Journal of Business, Economics & Finance

ISSN: 2146-7943 YEAR: 2013 VOLUME: 2 ISSUE: 1

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Journal of Business, Economics & Finance
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Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

CONTENT

Title and Author/s **Page**

Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

APPROXIMATE RULES TO CALCULATE MONTHLY MORTGAGE PAYMENTS

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KEYWORDS

Mortgage payment, mortgage interest rate, approximate rule.

ABSTRACT

There are many tools to calculate the monthly mortgage payment. If, however, any of these tools is not immediately available, it may not be easy to calculate the monthly mortgage payment. We propose three approximate rules for two popular 15- and 30-year mortgage terms. These rules work very well for historical mortgage interest rates that range from 4% to 15%. Not only financial professionals but also academicians can use them very easily in any informal situation without regard to availability of specific tools.

1. INTRODUCTION

Is there any easy way to calculate the monthly mortgage payment for a 15-year or a 30-year fixed rate mortgage loan? Actually, there are useful tools to calculate the monthly mortgage payment such as formula, financial calculator, and Excel. Online mortgage calculators are also offered by tons of websites. Any of these tools, however, may not be the answer for the question unless they are immediately available. More often than not, even financial professionals do not easily memorize the exact formula of the monthly mortgage payment. Even if they do, what if only a simple calculator is available? Unfortunately, it seems to be a difficult situation because there are few approximate rules known to people that can be easily used.

There are many studies that delve into the optimal decision of the mortgage term. Stansell and Millar (1976) investigate whether the variable rate mortgage payment significantly increases relative to the net income during a high inflation period and find that the variable payment does not impose a substantial burden on the mortgagor. Focusing on the same inflation effect, Barney and White (1986) shows that uncertainty in the future inflation can force even individuals with rising income to prefer the fixed payment mortgage to the graduated payment mortgage. As a similar study, MacDonald and Winson-Geidman (2012) find that inflation uncertainty decreases the adjustable rate mortgage (ARM) originations, specially, subprime ARM originations. Dhillon, Shilling, and Sirmans (1990) explain what mortgage term is preferred on the basis of wealth, tax, interest rate, and real housing price. Kistner (1998), Goff and Cox (1998), and Tomlinson (2002) support the long-term mortgage under some specific conditions. Gallay (2005) presents the mortgage decision based on scenarios using investment returns. Coulibaly and Li (2006) find that households eventually increase financial savings after the last mortgage payment. Basciano, Grayson, and Walton (2006) and Baek and Bilbeisi (2011) employ the Monte Carlo simulation to compare long-term and short-term mortgages in terms of their net gains. Deritis, Kuo, and Liang

(2010) formulate the impact of payment shock on mortgage performance and show that the payment shock is different depending on the delinquency situation of the loan and has the most impact on current loans. None of these studies, however, are directly associated with the mortgage payment method. The focus of our study is on developing approximate payment rules for the first time.

We propose three approximate rules that result from a simple linear regression. They are developed for two popular 15- and 30-year mortgage terms. In most cases, their percentage errors are less than 3%. In addition, they work for any amount of the mortgage loan.

Though these approximate rules are based on a very simple mathematical idea, it provides a really easy way to calculate the approximate mortgage payment in any informal situation regardless of availability of any specific tools.

2. APPROXIMATE RULES

2.1. 492+59 Rule (15-Year Mortgage Term)

Consider calculating the monthly mortgage payment for a 15-year, $200,000 mortgage loan at 4.50%. According to the exact formula,

Exact monthly payment = $(200{,}000 \times .045/12)/[1 - (1 + .045/12)^{-180}] = \$1{,}529.99$

The 492+59 approximate rule is proposed.

Approximate monthly payment for a 15-year mortgage loan = $(492 + 59 \times i) \times P$ (1)

where i is an interest rate (%), and P is a loan amount per $100,000. Using this approximate rule,

Approximate monthly payment = $(492 + 59 \times 4.5) \times 2 = \$1{,}515$.

The difference between the exact monthly payment and the approximate monthly payment is $14.99 which is only 0.98% error. If the mortgage rate increases to 6.75%,

Exact monthly payment = $(200{,}000 \times .0675/12)/[1 - (1 + .0675/12)^{-180}] = \$1{,}769.82$

Approximate monthly payment = $(492 + 59 \times 6.75) \times 2 = \$1{,}780.50$

The difference is $$10.68 which is only 0.6% error. With a mortgage rate of 5.60%, both payments are almost equal. Even when the amount of the mortgage loan increases or decreases, given a specific mortgage rate, the percentage error is always the same. For instance, even if the amount of the mortgage loan increases to $1,000,000 with the same rate of 6.75%, the percentage error is exactly equal to 0.6%.

2.2 179+71 Rule (30-Year Mortgage Term)

In the same way, the 179+71 approximate rule for a 30-year mortgage loan is proposed.

Approximate monthly payment for a 30-year mortgage loan = $(179 + 71 \times i) \times P$ (2)

On a 30-year, $350,000 mortgage loan at 4.75%,

Exact monthly payment = $(350{,}000 \times .0475/12)/[1 - (1 + .0475/12)^{-360}] = \$1{,}825.77$

Approximate monthly payment = $(179 + 71 \times 4.75) \times 3.5 = \$1{,}806.88$

The difference is $18.89 which is only 1.03% error. If the mortgage rate increases to 7.0%,

Exact monthly payment = $(350{,}000 \times .07/12)/[1 - (1 + .07/12)^{-360}] = \$2{,}328.56$

Approximate monthly payment = (179 + 71 x 7) x 3.5 = $2,366

The difference is $37.44 which is only 1.6% error.

2.3. 646+65-14 (Combined) Rule

Now, the 646+65-14 combined rule is proposed for both 15- and 30-year mortgage terms.

Approximate monthly payment = (646 + 65 x i – 14 x N) x P (3)

where N is either 15 or 30. Since this rule covers both 15- and 30-year terms, it is more convenient to use this rule than two independent 15- and 30-year approximate rules proposed earlier. Generally, however, this combined rule tends to show slightly higher percentage errors than those two independent rules depending on mortgage interest rates. Consider a 15-year, $300,000 mortgage loan at 4.75%.

Exact monthly payment = (300,000 x .0475/12)/[1 – (1 + .0475/12)$^{-180}$] = $2,333.50

Approximate monthly payment = (646 + 65 x 4.75 – 14 x 15) x 3 = $2,234.25

The difference is $99.25 which is 4.25% error. If the mortgage rate increases to 6.0%,

Exact monthly payment = (300,000 x .06/12)/[1 – (1 + .06/12)$^{-180}$] = $2,531.57

Approximate monthly payment = (646 + 65 x 6 – 14 x 15) x 3 = $2,478

The difference is $53.57 which is 2.12% error. If this is a 30-year mortgage loan,

Exact monthly payment = (300,000 x .06/12)/[1 – (1 + .06/12)$^{-360}$] = $1,798.65

Approximate monthly payment = (646 + 65 x 6 – 14 x 30) x 3 = $1,848

The difference is $49.35 which is 2.74% error. If the mortgage rate decreases to 4.25%,

Exact monthly payment = (300,000 x .0425/12)/[1 – (1 + .0425/12)$^{-360}$] = $1,475.82

Approximate monthly payment = (646 + 65 x 4.25 – 14 x 30) x 3 = $1,506.75

The difference is $30.93 which is 2.10% error.

As a matter of fact, even if the combined rule has slightly higher percentage errors, it may be preferred as one single rule that covers both 15- and 30-year mortgage terms. Once again, this combined rule also can be used for any amount of the mortgage loan.

3. DEVELOPMENT OF APPROXIMATE RULES

According to Mortgage-X.com (http://mortgage-x.com/trends.htm), the national average contract mortgage rate ranges from 4% to 15% for the past 5 decades. Approximate rules are developed within this range. As we know, basically, there are two different types of annuity. One is the ordinary annuity and the other is the annuity-due. The monthly payment formula for each annuity is as follows.

Ordinary Annuity

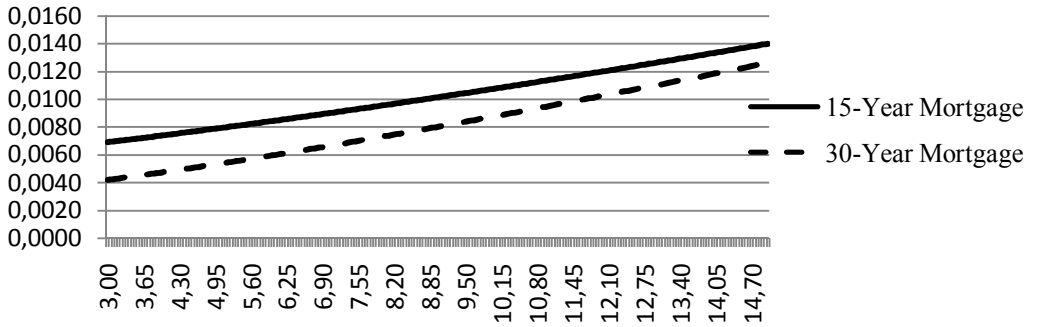
R = (i/12)/[1 – (1 + i/12)$^{-n}$] x P (4)

Annuity-Due

$$R = (i/12)/[(1 + i/12) - (1 + i/12)^{-n+1}] \times P \quad (5)$$

where i is an interest rate, R is the monthly payment at i, n is the number of months, and P is a loan amount. Since, however, the actual mortgage payment is calculated on the basis of the ordinary annuity, our approximate rules are developed using Equation (4). Under the assumption that the loan amount is $1, exact monthly payments are calculated as the interest rate increases from 3% to 15% given an increment of 0.05%. Figure 1 shows how monthly payments increase for both 15-year and 30-year mortgage terms as the interest rate increases.

Figure 1: Monthly Payments



Both curves are flat, and the 30-year curve is slightly steeper than the 15-year curve. R is an increasing function of i, and its curvatures for i values (4% - 15%) are small, which also confirms that R is a flat curve. This makes it possible to construct an approximate linear relationship between R and i. The following simple linear regression equation is used.

$$R(i) = \alpha + \beta i + \gamma D + \varepsilon \quad (6)$$

where D is a dummy variable that has either 15 or 30 depending on the mortgage term. First, two independent 15- and 30-year approximate rules are developed without the dummy variable. Second, the combined rule is developed with the dummy variable set to 15 if the mortgage term is 15 years and 30 if the mortgage term is 30 years. The regression results are shown in Table 1. Adjusted R-squares for all three cases are close to one, and coefficients are very significant at 1% level. As a result, we obtain a well-fitted linear relationship between monthly payments and interest rates.

Table 1: Regression Results

We calculate monthly payments at interest rates from 3% to 15% using an increment of .05%. Then, we regress monthly payments computed on interest rates and a dummy variable.

*** indicates a statistical significance at 1%.

Mortgage Term	σ	β	γ (Dummy)	Adjusted R^2
15-Year Term	.00492 (t=295.14***)	.00059 (t=343.27***)	-	.9980
30-Year Term	.00179 (t=85.97***)	.00071 (t=328.01***)	-	.9978
Combined Term	.00646 (t=151.52***)	.00065 (t=216.85***)	-.00014 (t=-99.26***)	.9916

Using coefficients, σ and β estimated from three regressions in Table 1, we write three approximate rules as follows.

15-year mortgage Rule

Approximate Monthly Payment = (492 + 59 x *i*) x P

30-year mortgage Rule

Approximate Monthly Payment = (179 + 71 x *i*) x P

Combined Rule

Approximate Monthly Payment = (646 + 65 x *i* – 14 x N) x P

where *i* is an interest rate (%), N is either 15 or 30, and P is a loan amount per $100,000.

In Table 2, the percentage error is calculated as the absolute value of the ratio of the difference between the exact payment and the approximate payment to the exact payment.

With the historical range of the national average contract mortgage rate (4% - 15%), most cases have less than 3% errors. Although the combined rule shows slightly higher percentage errors than two independent 15- and 30-year rules, it may be more convenient because it covers both 15- and 30-year terms with one single equation. It, however, entirely depends on users' preference. Since regressions are based on $1 loan, all three rules work in exactly the same way for any amount of the mortgage loan.

