average treatment effect on the treated (ATT). This finding, consistent with simple BHAR results in Table II, indicates that the market expects the commitment of a comeback CEO's time and effort to their home firm will improve firm performance providing evidence of an opportunity cost of CEO time spent serving as outside director.

Across-firm variations in director pay are well documented in the finance literature and director compensation generally depends on each director's actual work on the board, such as serving on or chairing committees, attending meetings, or being Chairman of the Board (Yermack, 2004; Ryan and Wiggins, 2004; Farrell, Friesen, and Hirsh, 2008). Besides direct compensation, outside director service provides non-monetary benefits such as exposure to different leadership styles and corporate governance as well as extending professional networks, ultimately bringing positive effects on the CEOs' home firm performance. Since outside direct compensation mirrors the non-monetary benefits of outside directorships (Fahlenbrach at el., 2010a), it is a reasonable assumption that the market's expectations for firm performance under a CEO serving as an outside director depend on the non-monetary benefits of her outside directorship, measured by the amount of director pay. Therefore, we hypothesize that there may be significant differences in BAHR of comeback CEO firms based on the amount of director compensation.

Specifically, if the opportunity cost of CEO time spent serving as an outside director exceeds the non-monetary firm benefits from an outside CEO directorship, we expect to see significant abnormal stock returns of comeback CEO firms, since the market may have unfavorable expectation on the firm's long-term performance. On the other hand, we expect to see insignificant abnormal stock returns on firms of comeback CEOs under market's favorable expectations, resulting from substantial non-monetary benefits of outside CEO directorship overweighing the opportunity costs of outside CEO director service. Thus, in order to investigate the long horizon firm performance of comeback CEOs we separate comeback CEO firms into higher and lesser outside director compensation based on the mean of relative CEO compensation (CEO total compensation at outside directorship / CEO total compensation at her home firm).

Consistent with our hypothesis, Table IV shows that firms of comeback CEOs with lesser compensation show consistently significant and positive long-run BAHR in both equal- and value-weighted models. The results indicate that firms of comeback CEOs with lesser outside director pay, consistently outperform the market's unfavorable expectations for firm performance. Consequently, the results in Table IV suggest that serving as an outside CEO director with low compensation (i.e. low non-monetary benefits) may decrease the CEO's home firm value.

In contrast, firms of comeback CEOs with higher director compensation do not show any significant BAHR in the long-run, especially from 6 month to 12 month. The results suggest the market had already factored substantial non-monetary benefits of outside directorships into the comeback CEO firms' stock price. The market's favorable expectations for the comeback CEO firm's long-run performance imply the non-monetary benefits of outside CEO directorships with higher compensation, offset the opportunity cost of CEO time spent serving on an outside directorship.

In results not presented, we find no significant performance difference exists between comeback CEO firms and firms of CEOs holding outside directorship, even when separating the sample based on CEO relative compensation differences. This is consistent with findings of previous studies on the impact of board assignment on firm stock and accounting performance.

Table IV: Relative compensation Buy and Hold Abnormal Returns

Panel A	Equal-Weighted Buy and Hold Abnormal Returns			
	LOW CEO relative compensation		HIGH CEO relative compensation	
	Mean	*t-statistics*	Mean	*t-statistics*
1 Month	0.01*	*1.88*	0.02	*1.45*
3 Month	0.03**	*1.98*	0.04 **	*2.13*
6 Month	0.04**	*2.10*	0.00	*0.42*
9 Month	0.03***	*2.79*	-0.01	*-0.09*
12 Month	0.03**	*2.24*	-0.05	*-0.90*

Panel B	Value-Weighted Buy and Hold Abnormal Returns			
	LOW CEO relative compensation		HIGH CEO relative compensation	
	Mean	*t-statistics*	Mean	*t-statistics*
1 Month	0.01***	*2.72*	0.05**	*2.36*
3 Month	0.02**	*2.17*	0.06**	*2.00*
6 Month	0.06***	*3.47*	0.00	*-0.22*
9 Month	0.06***	*3.03*	-0.01	*-0.66*
12 Month	0.05**	*2.04*	-0.01	*-0.99*

Statistical significance at the 1%, 5%, and 10% levels are indicated by ***, **, and *, respectively.

Conclusion

Previous studies on outside directorships mainly focus on why CEOs accept outside board service, how shareholder wealth changes after executives join outside directorships, and why firms hire outside CEO directors. In this study, we investigate how investors react to the event of a comeback CEO, who returns from their outside directorship, to serve as the CEO only and whether the comeback CEO is able to improve their home firm performance for the long term.

We find the market's reaction to comeback CEOs is positive, suggesting the market expects the commitment of comeback CEOs to their home firm will improve home firm performance in the long-run. When we separate the sample of comeback CEOs into higher and lesser compensated outside directorships, only comeback CEO firms with lesser compensated directorships show consistently significant and positive long-run BHAR but comeback CEO firms with higher compensation do not. As relative compensation is a proxy for relative firm size and influence, we conclude directorships with small firms tend to have a negative effect on home firm value. The findings suggest the market has unfavorable expectations for a firm's long-run performance when a CEO takes a directorship with lesser director compensation. The market's unfavorable expectations may result from the fact that outside directorships with low compensation require a considerable opportunity cost of the CEOs' time, outweighing the benefits of outside CEO director service. Our findings suggest that CEOs should choose outside directorships carefully to maximize their home firm value.