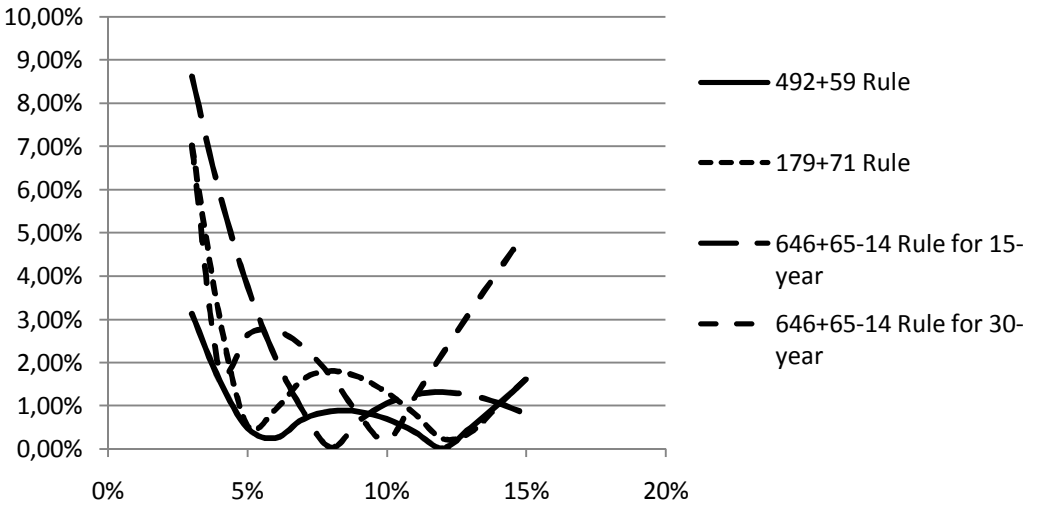
Table 2: Percentage Errors of Approximate Payments

% Error is computed as the absolute value of the ratio of the difference between the exact payment and the approximate payment to the exact payment.

Interest Rate	% Error for 15-Year Mortgage Term (492+59 rule)	% Error for 30-Year Mortgage Term (179+71 rule)	% Error for Combined Term (646+65-14 rule)	
			15-Year Term	30-Year Term
3%	3.13%	7.02%	8.63%	7.02%
4%	1.58%	3.02%	5.91%	1.80%
5%	0.48%	0.53%	3.77%	2.64%
6%	0.25%	0.91%	2.12%	2.74%
7%	0.69%	1.61%	0.87%	2.36%
8%	0.87%	1.80%	0.04%	1.67%
9%	0.86%	1.66%	0.66%	0.79%
10%	0.69%	1.30%	1.06%	0.18%
11%	0.39%	0.81%	1.27%	1.19%
12%	0.01%	0.23%	1.32%	2.20%
13%	0.49%	0.38%	1.25%	3.18%
14%	1.03%	1.00%	1.07%	4.12%
15%	1.61%	1.62%	0.82%	5.02%

Figure 2 also shows percentage errors graphically for all three rules. It is certain that percentage errors for all rules are relatively small (less than 2%) in the range between 5% and 10% which was dominant during the past two decades.

Figure 2: Percentage Errors for Approximate Rules



4. CONCLUSION

It is true that there are many tools that can be used to calculate the monthly mortgage payment. Sometimes, however, they may not be immediately available. Since there are few approximate rules known to people, we propose three approximate rules under the assumption that any specific tools are not immediately available. The 492+59 rule is an approximate method to calculate a 15-year mortgage payment and the 179+71 rule is an approximate method to calculate a 30-year mortgage payment. These approximate rules are very convenient and show quite small errors over the historical range of the national average contract mortgage rate. The combined 646+65-14 rule is even more convenient to use but shows a little higher errors than two independent rules.

Not only financial professionals but also academicians can use either two independent 15- and 30-year rules or the combined rule. These approximate rules can be widely used in financial education, college classroom teaching, and even financial consulting work. Since these rules show trivial errors that can be ignored in any informal situation, it is expected that these rules help make a quick mortgage decision as one of important investment decisions.

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Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

DO PRESS ANNOUNCEMENTS OF CORPORATE DOWNSIZING PREDICT ACTUAL DOWNSIZING?

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KEYWORDS

Restructuring, layoffs, downsizing, press announcements, board independence.

ABSTRACT

We investigate the determinants of actual downsizing following corporate press announcements of downsizing and find that some announcements are followed by lower growth rates in assets and employees and some are not. Our analysis indicates that the downsizing announcement sometimes implies net downsizing and sometimes implies strategic re-alignment of assets. Firms with increased asset and employee growth rates have higher market to book, a proxy for investment opportunities. In contrast, ex-post decreases in growth occur for firms with lower operating performance. Further we find that during a normal economy, board independence is also associated with lower ex-post growth, but not during a period of economic decline. This suggests a relatively more board involvement in asset restructuring during normal or boom times. The results provide new evidence on the nature of information contained in announcements of asset downsizing and employee layoffs.

1. INTRODUCTION

Managerial announcements of intended future actions often resolve information asymmetry and lead investors to update their valuations (e.g., Huson, Malatesta and Parrino (2004), John and Ofek (1995), Daley, Mehrotra and Sivakumar (1997), Mulherin and Boone (2000),among many others). There is, however, significant variation in the nature of corporate announcements. Discrete actions such as CEO firingsor dividend changeshave high correlation with actual changes within the firm. In contrast, announcements ofdownsizing via asset sales or employee layoffs do not necessarily imply reduced growth rates in assets or employees.Our contention is that all downsizing announcements are not created equal. Rather, some can be correlated with subsequent reductions in firm growth rates, while other can be correlated with net expansion if the announcement denotes strategic realignment of assets.

The literature on determinants of corporate announcements of downsizing is well-established (e.g., Kang and Shivdasani (1997); Denis and Kruse (2000)). In contrast, there is scant evidence on the determinants of actual downsizing following these announcements. Our contribution to the literature is to investigate the firm characteristics associated with post-announcementchanges in asset and employee growth.We expect the nature of correlation between the announcement and ex-post changes within the firm to be associated with two non-mutually exclusive firm characteristics. First, to the extent that asset sales or employee layoffs represent shedding of under-performing

assets, we expect post-announcement growth to be positively related to pre-announcement performance. That is, firms with worse performance will have lower ex-post growth rates. Second, we argue that announcements from firms with greater investment opportunities likely denote a strategic re-alignment of assets, rather than net downsizing. Using market-to-book value of assets as a proxy for investment opportunities, we expect greater post-announcement growth rates for firms with higher market-to-book. To our knowledge, we are the first to provide empirical evidence of these hypothesized determinants of variation in actual downsizing following press announcements of downsizing.

The analysis is conducted using S&P 1500 firms that announce employee layoffs, divestitures, asset sales, or plant closings during two time periods. The "early sample" comprises 252 firmsmaking announcements in calendar years 2005 and 2006 and the "late sample" comprises 417 firms making announcements during calendar years 2008 and 2009. We choose these sample periods to represent two distinct states of the economy. The early sample represents a normal period in the economy with a yearly average real GDP growth of 1.33%. The late sample represents a recession period with a yearly average real GDP growth of -1.74%. By conducting the analysis with these two samples, we are able to investigate whether these distinct economic environments influence the way firm characteristics correlated with post-announcement growth rates in assets and employees. Examining this question for these two short and distinct macro-economic sample periods can also allay concern that the changes we observe following downsizing are influenced by a turnaround in economic conditions after the announcement is made, which is more likely over a longer, continuous sample period.

We find significantly lower growth in assets for firms with poor prior performance in both normal and recession states of the economy. We also find higher growth rates in assets and employees for firms with higher market-to-book in both economic states. These results are consistent with our hypothesis that the information contained in a corporate downsizing announcement can be mixed and must be evaluated in the context of specific firm characteristics. Interestingly, we find that board independence influences lower post-announcement growth rates in a normal economic environment, but not in recession. Our interpretation is that the external pressure of poor economic conditions combined with poor performance force firms to reduce growth rates during recessions. However, during a normal economy, the board has an important role in influencing reduced growth rates following downsizing announcements.

We also construct comparison samples of non-announcing S&P 1500 firms with declines in operating performance equal to or worse than the lowest quartile of sample firms in each sample period.We do find that samplefirms have significantly lower post-announcement growth than these non-announcing firms, suggesting that, among firms with a significant performance decline, the downsizing announcement is an unconditionally stronger predictor of future reductions in growth rates. We also find a positive relation between operating performance and future growth in this non-announcing sample, indicating that poor performance motivates downsizing, whether or not there is a public announcement.

Overall, our results indicate thatfirm growth rates following downsizing announcements arelower for firms with worse prior performance in a normal economy and higher for firms with greater investment opportunities.Thus, our paper makes a distinct contribution to the literature by demonstrating that all corporate announcements of downsizing do not contain the same information for future changes in the firm, and researchers should be cautious in their use of dummy variables to denote these events.For example, some announcements of asset sales or layoffs can be indicative of strategic realignment of assets, rather than net downsizing. This is evident in the positive and highly significant relation between market to book value of assets and

asset growth rates in both sample periods for announcers and non-announcers. Our sub-period analysis for the recent financial crisis also adds to the literature on asset restructuring around financial crises, such as Zhou, Li, and Svejnar (2011) who study restructuring by Thai firms around the Asian Financial Crisis and Kang, Lee and Na (2010) who study restructuring by Korean firms for the same crisis. Our study provides an additional benefit in that we include both normal and crises economic sub-periods and are able to compare and contrast the determinants of restructuring for both periods.

The rest of this paper is organized as follows. The next section develops testable hypotheses. Section 3 describes the sample formationand presents descriptive statistics, Section 4presents results of tests for the determinants of growth in assets and employees following downsizing announcements, Section 5 reports results from additional tests, and Section 6 contains a concluding discussion.

2. LITERATURE AND HYPOTHESES

Announcements of divestitures and layoffs are well-documented responses to poor firm performance. John, Lang and Netter (1992) find that many firms eliminate business segments and reduce employees following negative earnings. Lang, Poulsen, and Stulz (1995) also find that firms are likely to sell assets following poor performance. Denis and Kruse (2000), Denis and Shome (2005), and Perry and Shivdasani (2005) find that asset downsizing and employee layoffs are more likely in firms with poor operating performance, and Paul (2007) finds higher frequency of downsizing for firms with poor acquisition performance. Yang (2008) develops theoretical arguments that asset sales are driven by declines in productivity, and finds empirical support for his theory in a negative relation between asset productivity and downsizing. Maksimovic and Phillips (2001) find that asset sales re-allocate assets to more efficient users, also indicating that downsizing is in part driven by relatively poor asset productivity.

This evidence indicates that poor performance can motivate downsizing, yet there is little evidence whether poor performance also motivates the degree of implementation of the downsizing announcement. Thus, we expect that pre-announcement performance would also influence the degree of follow-through with the announcement. However, some downsizing announcements can also denote re-alignment of assets and not decreased growth rates. We expect such announcements to be concentrated in firms with greater growth opportunities.For example, Fazzari, Hubbard, Peterson, Blinder and Poterba (1988) and Hoshi, Kashyap, and Scharfstein (1991), among others, document that corporate investment levels are highly correlated with Tobin's Q, our proxy for growth opportunities. Ourtestable hypotheses areas follows.

H1: There is a positive relation between pre-announcement performance and post-announcement growth for firms announcing downsizing.

H2: There is a positive relation between pre-announcement growth opportunities and post-announcement growth for firms announcing downsizing.

3. METHODOLOGY AND DATA

The earlysample is drawn from S&P 1500 firms making announcements of layoffs or asset downsizing in calendar years 2005 or 2006 and the late sample has announcements in calendar years 2008 or 2009. We begin sample construction by identifyingS&P 1500 constituent firms as of December 2005 for the early sample and December 2008 for the late sample. We then search *Lexis-Nexis* news wires for announcements of asset sales, divestitures, layoffs, or plant closings in calendar years 2005-06 and 2008-09.This procedure produces an early sample of 252 unique firms

with 122layoff announcements and 171divestiture announcements, and a late sample of 417 unique firms with 330 layoff announcements and 184 divestiture announcements. Throughout the paper we use the term "divestiture" to refer to any form of shedding assets (divestiture, spinoff, asset sale, plant closing), and the term "downsizing" to encompass divestitures and layoffs.

There are obvious notable differences between the early and late samples. During the late period (recession) there are 65% more firms announcing any kind of downsizing (417 vs. 252), and these firms have almost three times the number of layoff announcements compared to the early sample (330 vs. 122). This suggests that layoffs are the preferred downsizing method during bad economic times, presumably because there are fewer potential buyers of assets during economic downturns. In unreported analysis, we check the Fama-French 48 industry distribution of sample firms in the early and late period to see if the late period differences might be driven primarily by financial firms in distress. We do find a higher percentage of firms in the Insurance industry in the late sample (5.5% vs. 3.6%) and lower percentages in the late sample for Pharmaceutical and Food Products (3.3% vs. 5.6% and 1.9% vs. 5.2%, respectively), but otherwise there are no notable differences in industry distribution between the two sample periods.

We also construct comparison samples for each sample period comprising S&P 1500 firms with a decline in ROS equal to or worse than the lowest quartile sample firms' decline, but that do not announce downsizing. Our intent in forming this sample is to investigate whether firms have measurable decreases in growth rates following poor performance without any press announcement. This approach provides further evidence on the importance of press announcements as precursors to significant changes in firm size. The"non-announcing" sample is selected as follows. We first compute percentage change in ROS from the year before to the year of the downsizing announcement in each sample of announcing firms. We then identify the lowest quartile of change in ROS, which is -13.93% for the early sample and -18.62% for the late sample. Finally, we select as the non-announcing comparison samples all S&P 1500 firms with ROS percentage growth that is less than or equal to -13.93% from 2004 to 2005, and with ROS growth less than or equal to -18.62% from 2007-2008.

Appendix 1 contains descriptive statistics.The first two columns contain data forthe early and late samples.We focus our discussion on median values because of the impact of outliers on means. Late sample firms have significantly lower median market-to-book value of assets and change in return on sales (ROS), likely due to system-wide declines in market valuations and profitability during the recession. It is noteworthy, however that there are no significant differences between the early and late samples in financial leverage or ROS. The Appendix also contains comparison data for the non-announcing firms with ROS decline in the third and fourth columns.By construction, these firms have significantly lower median change in ROS than sample firms. In addition, sample firms are largerand have higher financial leverage. The result on firm size is consistent with the idea that larger firms are more likely to downsize or perhaps justmore likely to have their downsizing event reported in the press, suggesting greater visibility for larger firms.The higher financial leverage is consistent with the hypothesis in Lang, Poulsen and Stulz (1995) that financially constrained firms use asset sales as a source of financing.

4. RESULTS

This section reports empirical results for the hypothesis that firms have higher growth rates in assets and employees following downsizing events if they have better prior performance and bettergrowth opportunities.

4.1 Changes in Assets and Employees

Appendix 2 contains percentage change in number of employees and book value of assets for sample firms compared to non-announcing samples. Recall that non-announcers have a recent significant decline in ROS, comparable to the lowest quartile of sample firms. The intent of this analysis is to investigate whether firms respond to performance declines with downsizing, even if there is no press announcement, providing evidence on the significance of the announcement itself. Early sample growth rates are in Panel A (assets) and Panel B (employees) and corresponding late sample growth rates are in Panels C and D.

We first discuss results for the early sample in Panels A and B. Comparing all sample firms with the non-announcers (column (1) vs. column (2)) shows that non-announcers have significantly higher growth ratesthan sample firms. The median change in employees (assets) from t-1 to t+1 is 8.33% (11.27%) for non-announcers compared to -0.30% (5.40%) for sample firms. Column (3) contains data for sample firms in the first quartile of ROS decline to examine a subsample of announcing firms that are comparable to the non-announcers interms of recent change in ROS. Sample firms in this lowest quartile of ROS change have negative median growth rates in employees and assets of -0.559% and -1.48% respectively, which are significantly lower than the growth rates for the non-announcing sample, and also significantly lower than the growth rates for the sample overall. Thus, noticeable declines in growth rates occur only for announcing firms with a significant recent decline in performance.

Overall, the results for the early period in Panels A and B indicate that a performance decline by itself is not sufficient to prompt announced or actual declines in firm size. This analysis indicates a significant correlation between press announcements of downsizing and ex-post growth among firms with a significant performance decline. However, note from Panel A of Appendix 1 that non-announcers are significantly smaller than sample firms. Thus, we are likely also picking up a visibility effect in the sense that larger firms are subject to greater implicit external monitoring and thus more prone to initiating a public response to a performance decline. This idea that external scrutiny motivates explicit corporate action is consistent with results in Farrell and Whidbee (2002) that forced CEO turnover is more likely for firms with greater external monitoring via press coverage. It is also consistent with Offenberg (2009) who finds that larger firms are more likely to face external discipline when they make value-decreasing acquisitions.

Panels C and D contain growth rates in assets and employees for late sample firms,and show different patterns compared to the early period. Panel C shows that non-announcers have significantly lower median growth in book value of assets from t-1 to t+1 (-6.26% versus 2.13%) compared to announcers.Thus, compared to a normal economy (early period), in a recession period firms seem to respond to performance declines by reducing asset growth rates whether or not there is a public announcement of the downsizing. We note, however, that sample firms with comparable performance declines to the non-announcing sample do have significantly lower growth rates (column (3) vs. column (2)), suggesting that there is still a greater response by firms with announcements. Panel D contains results for the layoff subsample. Columns (1) and (2) show that sample firms have similar declines in employees as non-announcers. However, similar to results in Panel C, we see that sample firms with comparable performance decline to announcers do have much lower declines in employees.

4.2 Determinants of Changes in Asset and Employees: Growth Tercile Sorts

To perform the first set of conditional tests for changes in employees and assets following downsizing announcements, we divide sample and non-announcing firms into thirds based on post-announcement asset and employee growth. We then compare differences in firm characteristics for the top and bottom terciles and report results in Appendix3. Panel A contains results for total assets growth, Panel B contains results for employee growth for sample firms, and Panels C and D report corresponding growth rates for non-announcing comparison firms. Lowest tercile asset growth firms have significantly lower ROS than highest tercile ROS firms (14.64% vs. 21.77% for the early sample and 7.12% vs. 20.22% for the late sample). This extends existing evidence in papers such as Denis and Kruse (2000) and Denis and Shome (2005) that downsizing announcements are typically motivated by poor performance. The results in Appendix 3 show that the degree of post-announcement change is also negatively related to pre-announcement performance. Thus, we extend the literature by providing additional evidence on the importance of a negative performance shock in motivating measurable ex-post downsizing following these announcements.

Lowest tercile asset growth firms also have significantly lower market-to-book than highest tercile growth firms. This is consistent with the hypothesis that firms with better investment opportunities grow at relatively faster rates,and suggests that some announcementscould besignals of strategic re-alignment of assets rather than decreases in firm size. The results in Panel B for employee growth are similar to Panel A, showing significantly lower ROS and market-to-book for bottom tercile employee growth firms.

Panels C and D repeat the analysis for non-announcing comparison firms with performance declines. Again we see significantly lower ROS in firms with low employee and asset growth, indicating that growth rates are influenced by prior performance, whether or not an announcement of downsizing is made.Recall, however, that Appendix 1 does shows significantly lower growth rates for announcers compared to non-announcers. Thus, the announcement itself does appear to have some economic significance for the magnitude of change in growth. These panels also show a positive relation between growth rates in both employees and assets and market-to-book. This is consistent with results in Panels A and B for sample firms, indicating that firms with greater investment opportunities have higher growth rates.

4.3 Determinants of Asset Growth Rates: Regression Analysis

The results so far suggest are consistent with our hypotheses that pre-event operating performance and growth opportunities are associated with the degree of post-announcement downsizing. In this section, we perform conditional analysis of the determinants of changes in growth rates following downsizing announcements by estimating OLS regression coefficients. The dependent variables in the models arepercentage change in total assets and percentage change in employees from the year before to the year following the downsizing announcement.The test variables in the modelsareROS, change in ROS, and market-to-book value of assets.

The modelsalso include control variables for other firm characteristics that might influence growth rates. We include the governance variables board independence, board size and institutional ownership. Research and Development Expense (scaled by sales),and capital expenditures are included as additional proxies for growth opportunities, with predicted positive signs. Financial leverage controls for capital structure effects on growth. High financial leverage can constrain growth; however, firms can lever up in order to fund growth, so the sign prediction forleverage is uncertain.Book value of assets and employees scaled by sales are included to condition post-event changes on pre-event levels. Finally, we include two industry dummy variables denoting whether

firms are in manufacturing industries (SIC codes 2000-4000). We separate out manufacturing firms in high-tech industries (SIC 2830-2839; 3570-3579; 3660-3679; 3820-3829; 3840-3849) and denote them by the dummy variable "Manufacturing High-Tech." All other manufacturing firms are denoted by the dummy variable "Manufacturing Non-High-Tech." All variables are measured in the year before the announcement.

The OLS regression coefficients are presented in Appendix4.Sample size decreases primarily because of missing board and institutional ownership data for some firms. Odd-numbered columns contain results for the early sample and even-numbered columns contain results for the late sample. Panel A contains results for percentage change in assets. We first focus on results in columns (1) and (2) for the full sample of announcing firms. Column (1)shows a positive coefficient on ROS, indicating that early period firms with lower ROS have lower asset growth rates. This result extends the existing literature, which shows that poor performance increases the likelihood of a downsizing announcement (Espahbodi, John and Vasudevan (2000)). Here, we show that the degree of poor performance influences the magnitude of actual *ex-post*change within the firm. However, in the late period (column (2)) the coefficient on ROS is insignificant.

We also hypothesize that the announced divestiture or layoff may not reflect the firm's intention to achieve a net decline in size or growth rates. Rather, it could represent a strategic re-alignment of assets as firms decrease investment in one sector and increase investment in another. Thus, we expect that, among firms with downsizing announcements, those with greater investment opportunities are likely to be strategically re-aligning assets, while firms with fewer investment opportunities may be dis-investing. The positive coefficient on market-to-book in all columns of Panel Ais consistent with this argument, indicating higher post-announcement growth rates in firms with better investment opportunities. We note, however, that this effect is not mutually exclusive with decreases in growth being motivated by poor performance.

We note the negative coefficient on board independence in column (1) for the early sample, indicating that firms with greater board independence have lower post-announcement growth rates in assets. Thus, it appears that boards are more involved in actions related to reducing growth rates. We note that in the late period there is a positive coefficient on board independence, indicating higher growth rates for firms with more independent boards, however, this result is not robust to subsample analysis in later Appendices.

The full sample contains firms with announcements of both layoffs and divestitures. Effects on asset growth rates should arguably be concentrated in the sub-sample of firms announcing divestitures, although we recognize that a divestiture is effectively a layoff event and layoff announcements also portend reductions in firm size. Nevertheless, it remains an empirical question whether effects are different in the divestiture and layoff subsamples. Columns (3) through (6)contain coefficients for the divestiture and layoff subsamples.

Looking first at the results for the early period, we see the coefficient on ROS for divestitures is larger in magnitude in column (3) compared to the full sample, and insignificant in column (5) for the layoff subsample, indicating that the effect of ROS on post-event asset growth rates is concentrated in the divestiture subsample. At the same time, we see that the impact of board independence on post-event asset growth occurs primarily in the layoff subsample. Our interpretation is that in a normal economy firms respond to poor performance by downsizing via divestitures, presumably because there is a more liquid market for the assets. In contrast, in an economic recession, layoffs are the preferred option to downsize when performance is bad. We also note in column (5) for the early period layoff subsample that the institutional ownership variable is positive and significant. This indicates that greater institutional presence is associated

with higher growth rates, consistent with existing evidence that institutions prefer growth firms (e.g., Chan, Chen and Lakonishok (2002)and Jiang (2010)).