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The Impact of Race, Income, and Educational Attainment on Home Mortgage Foreclosure

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Abstract

Mortgage foreclosure continues to be a problem in the United States, and many studies have examined causes and solutions, especially concerning issues of race and income. In this study, we identified 453 episodes of foreclosure from data available through a well-known property listing web site. This data was combined with additional information about each property's individual housing and mortgage characteristics obtained from the local assessor's office, and the parish (county) clerk of courts. Geographic Information Systems (GIS) data was used to identify each property's census tract and its corresponding socioeconomic characteristics. The relationship between these characteristics and foreclosure was examined by creating a census tract measure of foreclosure incidence. Conclusions showed that race and income were not significantly related to the incidence of foreclosure, but a lower level of educational attainment was significantly positively correlated to the incidence.

Background

There have been numerous studies in recent years regarding home foreclosures, especially dealing with the after effects of the excessive foreclosures experienced after the U.S. financial crisis of 2007-2008. Falling home values and, in many cases, rising interest rates on adjustable and subprime mortgage loans, contributed to increased home mortgage default rates. This crisis led to a global economic downturn, and created concern by lenders and investors, which was enhanced by greater federal regulations required by the Dodd-Frank

legislation. As a result, lending guidelines in many cases became more restrictive as home mortgage lenders became more risk adverse in making loans, seeking to minimize the risk of mortgage default and incidents of foreclosure by those that were not able to repay their loans.

Although foreclosure rates have fallen from the alarming times after the 2008 financial crisis, foreclosure rates are still problematic in the United States, with some data showing that the situation in the State of Louisiana is more severe than the national average. The Mortgage Bankers Association (MBA) reported that the national percentage of mortgages in foreclosure in 2017 was 0.29 percent, and the average for Louisiana higher at 0.39 percent[1]. When comparing foreclosures to the number of housing units, RealtyTrac reported a foreclosure rate of 0.05 percent nationally, 0.04 percent for Louisiana, and 0.08 percent for Shreveport, an indication that the foreclosure problem was more severe in Shreveport.

According to the July 1, 2018 U.S. Census population estimate, 13.4 percent of the U.S. population is Black or African American. Comparatively, 32.6 percent of the population in Louisiana is Black, and the City of Shreveport, with a population of 192,036, has a 56.7 percent Black population. From a socioeconomic standpoint, Louisiana is one of the poorest states in the U.S., with over 19.7 percent of the population (or over 900,000 people) living below the poverty line in 2018, compared to the national average of 12.3 percent. The City of Shreveport's income and poverty situation is even more severe, with 25.7 percent of the population living in poverty, higher than the state and U.S. averages. Additionally, according to bankrate.com, Louisiana ranked among the top 20 states (out of 50) with the highest ratio of mortgages in foreclosure in 2017.

This study aims to examine foreclosures in the City of Shreveport, in the State of Louisiana, to determine the impact of race and other socioeconomic factors on the rate of foreclosure. The goal of this research is to seek a better understanding of how neighborhood socioeconomic characteristics relate to the rate of foreclosure in a majority minority city with a majority Black population. Given its income and demographics, Shreveport is an interesting city to study foreclosure activity and the impact of race and income on the rate of

[1] See Appendix 1.

occurrence, providing an improved understanding of the socioeconomic characteristics related to foreclosures. An improved understanding of the socioeconomic characteristics related to foreclosure in a majority minority area may improve policies designed to decrease incidents of foreclosures in the future. Following a review of several relevant foreclosure studies, a discussion of our data, findings, and the implications are presented.

Literature Review

Numerous studies have been published in recent years regarding mortgage foreclosures, particularly in light of the 2008 housing bubble and subsequent housing collapse. Much of this mortgage foreclosure literature tends to focus on the causes of individual home foreclosures, and a brief summary of this literature is included, however, fewer studies specifically address the neighborhood characteristics, especially the socioeconomic status of the population and how that is related to mortgage foreclosures. This secondary branch of the literature is most relevant to the primary focus of the current study.

Jones and Sirmans (2015) provide an extensive review of the determinants of residential mortgage default, examining over 100 articles from the early 1990s to 2014. Their review is divided into five major segments, including loan characteristics, trigger events, borrower characteristics, local housing market and macroeconomic conditions, and legal structures of the default process. The survey showed that loan characteristics were the strongest predictors of individual borrower default decisions, especially home equity and loan-to-value ratios and the probability of negative equity. Larger and more comprehensive data sets showed that borrower attributes and local housing market conditions significantly affect the incidence of default; the borrower's FICO score, a measure of consumer credit risk, was the most consistent predictor of default. With respect to fixed-rate mortgages (FRMs) and adjustable-rate mortgages (ARMs), they generally found that in prior studies the ARMs displayed significantly higher default risk than FRMs. One segment of their study, local housing market and macroeconomic conditions, is related to our present study of foreclosures, since we also address neighborhood-housing characteristics. The article further suggests that previous studies seem to indicate that default rates are lower in areas with

appreciating housing prices, and market interest rates higher than existing contact interest rates.