The subsample divestiture and layoff results for the late sample (columns (4) and (6)) show a positive and significant coefficient on ROS for layoffs and insignificant for divestitures. Recall that in the early sample ROS is significant only for divestiture announcing firms. This result seems consistent with the relatively higher of layoff announcements during the late (recession) period compared to the early (normal) period. The sensitivity of decreases in asset growth rates to prior performance is concentrated in the layoff subsample during the recession period and in the divestiture subsample during a normal economy.

The last two columns of Panel A contain coefficients for asset growth in the comparison samples of non-announcing firms with performance decline. The positive and significant coefficient on ROSindicates that ROS has a similar effect on ex-post growth rates as the subsample of firms announcing divestitures in the early periods (column (7) compared to column (3)). The coefficients on market-to-book and R&D are also positive and significant. Our interpretation of this result is that, independent of an announcement of asset downsizing, firms with lowerROS and investment opportunities have lower growth rates in assets. It is noteworthy, however, in the non-announcing samplethere is no relation between asset growth and board independence. Indeed,the effect of board independence on asset growth rates appearsonly forlayoffannouncing firms in the early sample period. This is consistent with the hypothesis that, in a normal economy,boards are more involved in decreases in asset growth rates. In contrast, the board has a lesser to non-existent role in a recession because the pressure of macro-economic conditions force reduced growth rates.

4.4 Determinants of Employee Growth Rates: Regression Analysis

Panel B of Appendix 4 reports results for change in employees following the downsizing announcements. Columns (1) and (2) contain coefficients for employee growth for the full samples. In contrast to results in Panel A for asset growth, results for the full sample show the coefficient on ROS is insignificant in the early period, but significant in the late period. However, the insignificant coefficient in column (1) for the early period must be interpreted in light of the coefficients on ROS in the early period divestiture and layoff subsamples (columns (3) and (5)), whichare opposite in sign. Column (3) shows that for the divestiture subsample, lower ROS is associated with lower employee growth, consistent with the results for the late period in columns (2) and (4) and with results for asset growth for the early period in Panel A. In contrast, Column (5) shows that lower ROS is associated with higher employee growth for the layoff announcing subsample.

We conclude from the results on ROS in both Panels A and B for the layoff subsample that poor pre-event performance does not motivate the degree of reduction in either assets or employees for firms announcing layoffs in the early period.However, in the late period of economic recession, we see that poor performance is significantly associated with lower growth rates in employees, in the predicted direction, for firms announcing divestitures.Finally, Columns (7) and (8)of Panel B contains OLS coefficients for employee growth rates in the non-announcing samples. There is a positive coefficient on ROS in both early and late samples, indicating that poor performance is associated with lowerex-post employee growth rates, with or without a layoff or downsizing announcement. In all but one model, the coefficient on market-to-book is positive and highly significant, consistent with the idea that high growth firms announcing downsizing are likely restructuring assets.

5. ADDITIONAL TESTS

The early(late) sample includes 41 (97) firms that have announcements of both divestitures and layoffs. Given that these firms represent a significant percentage of the sample, we perform additional tests to check whether their omission from the empirical analysis alters the results. We also perform further tests on the relation between prior performance and degree of announcement follow-through by evaluating subsamples formed on pre-event change in ROS.

5.1 Post-Event Growth for Pure Announcers

Appendix 5 contains OLS regression coefficients for post-announcement growth in assets and employees for pure announcers: firms that had a pure divestiture or layoff announcement in that they did not announce both divestiture and layoff during the sample period.The results in Panel A for asset growth are consistent with comparable in Appendix 4 for the full sample, although we note that for the pure announcers in this Appendix, the size and significance of the coefficient on ROS is higher.

Panel B contains results on employee growth for pure announcers. The results here reveal some notable differences compared to the Panel B of Appendix4. For the full sample of early period announcers in columns (1), there is now a significant positive coefficient on ROS, indicating that poor prior performance does motivate lower post-announcement employee growth. In earlieranalysis in columns (3) and (5) of Appendix4, we saw the puzzling result that the ROS variable had opposite and significant signs for the divestiture (positive) and layoff (negative) subsamples. This result is not present in Appendix 5 for subsamples of pure announcers. Rather, the positive coefficient on ROS for the divestiture subsample is larger and more significant, and the coefficient on ROS for the layoff subsample is insignificant.We conclude that the effect of pre-announcement ROS on ex-post asset and employee growth occurs primarily in the pure divestiture subsample. Thus, firms that have announcements of both layoffs and divestitures appear to have varied motives for the announcements.

One other notable result in Panel B is the negative and significant coefficient on capital expenditures in early period pure divestiture announcing firms (column (3)). This negative relation between capital expenditures and employee growth in the divestiture announcing subsamplessuggests a labor for capital substitution, in that firms with lowcapital expenditures have higherpost-announcement employee growth. There is also evidence of this labor-capital substitution effect in Atanassov and Kim (2009), who find that some poorly performing firms divest assets to avoid layoffs.

Panel C of Appendix 5 contains regression coefficients for the early and late samples combined, with the dummy variable “early” equal to one if the observation is from the early sample period. The primary purpose for Panel C is to test for significant differences between the early and late periods in our test variables. The results confirm that the differences discussed above between the early and late periods are significant. The positive and significant coefficient on the early dummy in columns (1) and (2) indicate that late period firms have lower growth rates in assets, consistent with external macro-economic pressure to downsize. The negative coefficient on the interaction of board independence and the early dummy goes along with this result, indicating that in the early period, board independence is important in attenuating growth, but in the late period, the poor economic conditions dominate.

5.2 Post-Event Growth for Change in ROS Subsamples

To further examine the impact of prior performance on growth, we split the samples of pure announcers into two based on median change in ROS from the year before to the year containing the downsizing announcement. Our purpose is to evaluate whether determinants of ex-post growth are concentrated in subsamples with greater recent performance declines. Panel Aof Appendix 6 contains OLS coefficients for percentage change in total assets by subsamples. Columns (1) and (2) are for firms that have a below median pre-announcement decline in ROS, and columns (3) and (4) have above median decline in ROS. As in earlier Appendices, odd- (even-) numbered columns contain results for early (late) samples.

The results show that the positive relation in the early sample between ROS and asset growth is contained in the subsample of pure announcers that have below sample median pre-announcement decline in performance. Thus, ex-ante performance explains ex-post growth only for firms that suffer a significant decline in performance. This result also holds for the effect of board independence on ex-post growth. Board independence curbs asset growth only in announcing firms with significant performance declines. Looking at results for the late sample, we see for the first time a positive and significant relation between change in ROS and asset growth in the below median firms (column (2)). In this below-median sample, the lower the change in ROS, the lower is the post-announcement growth in assets. Thus, we find that performance influences growth in different ways in different economic environments. In a normal economy, the recent *level* of ROS influences post-announcement growth, but in a recession, it is the recent *change* in ROS that matters for ex-post growth in assets.

Panel B of Appendix 6 contains results for employee growth. Again, we see significant positive coefficients on ROS in both columns (1) and (2), indicating that the effect of ROS on growth obtains only for firms with significant performance decline. There is also a negative and significant coefficient on board independence in Column (1) for the early period, which does not obtain for the full sample. This again indicates that boards are involved in downsizing activity for firms with performance declines.

We again include a Panel C that contains results for the sample combined with the early dummy interacting with test variables. The results in columns (1) and (2) for firms with below median change in ROS mirror results in Panel C of Appendix 5 for the full sample. Late period firms have lower overall growth rates than early period firms, and early period firms with greater board independence have lower growth rates.

6. CONCLUSION

Most empirical studies of managerial press announcements are premised on a high correlation between announced and actual managerial actions, assuming high signal strength in these announcements. We argue that downsizing announcements carry mixed signals because they may denote either reductions in firm size or asset restructuring. Thus, we investigate determinantsof the changes in asset and employee growth rates following publicly announced intentions to shed assets or layoff employees both during a normal economy and during a recession. Our testable hypothesis is that lower pre-announcement performance influences attenuated ex-post growth rates and greater investment opportunities influence higher ex-post growth.

Consistent with these predictions, we find that pre-announcement ROS is reliably related to post-announcement growth in assets and employees only for firms announcing divestitures, and that market-to-book influences higher growth rates in all samples. We conclude that downsizing

announcements do not contain a pure signal for future decreases in firm growth rates but can also denote increased growth as firms strategically re-align assets. Firms with poor past performance tend to cut their assets and employees in accordance with the announcement, whereas firms with good growth opportunities tend to re-align and grow their assets, rather than pursue net downsizing. Since all corporate announcements are not created equal,wesuggest that empiricists use dummy variables denoting downsizing based on corporate press announcements with caution.

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Appendix 1

Descriptive Statistics

The sample comprises 252 S&P 1500 firms in calendar years 2005 or 2006 (early sample), and 417 S&P 1500 firms in calendar year 2008 or 2009 (late sample) making announcements of layoffs or asset downsizing. The non-announcer sample contains 219 S&P 1500 firms for early sample period and 261 S&P 1500 firms for late sample period with a significant decline in performance and no downsizing announcement. Performance decline is defined as change of return on sales (ROS) from 2004 to 2005 for early sample period, or from 2007 to 2008 for late sample period, less than lowest quartile of change in ROS of sample firms. All the variables are obtained from CRSPSift. Total assets is book value of assets. Leverage is long-term debt divided by long-term debt plus common equity. Market to book value is market cap plus total assets minus common equity divided by total assets. Market cap is year-end stock price times year-end common shares outstanding. Capex is capital expenditures divided by total assets. Return on sales (ROS) is EBITDA divided by net sales. For sample firms, all data are calculated in the year before the announcement (t-1). For non-announcing firms, all data arecalculated in year 2004 for early sample period, and 2007 for late sample period. a, b, and c denote significance between early period sample firms and late period sample firms at 1%, 5% and 10% levels, respectively.

	Mean (Median) Sample Firm		Mean (Median) Non-announcers with performance decline		P-value for sample vs. non-announcers	
	2005-2006	2008-2009	2005-2006	2008-2009	2005-2006	2008-2009
Total Assets	41130.44	45937.46	10750.09	20813.76	0.0066	0.0429
	(4514.25)	(5695.55) b	(905.73)	(1723.16) a	(0.0001)	(0.0000)
Leverage	0.3293	0.4176	0.2754	0.2454	0.0172	0.0810
	(0.3265)	(0.3112)	(0.2321)	(0.2139)	(0.0058)	(0.0000)
MV/BV Assets	1.8390	1.5836 a	1.8074	1.4935 a	0.7303	0.1782
	(1.5270)	(1.3323) a	(1.4365)	(1.2031) a	(0.3336)	(0.0294)
Capex	0.0366	0.0461 a	0.0424	0.0452	0.1059	0.8400
	(0.0287)	(0.0343) b	(0.0277)	(0.0184) a	(0.9585)	(0.0000)
Return on Sales	0.1745	0.1521	0.1527	-0.2253	0.1806	0.1758
	(0.1419)	(0.1478)	(0.1341)	(0.1440)	(0.1254)	(0.4263)
Change in ROS (t-1 to t)	-0.6251	0.3608 c	-0.9700	-1.1617	0.5589	0.0010
	(-0.0186)	(-0.0550) b	(-0.2564)	(-0.4359) a	(0.0001)	(0.0000)
N	252	417	219	261		

Appendix 2: Change in Assets and Employees

Percentage change in asset (Panel A) and number of employees (Panel B) from the year before announcement (t-1) to the year of announcement (t), and from the year of announcement (t) to the year after announcement (t+1). Samples and variables are described in the Appendix1 header.

Panel A: Percentage Change in Book Value of Assets (2005-2006)

	(1) All Sample firms	N	(2) Non-announcers	N	(3)Sample firms in Q1 of ROS change	N	P-value (1) vs. (2)	P-value (2) vs. (3)	P-value (1) vs. (3)
t-1 to t	0.0554	252	0.1012	219	-0.0164	63	0.0600	0.0016	0.0070
	(0.0149)		(0.0427)		(-0.0055)		(0.0053)	(0.0004)	(0.0107)
t-1 to t+1	0.1373	246	0.1910	205	-0.0202	62	0.1403	0.0001	0.0002
	(0.0540)		(0.1127)		(-0.0148)		(0.0052)	(0.0001)	(0.0001)

Panel B: Percentage Change in Number of Employees (2005-2006)

	(1) All Sample firms	N	(2) Non-announcers	N	(3)Sample firms in Q1 of ROS change	N	P-value (1) vs. (2)	P-value (2) vs. (3)	P-value (1) vs. (3)
t-1 to t	-0.0121	251	0.1312	214	-0.0652	63	0.0001	0.0063	0.0031
	(-0.0066)		(0.0408)		(-0.0318)		(0.0001)	(0.0001)	(0.0023)
t-1 to t+1	-0.0022	244	0.2104	199	-0.0164	61	0.0001	0.0007	0.0004
	(-0.0030)		(0.0833)		(-0.0055)		(0.0001)	(0.0001)	(0.0001)

Panel C: Percentage Change in Book Value of Assets (2008-2009)

	(1) All Sample firms	N	(2) Non-announcers	N	(3)Sample firms in Q1 of ROS change	N	P-value (1) vs. (2)	P-value (2) vs. (3)	P-value (1) vs. (3)
t-1 to t	-0.0055 (-0.0068)	397	0.0072 (-0.0314)	261	-0.0726 (-0.0850)	100	0.5662 (0.1361)	0.0368 (0.0027)	0.0014 (0.0000)
t-1 to t+1	0.0290 (0.0213)	388	-0.0240 (-0.0626)	248	-0.0879 (-0.1060)	96	0.0645 (0.0000)	0.1621 (0.1758)	0.0000 (0.0000)

Panel D: Percentage Change in Number of Employees (2008-2009)

	(1) All Sample firms	N	(2) Non-announcers	N	(3)Sample firms in Q1 of ROS change	N	P-value (1) vs. (2)	P-value (2) vs. (3)	P-value (1) vs. (3)
t-1 to t	-0.0329 (-0.0323)	390	0.0219 (-0.0118)	258	-0.0461 (-0.0620)	97	0.0027 (0.0053)	0.0299 (0.0002)	0.4977 (0.0085)
t-1 to t+1	-0.0452 (-0.0595)	381	-0.0200 (-0.0507)	245	-0.1027 (-0.1198)	94	0.3164 (0.6422)	0.0242 (0.0083)	0.0366 (0.0006)

Appendix 3

Analysis of Changes in Assets or Employees by Tercile sorts

In Panels A and C, the sample is equally divided into three groups based on percentage change in total assets from the year before announcement (t-1) to the year after announcement (t+1). In Panel B and D, the sample is equally divided into three groups based on percentage change in employees from the year before announcement (t-1) to the year after announcement (t+1). Samples and variables are described in the Appendix1 header. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

Panel A: Total assets growth (t-1 to t+1)

	2005-2006			*2008-2009*		
	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)
ROS	0.1464	0.2177	0.0144	0.0712	0.2022	0.0891
	(0.1390)	(0.1860)	(0.0251)	(0.1198)	(0.1788)	(0.0000)
Market to Book	1.6779	2.2619	0.0006	1.4000	1.8748	0.0000
	(1.3838)	(1.7807)	(0.0006)	(1.1642)	(1.4583)	(0.0000)

Panel B: Employee growth (t-1 to t+1)

	2005-2006			*2008-2009*		
	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)
ROS	0.1545	0.2134	0.0131	0.0708	0.2121	0.0726
	(0.1273)	(0.1680)	(0.0058)	(0.1229)	(0.1862)	(0.0001)
Market to Book	1.5943	2.1991	0.0002	1.4757	1.8027	0.0032
	(1.3571)	(1.6774)	(0.0000)	(1.2606)	(1.4680)	(0.0035)

Panel C Non-Announcers: total assets growth (t-1 to t+1)

	2005-2006			*2008-2009*		
	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)
ROS	0.0968	0.1775	0.0232	0.0398	0.1381	0.3878
	(0.0896)	(0.1661)	(0.0002)	(0.0830)	(0.2069)	(0.0000)
Market to Book	1.4820	2.1557	0.0003	1.4129	1.6991	0.0711
	(1.3107)	(1.5946)	(0.0002)	(1.1519)	(1.3366)	(0.0026)

Panel D Non-Announcers: Employee growth (t-1 to t+1)

	2005-2006			*2008-2009*		
	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)	(1) Low (bottom third)	(2) High (Top third)	P-value (1) vs. (2)
ROS	0.1263	0.1560	0.3862	0.1168	0.1561	0.6396
	(0.0972)	(0.1631)	(0.0057)	(0.1080)	(0.2079)	(0.0002)
1.6161	0.0156	2.3641	0.0000	1.3166		
	(1.2554)	(0.1689)	(0.0000)	(1.0982)	(1.3059)	(0.0015)

Appendix 4

OLS Coefficients for Change in Assets and Employees

OLS coefficient estimates for determinants of changes in total assets and number of employees from the year before announcement to the year of announcement for sample firms, from 2004 to 2006 for non-announcers in early sample period, and from 2007 to 2009 for non-announcers in late sample period. The dependent variable equals the percentage change in total assets (Panel A) or number of employees (Panel B). ROS is EBITDA divided by net sales. Market to book value is market cap plus total assets minus common equity divided by total assets. Market cap is year-end stock price time year-end common shares outstanding. Leverage is long-term debt divided by long-term debt plus total common equity. Board data are from ISS RiskMetrics Group. Institutional ownership is year-end institutional holding (from 13f) divided by year-end total

number of share outstanding. All independent variables collected in the year before the announcement (t-1) for sample firms, in 2004 for non-announcers in early sample period, and in 2007 for non-announcers in late sample period. Columns (1) (3) (5) and (7) contain sample firms in 2005-06, and columns (2) (4) (6) and (8) contain sample firms in 2008-09. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

Panel A: Change in Total Assets (t-1 to t+1)

	Sample of Announcers		Announce divestiture only		Announce layoff only		Non-announcers with performance decline	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROS	0.4661**	0.0443	0.6150**	0.0496	-0.2307	0.3251**	0.7343***	0.1416
	(0.0487)	(0.1259)	(0.0465)	(0.1731)	(0.4485)	(0.0365)	(0.0003)	(0.2906)
Change in ROS	0.0002	0.0027	-0.0118	0.0204	-0.0004	0.0029	0.0111	0.0126
(t-1 to t)	(0.9365)	(0.2067)	(0.3498)	(0.4693)	(0.8765)	(0.1719)	(0.2308)	(0.3772)
Board	-0.4181**	0.3122*	-0.3526	0.4517	-0.4270*	0.2318	-0.1116	-0.3227
Independence	(0.0230)	(0.0581)	(0.1364)	(0.1191)	(0.0548)	(0.1932)	(0.5510)	(0.1009)
Institutional	0.1093	0.0165	-0.1129	-0.0843	0.4211**	-0.0125	0.2437	0.0043
ownership	(0.5135)	(0.9060)	(0.5804)	(0.7456)	(0.0435)	(0.9354)	(0.1530)	(0.9780)
Market value/	0.1677***	0.0937***	0.1894***	0.0966**	0.1978***	0.0860***	0.0973***	0.0885***
Book value	(0.0000)	(0.0000)	(0.0000)	(0.0143)	(0.0000)	(0.0001)	(0.0041)	(0.0024)
R&D/sales	0.3654	-0.6591**	0.2936	-1.0203**	0.5293*	-0.4787	0.6617***	0.1933
	(0.2494)	(0.0172)	(0.6731)	(0.0495)	(0.0827)	(0.1801)	(0.0047)	(0.2061)
Capex/total	-0.3798	0.4155	-0.7085	0.1987	-0.4555	0.2029	-0.1217	0.0781
assets	(0.6568)	(0.2277)	(0.5053)	(0.7506)	(0.7067)	(0.5946)	(0.8580)	(0.8213)
Book leverage	-0.0876	-0.0064	-0.1472	0.1987	0.1514	-0.0042	0.3166**	0.2394**
	(0.4931)	(0.4794)	(0.3459)	(0.8242)	(0.3896)	(0.6290)	(0.0293)	(0.0366)
Log (book value of assets)	0.0101	0.0208	-0.0001	0.0152	0.0359	0.0130	-0.0680***	0.0248
	(0.6374)	(0.1098)	(0.9979)	(0.5170)	(0.1918)	(0.3741)	(0.0069)	(0.2064)
Employees/	-6.1402	4.0781	-9.8441	13.6674	11.0980	-0.6617	-0.0680***	-0.3599
Sales	(0.4169)	(0.3522)	(0.2426)	(0.1448)	(0.3945)	(0.8840)	(0.0050)	(0.8313)
Log	-0.1536	0.0453	-0.1321	0.0483	-0.1566	0.0184	0.0584	0.0673
(board size)	(0.2808)	(0.5779)	(0.4699)	(0.7328)	(0.3854)	(0.8454)	(0.6721)	(0.5316)
Manufacturing	-0.0125	-0.0704*	0.0140	-0.0643	-0.0936	-0.0853**	-0.0404	-0.0580
Non-High-Tech	(0.8359)	(0.0560)	(0.8508)	(0.3296)	(0.1925)	(0.0305)	(0.5569)	(0.3804)
Manufacturing	-0.0012	0.0751	0.0587	0.1633	-0.0363	0.0598	-0.1611*	0.0986
High-Tech	(0.9883)	(0.1702)	(0.6632)	(0.1096)	(0.6910)	(0.3132)	(0.0730)	(0.2116)
Intercept	0.2934	-0.6786***	0.4280	-0.7162	-0.2267	-0.4507	0.0137	-0.3562
	(0.4021)	(0.0084)	(0.3417)	(0.1088)	(0.6047)	(0.1272)	(0.9693)	(0.2035)
Number of observations	219	321	148	143	108	254	169	184
Adjusted R^2	0.2396	0.1026	0.2668	0.0628	0.3256	0.1194	0.2147	0.1051

Appendix 4 – Continued:

Panel B: Change in Employees (t-1 to t+1)