The neighborhood spillover effects of foreclosure have been studied by several authors. Huang, Yates, Thrall and Peiser (2013) studied mortgage foreclosures in 2006-2007, during the onset of the financial crisis. While examining foreclosures in Los Angeles neighborhoods, identified by zip codes, they developed a model that predicted that a 6 percent mortgage failure rate (percentage of mortgages that are in default) was the turning point at which neighborhoods would enter a cascading mortgage foreclosure cycle and almost unstoppable downward cycle, as more and more foreclosures occurred. They strongly recommended that if foreclosure rates reached 5 percent, preemptive actions be taken to prevent the downward cycle and increasing rate of foreclosures as homes deteriorate and neighborhoods decline. This would indicate that where a property is located could have an impact on mortgage default.

We see this further explored in Vernon-Bido et. al. (2017), which studied neighborhood density as related to the foreclosure contagion effect. Using neighborhoods located in Virginia Beach, and a GIS agent based simulation model, the authors found that a reduction in property values and an increase in foreclosures were related to increasing density in four of the five neighborhoods they examined**.** In the study reported in our paper, we also look at foreclosure rates by census tracts in an effort to determine neighborhood impact on the incidence of foreclosure.

Ding, Quercia, and Radcliffe (2010) analyzed the spillover effect of the concentration of subprime lending on the performance of community reinvestment mortgages that targeted low to moderate-income borrowers. They found that the level of subprime lending in a census tract is an important predictor of default of community reinvestment loans made in the same neighborhood. Their study highlights the negative neighborhood spillover effects of foreclosures. They found subprime lending resulted in clusters of foreclosed properties that reduced neighborhood property values, in turn increasing the risk of foreclosure on loans in their study[2].

[2] Bible, Coombs, Joiner and White (2010) studied mortgage foreclosures in Caddo Parish Louisiana, focusing on adjustable rate loans made in the 2000's. They found that that the terms for the adjustable rate mortgages tended to be significantly harsh on the borrowers, forcing many into

In another study, authors looked at how differences in the laws and regulations of a location impact subprime lending. For example, Coe and Liu (2016) examined the impact of state laws on the types of mortgages originated, specifically examining whether judicial foreclosure requirements and allowance of deficiency judgements tended to be related to higher risk, FHA and subprime loans. They found that higher risk loans were less likely to be originated in states with judicial foreclosure requirements, and that permitting deficiency judgements in a site tends to increase the chance of originating higher risk loans[3]. Our study deals with neighborhood effects on foreclosure as measured by census tract data, but does not deal specifically with subprime loans. Since the debacle of the 2000s, banks have reduced the frequency of subprime lending, including our study area in Louisiana.

Additionally, other studies examined the impact of race and segregation of neighborhoods on the rate of home mortgage foreclosures. In an extensive study on neighborhood foreclosures and residential segregation, Hall, Crowder and Spring (2015) looked at virtually all home foreclosures from 2005 to 2009 for block groups in the United States. Their results showed that foreclosures were more prevalent along racial lines in that Black and Latino residents experienced higher foreclosure rates, and that foreclosure concentrations were linked to declining percentages of White residents and expanding percentages of Black and Latino residents. Our study contributes to the literature by also examining home foreclosures by race and census tracts.

In a study examining housing foreclosures for the nation's 100 largest Metropolitan Statistical Areas, Rugh and Massey (2010) found

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foreclosure when the terms were adjusted and borrowers were underwater and unable to sell their homes as prices stabilized or declined and the rates on mortgages increased dramatically.

[3] Aalberts and Bible (1988 and 1991) studied the mortgage foreclosure process for homes in Caddo Parish Louisiana, prior to the housing collapse in 2008 and beyond. Their study provided insight into the default/foreclosure process showing factors that related to the dismissal of foreclosure suits and examined the legal implications of an appraisal on mortgaged properties. Our study does examine the length of time between the foreclosure suit and the actual foreclosure sale, providing insight into the likelihood for dismissal or not settlement of the foreclosure suit. Louisiana does allow for deficiency judgements, but the lender must have an appraisal completed.

that the greater the degree of Hispanic and Black segregation found in a metropolitan area, the higher the number and rate of foreclosures the area experienced. The authors showed that both Hispanic and Black homeowners and Hispanic and Black neighborhoods bore the brunt of the foreclosure crisis and furthermore risky lending was structured based on race and ethnicity (Rugh and Massey, 2010). Their study used RealtyTrac data for foreclosures, whereas for this study, we use Zillow. Furthermore, the current study examines the influence of race and ethnic background using foreclosure rates, race, and income by census tract, more narrowly, for the City of Shreveport.

Aughinbaugh (2013) studied a cohort of the youngest baby boomers (those born between 1957 and 1964) using the National Longitudinal Survey of Youth 1979 database that included their patterns of foreclosure and homeownership for the period between 1988 through 2008. The author found that Black residents were less likely to lose their home due to foreclosure, as compared to Hispanics, and that as education increased, homeowners were less likely to receive a foreclosure notice, and less likely to experience losing their home due to foreclosure.

This study uses census tract level socioeconomic characteristics, shown to be correlated with individual FICO scores in prior research, in addition to the census tract rate of foreclosure, to provide insight into how these variables are correlated in our study area. A current census tract average FICO score would capture the credit risk of current mortgage seekers or recent borrowers but census tract demographics capture the current socioeconomic characteristics of the entire neighborhood, not just recent borrowers. Beer, et al. (2018) found household income is correlated with credit scores, so median household income is included as the measure of income at the census tract level. Census tract level race and educational attainment measures are included as Bernerth (2012) found minority status to be negatively related to credit scores and education level to be positively related to credit scores. Our study seeks to add to the body of literature on the relationship between race, income, and education on the neighborhood rate of home foreclosures.

Methodology

In evaluating the relationship between the socioeconomic characteristics of the census tracts and foreclosure in the census tracts,

the individual foreclosures are grouped based on their census tract location. The first test examines whether the characteristics of the homes receiving a foreclosure notice differ between majority Black and majority White census tracts. Given the large number of observations observed in both groups, an independent samples test of the means is used to assess differences in the mean characteristics of the foreclosed homes based on the majority racial composition of their census tract location. The second test examines whether the characteristics of the homes receiving a foreclosure notice differ based on the relative poverty status of their census tract location. A dummy variable is used to group census tracts into two groups, those that exceed the poverty guideline and those that do not. Due to the large number of observations included in the study for both groups, an independent samples test of the difference between the means is used to compare the mean characteristics of the foreclosed homes based on the poverty status of their census tract location. The final analysis evaluates the relationship between the socioeconomic characteristics of the census tracts and the rates of foreclosure in the census tracts. Due to the high correlation between the socioeconomic characteristics of interest, correlation analysis is used to evaluate the relationships between these variables and with the incidence of foreclosure. The census tract socioeconomic characteristics exhibit some skewness so both Pearson and Spearman correlations are reported. Although Pearson correlations are robust to non-normality, the test statistics are not, so the Spearman correlations and p-values were also included in the results.

Description of the Data

General data

This study examines 453 single-family residential homes in Shreveport, Louisiana that were in default and received a notice of foreclosure from the lender during a review period in 2017. Many of the homes were listed to be sold at auction, while others were waiting for sale or some type of settlement. The data was obtained from the Zillow online real estate database during the period of August 2017 to October of 2017 and included all homes listed in Shreveport that received foreclosure notices. Information on home characteristics and mortgages was obtained from Zillow; the Caddo Parish Assessor's Office was also used to obtain detailed information on the home

characteristics and the current and past property owners. Sale price data were obtained from the Caddo Parish Clerk of Courts property records, which showed 279 of the 453 homes (61.5 percent) were sold at a sheriff's sale on or before October 15, 2017. The summary statistics for the foreclosed homes are presented in Table 1.

Table 1. Summary Statistics of Foreclosed Homes

	Mean	Standard Error	Median	Standard Deviation	N
Assessed property value	$112,370	$3,778	$97,170	$80,416	453
Recent sale price before auction	$102,647	$4,601	$82,769	$93,274	411
Heated/cooled square feet	1660	32	1499	671	453
# of bedrooms	3.02	0.03	3	0.69	453
Homestead exemption (yes=1)	0.41	0.02	0	0.49	450
Age	33	0.87	29	19	451
Sales price at auction	$66,025	$4,241	$50,000	$69,551	269
Mortgage balance at foreclosure	$101,951	$4,282	$85,033	$77,315	326
Mortgage balance to auction price	21.81	10.39	1.58	1.44	192
Mortgage balance to assessed value	1.02	0.038	0.92	0.68	326
Auction price to assessed value	0.63	0.05	0.6	0.84	269

Property data

The home characteristics information obtained include the dates each property was built, the number of heated and cooled square feet, the number of bedrooms, the number of baths, the assessed value (from the public assessor's database), the assessed value of the land and improvements, and the name of the mortgagor(s). Also included were the date of auction sale, the sale price, the purchaser at the auction, and the name of the buyer at the auction sale for all homes sold at auction.

The 2017 median value of owner-occupied housing units in Shreveport was $139,800, (compared to the U.S. median of $193,500)

as reported by the Census Bureau estimates data, an indication that housing in this city is moderately priced. The 453 properties that are part of this study ranged from assessed values of $10,310 to $630,090, with an average value of $112,370 (which included land and improvements). The average number of heated and cooled square feet was 1,660, and ranged from 696 to 5,113 square feet. It appears that most of the homes were older; the newest foreclosed home was 3 years' old and oldest 114 years' old, with an average age of 33 years, and a standard deviation of 19.

Also of interest is that 183 of 450 homes (40.6 percent) had a homestead exemption on file with the Clerk of Courts. In Louisiana, homestead exemptions (resulting in a $75,000 reduction in assessed value for parish (county) taxes), are only available for one owner-occupied home per family. This indicates that more than half of the foreclosed homes were not owner-occupied, and likely being held for investment purposes.