	Sample of Announcers		Announce divestiture only		Announce layoff only		Non-announcers with performance decline	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ROS	0.2253	0.0489**	0.5099***	0.0533**	-0.4118*	0.1072	0.7646*	0.4533***
	(0.1309)	(0.0176)	(0.0073)	(0.0500)	(0.0729)	(0.3347)	(0.0737)	(0.0003)
Change in ROS	0.0006	0.0007	-0.0012	-0.0116	0.0004	0.0006	0.0053	0.0090
(t-1 to t)	(0.7433)	(0.6598)	(0.8812)	(0.5808)	(0.8587)	(0.6966)	(0.7897)	(0.4901)
Board	-0.1363	-0.0098	-0.0529	-0.0003	-0.1153	0.0137	0.0001	-0.1912
Independence	(0.2400)	(0.9328)	(0.7159)	(0.9989)	(0.4862)	(0.9143)	(0.9998)	(0.2869)
Institutional	0.2274**	-0.0303	0.1824	-0.3371*	0.2399	0.0469	0.7859**	0.0001
ownership	(0.0336)	(0.7596)	(0.1474)	(0.0843)	(0.1242)	(0.6708)	(0.0319)	(0.9994)
Market value/	0.0731***	0.0662	0.0590**	0.0517*	0.1050***	0.0599***	0.0350	0.0537**
Book value	(0.0001)	(0.0000)	(0.0181)	(0.0777)	(0.0000)	(0.0002)	(0.6267)	(0.0428)
R&D/sales	0.0296	-0.6759***	0.5057	-0.9964**	0.0837	-0.2384	0.6111	0.5162***
	(0.8831)	(0.0006)	(0.2570)	(0.0107)	(0.7125)	(0.3515)	(0.2680)	(0.0003)
Capex/total assets	-0.3866	0.0517	-1.0069	-0.2351	0.3251	-0.0029	-1.7193	0.1253
	(0.4765)	(0.8325)	(0.1256)	(0.6148)	(0.7202)	(0.9916)	(0.2359)	(0.6920)
Book leverage	-0.0981	-0.0036	-0.1103	0.0006	0.0655	-0.0038	0.2056	0.1849*
	(0.2248)	(0.5704)	(0.2469)	(0.9406)	(0.6194)	(0.5385)	(0.5125)	(0.0771)
Log (book value of assets)	0.0190	0.0107	0.0061	-0.0094	0.0486**	0.0157	-0.1054**	-0.0101
	(0.1637)	(0.2475)	(0.7192)	(0.5917)	(0.0204)	(0.1359)	(0.0500)	(0.5754)
Employees/ Sales	0.5168	0.2467	1.3727	2.4679	-1.2029	-0.0883	-5.2892	-0.8118
	(0.9142)	(0.9368)	(0.7901)	(0.7235)	(0.9017)	(0.9783)	(0.6116)	(0.5995)
Log	-0.0060	0.0399	0.0188	0.0732	-0.1187	0.0173	0.0545	0.1070
(board size)	(0.9484)	(0.4904)	(0.8738)	(0.4887)	(0.3814)	(0.7977)	(0.8526)	(0.2773)
Manufacturing	0.0431	-0.0870***	0.0585	-0.0874*	0.0220	-0.1013***	0.1001	-0.0898
Non-High-Tech	(0.2600)	(0.0009)	(0.2023)	(0.0770)	(0.6839)	(0.0004)	(0.4925)	(0.1390)
Manufacturing	0.0445	0.0539	0.0257	0.1677**	0.0156	0.0109	-1.1454	0.1125
High-Tech	(0.3894)	(0.1664)	(0.7632)	(0.0286)	(0.8206)	(0.7985)	(0.4495)	(0.1196)
Intercept	-0.3853*	-0.2766	-0.3846	0.0641	-0.4213	-0.3431	0.1020	-0.2650
	(0.0977)	(0.1290)	(0.1934)	(0.8470)	(0.2005)	(0.1056)	(0.8940)	(0.3007)
Number of observations	219	321	148	143	108	254	169	184
Adjusted R^2	0.1244	0.1254	0.1335	0.1185	0.1086	0.1179	0.0222	0.1610

Appendix 5

OLS Coefficients for Pure Announcers

OLS coefficient estimates for determinants of changes in total assets and number of employees from the year before announcement to the year of announcement for 211 firms in 2005-06 and 320

firms in 2008-09 with announcement of either layoff or divestiture, but not both. Samples and variables are described in the header to Appendix4. In Panel C, Early=1 if firm is from 2005-06 sample, otherwise Early=0. Columns (1) (3) (5) and (7) contain sample firms in 2005-06, and columns (2) (4) (6) and (8) contain sample firms in 2008-09. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

Panel A: Change in Total Assets (t-1 to t+1)

	Sample of Announcers		Announce divestiture only		Announce layoff only	
	(1)	(2)	(3)	(4)	(5)	(6)
ROS	0.6542**	0.0399	0.8405**	0.0655	0.0059	0.2847*
	(0.0161)	(0.1549)	(0.0267)	(0.1157)	(0.9896)	(0.0846)
Change in ROS (t-1 to t)	-0.0000	0.0025	-0.0114	0.0346	-0.0022	0.0025
	(0.9989)	(0.2216)	(0.4224)	(0.2548)	(0.5211)	(0.2055)
Board Independence	-0.4650**	0.2934	-0.3883	0.5286	-0.5316	0.1392
	(0.0296)	(0.1002)	(0.1934)	(0.2006)	(0.1053)	(0.4729)
Institutional ownership	0.1386	0.0738	-0.2104	-0.0239	0.6777**	0.0534
	(0.4911)	(0.6090)	(0.4380)	(0.9414)	(0.0406)	(0.7367)
Market value/ Book value	0.1628***	0.0754***	0.1877***	0.0336	0.1620***	0.0708***
	(0.0000)	(0.0006)	(0.0011)	(0.5779)	(0.0013)	(0.0030)
R&D/sales	0.2992	-0.7113**	-0.3063	-1.2724**	0.6161	-0.6969*
	(0.3945)	(0.0119)	(0.7399)	(0.0439)	(0.1163)	(0.0696)
Capex / total assets	-0.4261	0.5641	-0.7489	0.8070	-0.2964	0.3653
	(0.6543)	(0.1292)	(0.5530)	(0.3531)	(0.8569)	(0.3883)
Book leverage	-0.1578	-0.1625*	-0.2867	0.0692	0.0634	-0.1730*
	(0.2798)	(0.0530)	(0.1318)	(0.7349)	(0.8115)	(0.0641)
Log (book value of assets)	0.0121	0.0296**	0.0060	0.0218	0.0557	0.0278*
	(0.6318)	(0.0457)	(0.8609)	(0.5638)	(0.1972)	(0.0934)
Employees / Sales	-5.7261	5.0027	-0.8604	32.4515**	27.8687	-0.7143
	(0.5045)	(0.2749)	(0.3683)	(0.0225)	(0.2154)	(0.8787)
Log (board size)	-0.1624	0.0519	-0.1898	-0.0034	-0.1393	0.0103
	(0.3196)	(0.5463)	(0.4085)	(0.9853)	(0.5906)	(0.9197)
Manufacturing	0.0257	-0.0471	0.0854	0.0223	-0.0246	-0.0651
Non-High-Tech	(0.7208)	(0.2432)	(0.3800)	(0.8265)	(0.8226)	(0.1300)
Manufacturing High-Tech	0.0110	0.0360	0.1714	0.1253	-0.0366	0.0220
	(0.9039)	(0.5433)	(0.3382)	(0.4086)	(0.7608)	(0.7292)
Intercept	0.3167	-0.7377***	0.6075	-0.8454	-0.5963	-0.4581
	(0.4390)	(0.0066)	(0.2949)	(0.1325)	(0.3738)	(0.1496)
Number of observations	182	245	111	67	71	178
Adjusted R^2	0.1961	0.1139	0.2237	0.0815	0.1659	0.1264

Appendix 5 - Continued:

Panel B: Change in Employees (t-1 to t+1)

	Sample of Announcers		Announce divestiture only		Announce layoff only	
	(1)	(2)	(3)	(4)	(5)	(6)
ROS	0.3677**	0.0447**	0.7537***	0.0495*	-0.3003	0.0471
	(0.0248)	(0.0157)	(0.0005)	(0.0936)	(0.3583)	(0.6458)
Change in ROS (t-1 to t)	0.0007	0.0006	0.0013	-0.0097	0.0002	0.0003
	(0.7372)	(0.6696)	(0.8669)	(0.6501)	(0.9443)	(0.8046)
Board Independence	-0.1667	-0.0632	-0.0508	-0.1485	-0.1683	-0.0646
	(0.1943)	(0.5897)	(0.7628)	(0.6091)	(0.4681)	(0.5927)
Institutional ownership	0.2414**	0.0501	0.1829	-0.2890	0.3095	0.1719*
	(0.0498)	(0.5978)	(0.2369)	(0.2124)	(0.1851)	(0.0837)
Market value/ Book value	0.0706***	0.0659***	0.0644**	0.0530	0.0958***	0.0630***
	(0.0011)	(0.0000)	(0.0421)	(0.2165)	(0.0070)	(0.0000)
R&D/sales	-0.0648	-0.7337***	0.2680	-1.2088***	-0.0065	-0.2665
	(0.7601)	(0.0000)	(0.6064)	(0.0077)	(0.9812)	(0.2639)
Capex / total assets	-0.5654	0.2715	-1.3933*	0.5353	0.2085	0.3450
	(0.3274)	(0.2667)	(0.0524)	(0.3839)	(0.8589)	(0.1914)
Book leverage	-0.1619*	-0.0855	-0.1970*	0.0187	-0.0292	-0.0426
	(0.0667)	(0.1213)	(0.0660)	(0.8971)	(0.8776)	(0.4626)
Log (book value of assets)	0.0096	0.0179*	-0.0101	-0.0136	0.0357	0.0297***
	(0.5310)	(0.0668)	(0.5997)	(0.6091)	(0.2456)	(0.0044)
Employees / Sales	0.9283	-0.0912	1.5858	5.8760	5.3545	-0.5179
	(0.8582)	(0.9758)	(0.7779)	(0.5502)	(0.7370)	(0.8590)
Log (board size)	0.0660	0.0449	0.1560	0.1149	0.0378	-0.0009
	(0.5174)	(0.4276)	(0.2606)	(0.3847)	(0.8377)	(0.9886)
Manufacturing	0.0431	-0.0618**	0.0632	-0.0003	0.0190	-0.0782***
Non-High-Tech	(0.3217)	(0.0204)	(0.2488)	(0.9972)	(0.8087)	(0.0038)
Manufacturing High-Tech	0.0451	0.0261	0.0414	0.1569	0.0064	-0.0264
	(0.4155)	(0.5035)	(0.6801)	(0.1464)	(0.9402)	(0.5049)
Intercept	-0.4436*	-0.3511**	-0.5656	0.0069	-0.6541	-0.4538**
	(0.0902)	(0.0485)	(0.1161)	(0.9860)	(0.1734)	(0.0225)
Number of observations	182	245	111	67	71	178
Adjusted R^2	0.1378	0.1709	0.1789	0.1674	0.0090	0.1901

Appendix 5 - Continued:

Panel C: Differences between Early and Late Samples

	Change in Total Assets (t-1 to t+1)			Change in Employees (t-1 to t+1)		
	Sample of Announcers	Announce divestiture only	Announce layoff only	Sample of Announcers	Announce divestiture only	Announce layoff only
	(1)	(2)	(3)	(4)	(5)	(6)
Early (dummy)	1.2898***	1.4873**	0.9418	0.0774	0.0874	-0.2537
	(0.0041)	(0.0110)	(0.2281)	(0.7864)	(0.8084)	(0.6407)
ROS	0.0310	0.2264	0.0658	0.0453**	0.1091	0.0563**
	(0.3520)	(0.2674)	(0.1066)	(0.0296)	(0.3665)	(0.0484)
ROS*Early	0.5522***	0.3762	0.2446	0.1542	0.2165	-0.1803
	(0.0044)	(0.1799)	(0.5433)	(0.2007)	(0.1926)	(0.5204)
Change in ROS (t-1 to t)	0.0026	0.0032	-0.0152	0.0006	0.0008	-0.0369**
	(0.2926)	(0.2060)	(0.5659)	(0.7177)	(0.5910)	(0.0468)
Change in ROS	-0.0034	-0.0172	0.0131	-0.0004	-0.0025	0.0377**
(t-1 to t)*Early	(0.3616)	(0.1267)	(0.6213)	(0.8537)	(0.7126)	(0.0441)
Board Independence	0.3312	0.1293	0.6631	-0.0372	-0.0463	-0.1095
	(0.1219)	(0.6028)	(0.1226)	(0.7801)	(0.7528)	(0.7134)
Board Independence*Early	-0.7991***	-0.6363*	-1.1435**	-0.1333	-0.1266	-0.0431
	(0.0040)	(0.0554)	(0.0339)	(0.4392)	(0.5195)	(0.9079)
Institutional ownership	0.0191	0.0249	0.0088	0.0038	0.1017	-0.2318
	(0.9110)	(0.9009)	(0.9792)	(0.9719)	(0.3911)	(0.3252)
Institutional	0.1038	-0.2142	0.5887	0.2254	0.1131	0.4923
ownership*Early	(0.6608)	(0.4523)	(0.2013)	(0.1296)	(0.5082)	(0.1260)
Log (board size)	0.1172	0.0808	0.0839	0.0818	0.0598	0.1208
	(0.2327)	(0.5139)	(0.6393)	(0.1818)	(0.4156)	(0.3338)
Log (board size)*early	-0.3254**	-0.3572*	-0.1813	-0.0599	-0.0410	-0.0035
	(0.0252)	(0.0550)	(0.4872)	(0.5175)	(0.7205)	(0.9847)
Market value/ Book value	0.1107***	0.1147***	0.1124***	0.0696***	0.0694***	0.0735***
	(0.0000)	(0.0000)	(0.0021)	(0.0000)	(0.0000)	(0.0038)
R&D/sales	-0.1837	-0.7373*	0.1704	-0.3792***	-0.2175	-0.3208
	(0.4110)	(0.0602)	(0.5895)	(0.0067)	(0.3492)	(0.1466)
Capex / total assets	0.4149	0.3053	0.3598	0.1660	0.0863	0.2983
	(0.2812)	(0.5115)	(0.6379)	(0.4898)	(0.7544)	(0.5759)
Book leverage	-0.1425*	-0.1883**	-0.0424	-0.1012**	-0.0842	-0.0579
	(0.0685)	(0.0424)	(0.7912)	(0.0382)	(0.1250)	(0.6046)
Log (book value of assets)	0.0175	0.0171	0.0271	0.0140*	0.0157	0.0052
	(0.1912)	(0.3001)	(0.3314)	(0.0944)	(0.1090)	(0.7887)
Employees / Sales	1.7254	-3.5161	29.9271**	0.6703	0.4587	5.9760
	(0.6952)	(0.4613)	(0.0141)	(0.8074)	(0.8713)	(0.4770)
Manufacture	-0.0262	-0.0124	-0.0359	-0.0272	-0.0318	-0.0078
(no High-tech)	(0.4904)	(0.7812)	(0.6295)	(0.2503)	(0.2308)	(0.8813)
Manufacture (High-tech)	0.0164	0.1115	-0.0553	0.0231	0.0094	0.0245
	(0.7536)	(0.1109)	(0.5310)	(0.4770)	(0.8210)	(0.6899)
Intercept	-0.8377***	-0.5748	-1.2782**	-0.4133**	-0.4552*	-0.2498
	(0.0087)	(0.1448)	(0.0268)	(0.0374)	(0.0517)	(0.5309)
Number of observations	427	289	138	426	288	138
Adjusted R^2	0.1645	0.1785	0.1523	0.1433	0.1414	0.1127