Foreclosure sale and mortgage data

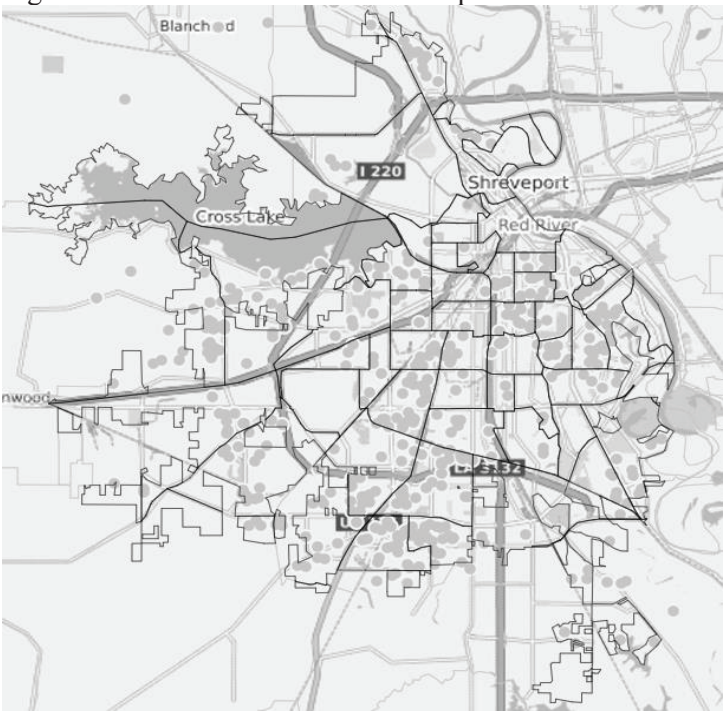
Our data shows the average sale price for the most recent sale was $102,647, about 10 percent less than the average assessed value of $112,370, which is somewhat surprising since assessed values usually lag behind market prices in this area. Three hundred twenty-six homes reported an average and median mortgage balance of $101,951 and $85,033 respectively, at the time of the foreclosure notice. When comparing the mortgage balances to assessed values, we found the mean was 102 percent and median 92 percent, indicating that, not unexpectedly, a relatively high loan to value ratio existed for the homes sold in the sheriff's foreclosure auction. When examining the auction price and assessed value, it is evident that the homes sold for substantially less at auction, with a mean auction price of 63 percent of assessed value. Additional information dealing with the type of loan, obtained from the clerk of courts records, indicated that there were 259 conventional loans and 217 insured and guaranteed loans by Government Sponsored Agencies (GSAs), either FHA or VA loans. When looking at the days from the last sale until the actual auction date, it appears that 246 homes were held an average of a little over 10 years before going into foreclosure sale at auction.

Foreclosure property locations

The question of interest is whether differences exist in the rate of foreclosure throughout the city, and, if differences do exist, determine

which socioeconomic characteristics are related to higher rates of foreclosure. In order to evaluate the foreclosures, each foreclosed parcel is mapped into its corresponding census tract. Using Alteryx Public Geocoder, one of many free online geocoding applications,[4] the 453 foreclosure properties are assigned to their corresponding census tracts by converting their location into latitude and longitude coordinates, and then each property is placed into its corresponding census tract using Tableau analytics platform. The 5-YR American Community Survey (ACS) is used to obtain socioeconomic characteristics and information about the overall number of properties with a mortgage in each tract. Figure 1 displays the locations of foreclosures in the study and shows that the foreclosure properties are dispersed throughout the City of Shreveport.

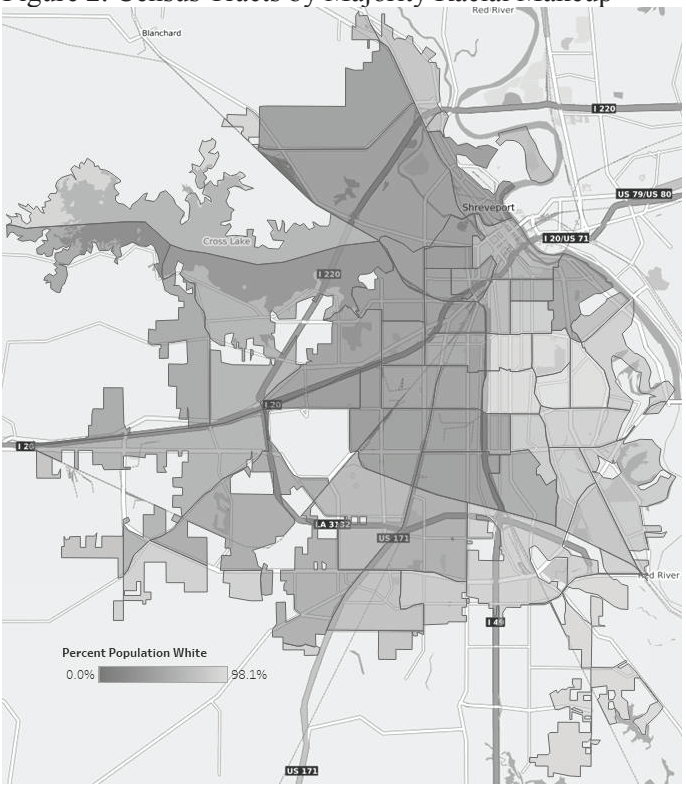
Figure 1. Locations of Foreclosure Properties



[4] Other free online geocoding applications that could be used include Google Maps, HERE Maps, and the U.S. Census Bureau's Census Geocoder.

In addition to the characteristics of the foreclosed homes, data for each property's neighborhood and socioeconomic characteristics were gathered, including population, race, and income, based on each property's geographic location (determined by census tract). Since the overall summary characteristics of the foreclosed homes were provided in Table 1, as a second step in evaluating the foreclosures, the characteristics of the homes are compared to see if differences in the foreclosures exist between census tracts when grouped by socioeconomic characteristics. Since research by Rugh and Massey (2010) has shown racial segregation to be related to higher rates of foreclosure in Black neighborhoods, the racial composition of the census tract for each of the foreclosure properties was determined. Census tracts are grouped based on their majority racial composition. Figure 2 shows the distribution of census tracts in the area based on their racial composition.

Figure 2. Census Tracts by Majority Racial Makeup



The characteristics of foreclosed homes are shown in Table 2 based on whether they are located in majority Black or majority White census tracts.[5] The foreclosure homes in majority Black census tracts have lower mean values in every characteristic. The independent samples t-test indicates statistically significant differences at the 0.01 level of significance for every characteristic except for whether the property owner claims a homestead exemption and age.

Table 2. Mean Foreclosure Characteristics by Census Tract Race

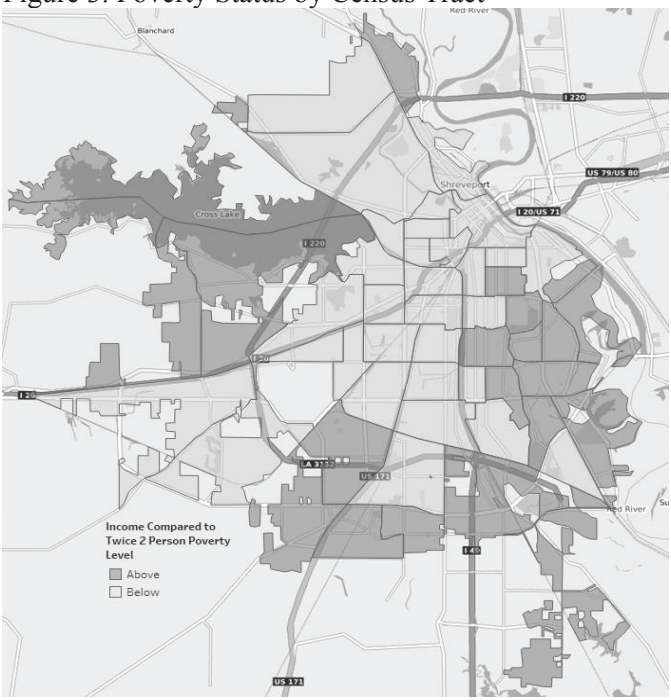
	Black	White	t-test	p-value
Mortgage balance	$ 82,964	$ 128,476	-5.108	<0.001
N	190	136		
Homestead exemption	0.37	0.46	-1.817	0.070
N	264	186		
Purchase price	$ 83,590	$ 128,347	-4.55	<0.001
N	236	175		
Price Sheriff's Sale	$ 50,274	$ 89,144	-4.338	<0.001
N	160	109		
Assessed Value	$ 95,737	$ 135,604	-5.09	<0.001
N	264	189		
Square Ft.	1529.44	1843.2	-4.768	<0.001
N	264	189		
Age (years)	32.47	34.78	-1.238	0.216
N	263	188		

In a separate analysis, the homes receiving foreclosure notices are grouped based on the relative poverty status of their census tract location. In the City of Shreveport, median household income (HHI)

[5] The population of Shreveport, Louisiana is overwhelmingly comprised of two racial groups, White and Black. Asians account for only 1.2% of the population, and over one-third of census tracts report 0% Asian population. Since one variable of interest is the racial composition of the census tract, all census tracts are categorized based on the majority racial group of the census tract, and all census tracts in the study area are either majority Black or majority White.

across census tracts is quite varied, ranging from $14,776 to $110,758, with margins of error between $3,099 and $24,999. In order to identify census tracts based on their relative poverty status, a poverty income threshold must be determined.

Figure 3. Poverty Status by Census Tract



The relevant income threshold is based on combining several key measures: the average household size for the city of Shreveport (2.51), the 2017 Poverty Guidelines for a 2-person family ($16,250), and median gross rent paid in the city ($781). At an income level twice the poverty threshold for a 2-person family ($32,500), monthly income would be approximately $2,708. Using a standard assumption of spending 30 percent of monthly income on rent would equate to $812, which is close to the median gross rent paid in the city ($781). Given these assumptions, the relative poverty indicator was set at $32,500 (twice the 2017 Poverty Guideline for a 2-person family). Therefore, in census tracts where the median household income is above the threshold, a median household could at least afford the median city rent in the event of a foreclosure. Census tracts below this threshold

would be unable to afford rent and would be at most risk if the home they resided in processed through foreclosure.

Census tracts are divided into two groups, those tracts in which the median household income is large enough to statistically differ from the poverty threshold, and tracts in which median income either is below the threshold or does not differ from the poverty guidelines. Our analysis shows that twenty-two of the fifty-two census tracts (42.3 percent) exceed 200 percent of the poverty guideline. Figure 3 illustrates the relative poverty status of the census tracts in the city.