Appendix 6

OLS Coefficients for Pure Announcers by Change in ROS sorts

OLS coefficient estimates for determinants of changes in total assets and number of employees from the year before announcement to the year of announcement for sample firms with announcement of either layoff or divestiture, but not both. Columns (1) and (2) contains firms with below sample median change in ROS in the year before the downsizing announcement, and columns (3) and (4) contain above sample median change in ROS firms. Samples and variables are described in the header to Appendix4. In Panel C, Early=1 if firm is from 2005-06 sample, otherwise Early=0. Columns (1) (3) (5) and (7) contain sample firms in 2005-06, and columns (2) (4) (6) and (8) contain sample firms in 2008-09. ***, **, and * denote significance at 1%, 5% and 10% levels, respectively.

Panel A: Change in Total Assets (t-1 to t+1)

	Change in ROS (t-1 to t) below median (no double event)		Change in ROS (t-1 to t) above median (no double event)	
	(1)	(2)	(3)	(4)
ROS	1.4648***	0.0134	-0.0674	0.1476
	(0.0016)	(0.6471)	(0.8447)	(0.5482)
Change in ROS (t-1 to t)	-0.0009	0.0554**	-0.0024	0.0025
	(0.8129)	(0.0438)	(0.8819)	(0.2414)
Board Independence	-0.6117*	0.2747	-0.2993	0.2923
	(0.0646)	(0.2674)	(0.2875)	(0.2405)
Institutional ownership	0.3571	0.1011	0.1006	-0.0172
	(0.2888)	(0.6158)	(0.6925)	(0.9319)
Market value/ Book value	0.0728	0.0185	0.1780***	0.0814***
	(0.2800)	(0.6237)	(0.0000)	(0.0041)
R&D/sales	0.3216	0.6407	0.4250	-1.0318***
	(0.5193)	(0.2835)	(0.4369)	(0.0011)
Capex / total assets	-1.8824	1.6906***	1.5789	0.4032
	(0.1604)	(0.0040)	(0.2881)	(0.4208)
Book leverage	-0.2631	0.0161	-0.1682	-0.2045*
	(0.3243)	(0.9001)	(0.3282)	(0.0675)
Log (book value of assets)	-0.0186	0.0342*	0.0385	0.0183
	(0.6474)	(0.0904)	(0.2296)	(0.4128)
Employees / Sales	0.2551	-11.9014*	-12.4211	16.8409***
	(0.9842)	(0.0938)	(0.3316)	(0.0058)
Log (board size)	0.0185	0.1838	-0.3400*	-0.0015
	(0.9472)	(0.1710)	(0.0902)	(0.9893)
Manufacturing Non-High-Tech	0.0703	0.0072	0.0736	-0.0889
	(0.5683)	(0.9046)	(0.4131)	(0.1006)
Manufacturing High-Tech	0.1433	0.0747	-0.0936	0.0356
	(0.3255)	(0.4224)	(0.4961)	(0.6373)
Intercept	0.1433	-1.1325***	0.4798	-0.4412
	(0.3255)	(0.0051)	(0.3474)	(0.2374)
Number of observations	91	120	91	125
Adjusted R^2	0.1904	0.1288	0.2039	0.1911

Appendix 6 – Continued:

Panel B: Change in Employees (t-1 to t+1)

	Change in ROS (t-1 to t) below median (no double event)		Change in ROS (t-1 to t) above median (no double event)	
	(1)	(2)	(3)	(4)
ROS	0.6033***	0.0498***	0.1997	-0.1934
	(0.0074)	(0.0091)	(0.4288)	(0.2579)
Change in ROS (t-1 to t)	-0.0002	0.0033	-0.0036	0.0008
	(0.9329)	(0.8515)	(0.7547)	(0.6058)
Board Independence	-0.2883*	-0.0682	-0.0385	-0.1066
	(0.0742)	(0.6676)	(0.8520)	(0.5366)
Institutional ownership	0.2831*	0.0621	0.2675	0.0699
	(0.0868)	(0.6315)	(0.1575)	(0.6174)
Market value/ Book value	0.0528	0.0185	0.0758**	0.0884***
	(0.1101)	(0.4475)	(0.0129)	(0.0000)
R&D/sales	0.0689	0.2780	-0.2293	-1.0940***
	(0.7771)	(0.4681)	(0.5667)	(0.0000)
Capex / total assets	-1.1566*	0.2211	0.7683	0.8429**
	(0.0783)	(0.5507)	(0.4866)	(0.0166)
Book leverage	-0.3035**	-0.0743	-0.1197	-0.0613
	(0.0216)	(0.3689)	(0.3418)	(0.4271)
Log (book value of assets)	0.0275	0.0314**	-0.0044	0.0094
	(0.1687)	(0.0162)	(0.8495)	(0.5452)
Employees / Sales	3.0862	-2.2464	-0.2527	4.1599
	(0.6232)	(0.6203)	(0.9787)	(0.3186)
Log (board size)	-0.0655	0.1028	0.2098	0.0445
	(0.6318)	(0.2327)	(0.1814)	(0.5654)
Manufacturing Non-High-Tech	0.0464	-0.0247	0.0667	-0.0934**
	(0.4411)	(0.5218)	(0.3125)	(0.0137)
Manufacturing High-Tech	0.0093	-0.0157	0.1134	0.0617
	(0.8960)	(0.7927)	(0.2615)	(0.2413)
Intercept	-0.2366	-0.5867**	-0.7732*	-0.2765
	(0.4864)	(0.0231)	(0.0655)	(0.2859)
Number of observations	91	120	91	125
Adjusted R^2	0.2387	0.1050	0.0618	0.2671

Appendix 6 - Continued:

Panel C: Differences between Early and Late Samples

	Change in Total Assets (t-1 to t+1)		Change in Employees (t-1 to t+1)	
	Change in ROS (t-1 to t) below median	Change in ROS (t-1 to t) above median	Change in ROS (t-1 to t) below median	Change in ROS (t-1 to t) above median
	(1)	(2)	(3)	(4)
Early (dummy)	1.0877*	1.3231*	0.4553	-0.3179
	(0.0646)	(0.0563)	(0.2138)	(0.4690)
ROS	0.0263	0.0725	0.0540***	-0.0326
	(0.3944)	(0.8285)	(0.0055)	(0.8735)
ROS*Early	0.8218***	0.2983	0.3491**	0.1439
	(0.0013)	(0.4699)	(0.0279)	(0.5685)
Change in ROS (t-1 to t)	0.0504*	0.0030	-0.0022	0.0013
	(0.0844)	(0.2988)	(0.9040)	(0.4556)
Change in ROS	-0.0531*	-0.0140	0.0016	-0.0073
(t-1 to t)*Early	(0.0704)	(0.3800)	(0.9309)	(0.4579)
Board Independence	0.2479	0.4535	-0.0509	-0.0577
	(0.3422)	(0.1905)	(0.7544)	(0.7848)
Board	-0.7843**	-0.8804**	-0.2287	0.0012
Independence*Early	(0.0264)	(0.0413)	(0.2967)	(0.9965)
Institutional ownership	-0.0055	0.0067	0.0571	-0.0198
	(0.9791)	(0.9809)	(0.6602)	(0.9075)
Institutional	0.4109	-0.0207	0.2282	0.2641
ownership*Early	(0.1894)	(0.9540)	(0.2424)	(0.2339)
Log (board size)	0.1960	0.0477	0.0980	0.0873
	(0.1343)	(0.7443)	(0.2294)	(0.3300)
Log (Board Size)*Early	-0.4034**	-0.2276	-0.2317*	0.0734
	(0.0425)	(0.2930)	(0.0615)	(0.5944)
Market value/ Book value	0.0428	0.1422*	0.0417**	0.0841***
	(0.1272)	(0.0000)	(0.0177)	(0.0000)
R&D/sales	0.4270	-0.6908**	0.0430	-0.7952***
	(0.1458)	(0.0423)	(0.8141)	(0.0002)
Capex / total assets	0.5110	0.5691	-0.3057	0.8229**
	(0.2973)	(0.3618)	(0.3174)	(0.0324)
Book leverage	-0.1374	-0.1812	-0.1565**	-0.0980
	(0.1804)	(0.1295)	(0.0149)	(0.1796)
Log (book value of assets)	0.0230	0.0111	0.0320***	-0.0041
	(0.1663)	(0.6099)	(0.0022)	(0.7616)
Employees / Sales	-3.6454	10.4246	1.1834	3.3297
	(0.5175)	(0.1329)	(0.7362)	(0.4333)
Manufacture	-0.0024	-0.0299	-0.0184	-0.0279
(no High-tech)	(0.9626)	(0.6051)	(0.5566)	(0.4295)
Manufacture (High-tech)	0.0106	0.0990	-0.0170	0.0987*
	(0.8713)	(0.2375)	(0.6775)	(0.0552)
Intercept	-0.8873**	-0.7736	-0.5793**	-0.2697
	(0.0264)	(0.1334)	(0.0202)	(0.3914)
Number of observations	211	216	211	215
Adjusted R^2	0.1669	0.1727	0.1641	0.1697

Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

MODELING ISTANBUL STOCK EXCHANGE-100 DAILY STOCK RETURNS: A NONPARAMETRIC GARCH APPROACH

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KEYWORDS

ARCH-GARCH modeling, nonparametric GARCH, unit root, ARMA, stock returns, ISE 100.

ABSTRACT

Autoregressive conditional heteroscedasticity (ARCH) and Generalized ARCH (GARCH) models with various alternatives have been widely analyzed in the finance literature in order to model the volatility of the returns. In all of these models, the hidden variable volatility depends parametrically on lagged values of the process and lagged values of volatility (Bühlmann and McNeill, 2002) where the parameters are estimated with a nonlinear maximum likelihood function. In this paper a nonparametric approach to GARCH models proposed by Bühlmann and McNeill (2002) is followed to model the volatility of daily stock returns of the Istanbul Stock Exchange 100 (ISE 100) market from January 1991 to November 2012.