Table 3. Mean Foreclosure Characteristics by Tract Poverty Status

	At or below 200% poverty	Above 200% poverty	t-test	p-value
Mortgage balance	$ 80,883	$ 119,253	-4.595	<0.001
N	147	179		
Homestead exemption	0.36	0.44	-1.812	0.071
N	195	255		
Purchase price	$ 80,250	$ 118,766	-4.213	<0.001
N	172	239		
Price Sheriff's Sale	$ 51,444	$ 76,912	3.016	0.003
N	115	154		
Assessed Value	$ 89,077	$ 129,975	-5.532	<0.001
N	195	258		
Square Ft.	1473.48	1801.59	-5.423	<0.001
N	195	258		
Age (years)	34.66	32.50	1.229	0.222
N	194	257		

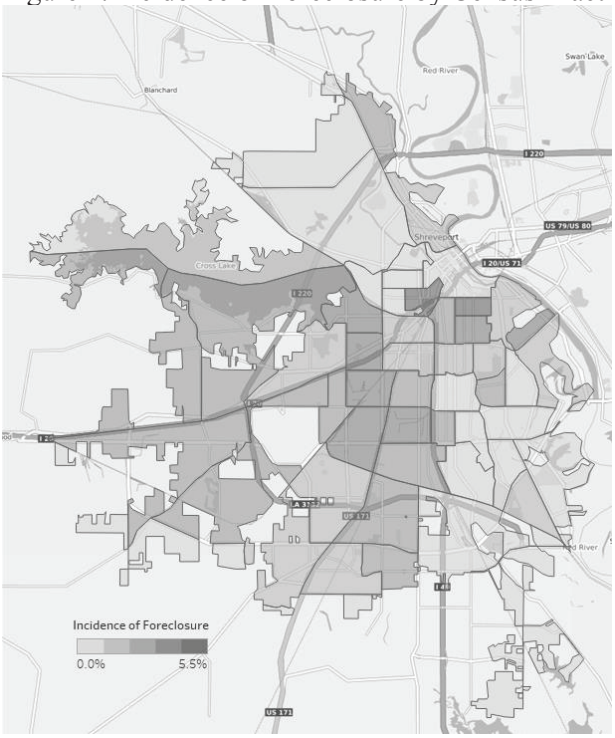
Table 3 shows the characteristics of the homes receiving foreclosure notices based on whether they are located in a census tract above the poverty threshold or not. The independent samples t-test is used to assess whether there is a significant difference between these groups. The foreclosure homes in census tracts at or below the poverty threshold have lower mean values in every characteristic except age. As was the case when grouped by race, statistically significant differences, at the 0.01 level of significance, exist between the means

when the foreclosures are grouped based on poverty status for all variables except homestead exemption and age.

Measuring the rate of foreclosure

Since the foreclosure properties are grouped into their corresponding census tracts, one way to numerically measure the spread of foreclosures throughout the city is to create a measure of foreclosure incidence. Comparing the number of properties with a mortgage to the number of foreclosures in the census tract yields an incidence, or rate, of foreclosure. Figure 4 shows how this incidence is spread across the City of Shreveport. Overall, during the review period, the census tracts found within the City of Shreveport had 453 foreclosures out of 28,804 single-family housing units with a mortgage; this represents a citywide incidence rate of foreclosure of 1.6 percent. The incidence of foreclosures ranges between 0.23 percent and 5.24 percent within the census tracts, though six tracts had zero foreclosure properties.

Figure 4. Incidence of Foreclosure by Census Tract



The prior results demonstrate the characteristics of the homes receiving a foreclosure notice in majority Black and majority White census tracts differ, and that differences exist in the characteristics of homes in census tracts above and below the poverty guideline. Now we examine the relationship between the socioeconomic variables of the tract and the rate of foreclosure in the tract, as well as other neighborhood characteristics, using correlation analysis. Tables 4 and 5 show the Spearman and Pearson correlations, respectively, for the fifty-two census tracts. The Spearman correlations indicate significant positive relationships between the socioeconomic characteristics median household income (HHI) and percent White ($r=0.77$, $p<0.01$), and higher levels of educational attainment, such as the percentage with a college degree ($r=0.79$, $p<0.01$). At the census tract level, neither percent White nor median household income are significantly correlated with the rate of foreclosure.[6] The percentage of the census tract with only a high school education is negatively correlated with median household income ($r=-0.59$, $p<0.01$) and percent White ($r=-0.67$, $p<0.01$). This variable measuring educational attainment is positively correlated with the rate of foreclosure ($r=0.309$, $p<0.05$), indicating as the percentage with only a high school education increases, the incidence of foreclosure increases.

Conclusions and Observations

Prior research has established the importance of individual borrower and loan characteristics as influences on the likelihood of foreclosure. Research has also indicated racial demographics of a neighborhood are related to foreclosure. However, we found that, as observed during the time period in this city, neither race nor income were significantly related to the incidence of foreclosure.

However, our results did find that education was significantly correlated with the incidence of foreclosure at the census tract level, suggesting that educational attainment is an important factor to

[6] The relationship between race and the other census tract characteristics was evaluated with only one variable, Percent White, since the racial demographics of the census tracts are such that there is almost perfect negative correlation between Percent White and Percent Black, $r=-0.996$. The correlation between Percent Asian and Incidence of Foreclosure, the primary variable of interest, was observed to be $r=0.010$, and statistically insignificant, with a p-value of 0.945, so Percent Asian was not included in the results shown in the correlation tables.

consider in foreclosure research. At a local level, these conclusions suggest more focus on educational attainment across all demographic groups could be a way to reduce the incidence of foreclosure. Our analysis and results provide additional support for the findings of Aughinbaugh (2013). In that study, it found that in the relationship between educational attainment and foreclosure notices at the individual level, as education increased, foreclosure incidents decreased among Black residents.

Table 4. Spearman Correlations Between Socioeconomic Characteristics and Foreclosure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Median HHI	–								
(2) % White, Non-Hispanic	.766 ***	–							
(3) Incidence of Fore-closure	-.050	-.183	–						
(4) % No High School	-.884 ***	-.751 ***	.142	–					
(5) % High School	-.592 ***	-.670 ***	.309 **	.601 ***	–				
(6) % Some College	.321 **	.231 *	.121	-.420 ***	-.321 **	–			
(7) % College Grad	.786 ***	.764 ***	-.197	-.827 ***	-.836 ***	.206	–		
(8) Median Gross Rent	.814 ***	.615 ***	-.090	-.680 ***	-.469 ***	.115	.642 ***	–	
(9) Median Home Value	.785 ***	.756 ***	-.271 *	-.839 ***	-.745 ***	.237 *	.869 ***	.664 ***	–
(10) % Owner Occupied	.785 ***	.524 ***	-.092	-.688 ***	-.339 **	.034	.597 ***	.689 ***	.581 ***

N=52, *** correlation is significant at the 0.01 level (2-tailed), ** significant at the 0.05 level (2-tailed), * significant at the 0.10 level (2-tailed)

The authors encourage further study of similar majority-minority cities to determine if similar results are found. Zillow data, combined

with assessor and clerk of courts data, data from the U.S. Census Bureau, and publicly available geocoding applications, provide a wealth of no cost data readily available for analysis. Given the costs to lenders, and the negative impact on the lives of the people going through a foreclosure process, and to their neighborhoods, we believe it is a worthwhile effort to help identify the causes of foreclosure incidents and what does not; then, we can develop strategies that would help reduce them, such as educating borrowers in helping them make better decisions.

Table 5. Pearson Correlations Between Socioeconomic Characteristics and Foreclosure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Median HHI	–								
(2) % White, Non-Hispanic	.802 ***	–							
(3) Incidence of Fore-closure	-.202	-.188	–						
(4) % No High School	-.726 ***	-.771 ***	.036	–					
(5) % High School	-.664 ***	-.753 ***	.280 **	.537 ***	–				
(6) % Some College	.075	.317 **	.103	-.484 ***	-.257 *	–			
(7) % College Grad	.832 ***	.818 ***	-.255 *	-.730 ***	-.880 ***	.032	–		
(8) Median Gross Rent	.854 ***	.655 ***	-.105	-.628 ***	-.472 ***	.034	.663 ***	–	
(9) Median Home Value	.878 ***	.763 ***	-.320 **	-.698 ***	-.720 ***	.036	.871 ***	.749 ***	–
(10) % Owner Occupied	.808 ***	.617 ***	-.145	-.631 ***	-.368 ***	.016	.601 ***	.706 ***	.610 ***

N=52, *** correlation is significant at the 0.01 level (2-tailed), ** significant at the 0.05 level (2-tailed), * significant at the 0.10 level (2-tailed)

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Appendix 1

2017 Louisiana: Non-Seasonally Adjusted

	Q1	Q2	Q3	Q4
% All Mortgages Past Due	6.77	6.74	7.65	8.07
% Mortgage Payments Past Due 30-59 Days	3.22	3.41	4.04	4.23
% Mortgage Payments Past Due 60-89 Days	1.09	1.18	1.40	1.50
% Mortgage Payments Past Due 90+ Days	2.47	2.15	2.20	2.34
% Seriously Delinquent Mortgages	4.06	3.69	3.67	3.92
% Mortgage Foreclosures Started	0.43	0.38	0.34	0.44
% Mortgage Foreclosure Inventory (EOP)	1.59	1.54	1.49	1.58
All Mortgages Number Serviced	446,059	460,716	459,245	458,322

	2017 United States: Non-Seasonally Adjusted			
	Q1	Q2	Q3	Q4
% All Mortgages Past Due	4.33	4.22	4.99	5.45
% Mortgage Payments Past Due 30-59 Days	2.26	2.27	2.84	2.75
% Mortgage Payments Past Due 60-89 Days	0.70	0.74	0.86	0.99
% Mortgage Payments Past Due 90+ Days	1.37	1.20	1.29	1.72
% Seriously Delinquent Mortgages	2.76	2.49	2.52	2.91
% Mortgage Foreclosures Started	0.30	0.26	0.25	0.25
% Mortgage Foreclosure Inventory (EOP)	1.39	1.29	1.23	1.19
All Mortgages Number Serviced	37,712,386	38,948,580	38,835,925	38,764,655