1. INTRODUCTION

In the empirical literature Bollerslev (1986)'s generalized autoregressive conditional heteroscedasticity (GARCH) models, which are the extensions of Engle (1982)'s autoregressive conditional heteroscedasticity (ARCH) models are the most widely used models both in the Turkish and international markets on modeling the stochastic stock return volatility since they have the capability of capturing volatility clusters. Many research has been done on analysis of volatility of common stocks traded in ISE and comparing the performance of different parametric volatility models especially the GARCH models regarding stock return volatility (Atakan, 2009), (Yalçın, 2007), (Özden, 2008), (Rüzgar and Kale, 2007), (Sevüktekin and Nargeleçekenler, 2006), (Kalaycı, 2005).It is well proposed that the volatility of ISE returns exhibits an autoregressive moving average procedure. Because of the dependency in financial returns, time varying conditional volatility models are more flexible approaches for modeling risk or for predicting the volatility of a stock portfolio.

In this paper we will use a nonparametric approach to GARCH models proposed by (Bühlmann and McNeill, 2002) in order to model the volatility of daily stock returns of ISE 100 market from January 1991 to November 2012 data. We apply this nonparametric approach which is less sensitive to model misspecification. We compare the estimation capability of nonparametric and parametric GARCH models on the volatility of ISE 100 returns for the period of January 1991 to November 2012.

There are many papers modelling the volatility of daily stock returns of ISE using parametric methods. Balaban, et al. (1996) have studied the daily volatility of ISE index return for the period of January 1989 to July 1995. They preferred to model the squared return by using autoregressive moving average (ARMA) procedure for forecasting the volatility. They proposed an AR (1) model which implies that the stock return fluctuation can be modeled by using past squared returns.

There are some other papers, which bring out that ISE return series has an ARCH effect. Balaban (1999) referred the advantages of ARCH models which are more reliable than moving averages models, for measuring the daily risk of ISE 100for the period of 4 January 1988 to 31 December 1997. In a similar study by Korkmaz and Aydın (2002) exponentially weighted moving average (EWMA) and GARCH models are used to determine the VaR of ISE 30 return in the period of January 5, 1998 to January 31, 2002 and the results of the models are compared. Sarıkovanlık (2006) estimates the volatility of the daily returns for 49 individual stocks in ISE between 1990-2005. In this study he concluded that GARCH (1,1) is the best model for modeling the variance of the stock returns. In her research, Sarıoğlu (2006) investigates for the factors that affect the ISE stock market volatility in two periods January 1991-December 2004 and May 1996-December 2004. For two periods the study reveals same results that exchange rates, industrial manufacturing index, changes in the stock of money and foreign capital ratio are associated with ISE volatility. Moreover, effectiveness of GARCH models family is revealed and GARCH(1,1) model is selected as a fitted model on the index return volatility. Furthermore, Gökçe (2001) and Mazıbaş (2005) mentioned effectiveness of autoregressive conditional heteroscedastic models on volatility of several ISE indices. For the period of 1989-1997Gökçe (2001) has studied on volatility of ISE 100 daily returns. Similar to Sarıoğlu's (2006) paper results, in this study residual of the AR(1) model of daily returns follow GARCH(1,1) procedure. In another study by Mazıbaş (2005) for the period of 1997-2004, daily, weekly and monthly volatility in composite, financial, services and industry indices of ISE has been modeled by ordinary GARCH models and EGARCH, GJR-GARCH, Asymmetrical PARCH and CGARCH models. It has been concluded that weekly and monthly forecasts results are more precise than daily forecasts, due to the high volatility in daily returns. ARCH-type models has weakness for modeling daily volatility. Estimations have demonstrated the existence of asymmetry and leverage effects for all types of data for the period of 1989-1997.

In contrast to the results in these papers, Kılıç (2004) has analyzed the existence of long memory properties in daily ISE 100 for the period of 4 January 1988 to 23 October 2003 and he concluded that the AR(1)-FIGARCH model is the adequate model, which has evidence of long memory dynamics. In the research paper by DiSario et al. (2008) absolute values of daily ISE 100returns are characterized by long memory as well as the squared and log squared values for the period of July 1988 to May 2004. They concluded that shocks to the stock index volatility decay slowly and in that period returns are associated with each other. However, forecasts of the conditional variance for a short period of time is more important than the long-run, since when investors consider holding the assets for only a certain period.

The motivation for using nonlinear models arises from the two properties of financial time series; firstly from the fact that the distribution of returns has heavy tails and is leptokurtic and secondly from the fact that the volatility of financial time series changes over time. Most of the papers on stock return data of ISE have proposed that stock returns have these properties. Particularly for financial data, nonparametric approaches for nonlinear time series have been developed.

Among many others, value-at-risk (VaR) approach is one of the most preferred nonparametric estimation methods to measure market risk. Modeling market risk is quite important for determining the variance of portfolio return in finance. After the global financial crisis, reporting portfolio risks have become an obligation by the regulators and value-at-risk is determined as a

standard way for measuring portfolio risk for the financial institutions. In this sense, to measure the credit risk of a portfolio, a risk manager considersthe market risk which is the volatility of market index as a best reflector of the trend of a market. Since variance is the measure of risk and the dependency is the major feature of stock returns, it calls for a good model of variance that mimics the return distribution. Most generally, determining the distribution of returns is the main problem when estimating the market risk. This is because financial returns have a leptokurtic distribution with a dependency on the tails. Therefore, violation on the assumptions, such as having an identical distribution induces developers to seek a more general approach for modeling the risk. This is why historical value-at-risk (VaR) approach is preferred as a nonparametric estimation method to measure the market risk. According to Chen and Tang (2005), nonparametric estimators are free of distributional assumptions on return series and they can capture fat-tailed and asymmetric distribution of the return process.

Thus, all the applications on the return series of ISE Indices indicate that alternative approaches are needed for the ISE since it is an emerging market. Because of the use of high frequency asset return data, and restrictive and hard-to-estimate parametric models, flexible and computationally simple nonparametric approaches have been popular (Andersen et al., 2002). Bellini and Figa-Talamanca (2004) have studied on a nonparametric tool for measuring serial dependence in the tails of financial data. According to their research on many financial time series exhibit strong dependency for daily log returns which is not fully covered by usual GARCH models (Bellini and Figa-Talamanca, 2004).

Therefore, we use a different nonparametric approach to model the return volatility process of Turkish market risk. We utilize the nonparametric approach to GARCH models proposed by (Bühlmann and McNeill, 2002) in order to model the volatility of daily stock returns of ISE 100 market from January 1991 to November 2012 data. This nonparametric approach which is an iterative process using a nonparametric smoothing technique is less sensitive to model misspecification. After modeling the volatility with this method, the estimation capability of nonparametric and parametric GARCH models on the volatility of ISE 100 returns are compared for the period of January 1991 to November 2012. The rest of the paper is organized as follows: In section 2 parametric ARCH-GARCH and nonparametric GARCH models are described briefly. The data set used in the analysis is presented in section 3 and the parametric ARCH and GARCH results are given in this section. In section 4 nonparametric GARCH models are estimated and the results are summarized with a comparison of those obtained from parametric and nonparametric methods. Finally in section 5the paper is concluded.

2. CONDITIONAL HETEROSCEDASTIC MODELS FOR STOCK RETURNS

Since the main concern in the stock exchange market is to model the volatility of the stock returns, it is crucial to obtain the stock returns. The simple returns are calculated as follows where P_t is the price of the stock at time t:

$$R_t = \frac{P_t}{P_{t-1}} - 1 \qquad \textbf{(1)}$$

The natural logarithm of the simple return is called the continuously compounded return or log return calculated as given in Equation (2)(Tsay, 2002, pp.4):

$$r_t = ln(1 + R_t) = ln\frac{P_t}{P_{t-1}} \quad \textbf{(2)}$$

It is commonly assumed that the log returnsr_t is independent and identically (iid) distributed as normal distribution with mean μ and varianceσ^2(Tsay, 2002, pp. 11).Therefore if it is believed that the stock returns contain a conditional volatility, this has to be modeled. In order to model the conditional volatility traditional ARCH, GARCH methods will be estimated and with the nonparametric GARCH approach the performance of the estimates is targeted to be improved.

Since Engle (1982)'s seminal work of ARCH, a wide range of volatility methods have been developed and applied in many areas such as risk management, portfolio management, option pricing, foreign exchange, interest rates etc. A summary for these models can be seen from (Wei, et al., 2010).

ARCH models were developed by Engle (1982) in order to model the volatility of time series, specifically the UK inflationary uncertainty. However, ARCH models have been widely used in many areas of economics and finance in analyzing the time-varying volatility. It is believed that the largest variation might happen around the peaks which more precisely implies that the probability of obtaining a large variation is greater than a small variation. An ARCH (q) model of a time series r_t is defined by (Engle, 1982) assuming that the mean of r_t is given as,

$$r_t|F_{t-1} \sim N(\boldsymbol{x}_t'\beta, \sigma_t^2) r_t = \boldsymbol{x}_t'\beta + \varepsilon_t\varepsilon_t = \sigma_t Z_t \quad \textbf{(3)}$$

whereF_{t-1} refers to the information set available at time $t-1$where Z_t is a sequence of iid random variables with mean zero and variance one. Here the $\boldsymbol{x}_t'$ may include lagged dependent and exogenous variables. Therefore the conditional variance,

$$\sigma_t^2 = \alpha_0 + \alpha_1\varepsilon_{t-1}^2 + \alpha_2\varepsilon_{t-2}^2 + \cdots + \alpha_q\varepsilon_{t-q}^2 \quad \textbf{(4)}$$

is defined as an explicit function of the q lagged squares ofε_t's and $\alpha_0 > 0$ and $\alpha_i \geq 0$ for $i > 0$ (Tsay, 2002, pp. 82-83, 87).For the log-return series (r_t) a simple way to build an ARCH model is firstly to estimate an Autoregressive Moving Average (ARMA) model in order to remove any linear dependence in the data which is equivalent to removing the sample mean from the data. This should be done if the sample mean is significantly different from zero. Secondly, the residuals of the ARMA model are used to test for ARCH effects. Therefore, residuals $\varepsilon_t$obtained from the ARMA model, namely the mean corrected stock returns are squared and the squared residuals $\varepsilon_t^2$are used to check for conditional heteroscedasticity. There are Ljung-Box test and Lagrange multiplier tests of Engle (1982) available for conditional heteroscedasticity. If the test results are significant then one can build an ARCH model. Thirdly, the order of the ARCH model (q) is determined according to the partial autocorrelation function (PACF) of the squared residuals of the ARMA model (ε_t^2) (Tsay, 2002, pp. 86-87). The order (q) is the number of the significant partial autocorrelation (PAC) values. Finally, the ARCH(q) model is estimated and checked for the significance of the coefficients.

In the Generalized autoregressive conditional heteroscedastic (GARCH) models developed by Bollerslev (1986), conditional variance is described in terms of weighted averages of past conditional variances and squared past returns as an extension to Engle (1982) ARCH models. A GARCH(p,q) model of the log-return series (r_t) with a suitable ARMA(l) model for the mean can be defined as

$$r_t = \sum_{i=1}^{l} a_i r_{t-i} + \varepsilon_t \varepsilon_t = \sigma_t Z_t$$
$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \alpha_2 \varepsilon_{t-2}^2 + \cdots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \beta_2 \sigma_{t-2}^2 + \cdots + \beta_p \sigma_{t-p}^2 \quad \textbf{(5)}$$

where Z_t is a sequence of iid random variables with mean zero and variance one, $\alpha_0 > 0$ and $\alpha_i, \beta_i \geq 0$for $i > 0$ (Tsay, 2002, pp. 82-83, 87).

In their paper, Tjøstheim and Auestad (1994) worked the possibility of identifying nonlinear time series models using nonparametric methods. Härdle and Chen (1995) present a selective review of the approaches that based on nonparametric model building procedure in time series analysis. They point that nonlinear and nonparametric time series analysis is useful in order to deal with the limitations of the ARMA models with constant mean. Härdle, et al., (1997) review some developments in modern nonparametric techniques for time series analysis. Engle and Gonzalez-Rivera (1991) addresses semi-parametric ARCH model by introducing a more efficient estimator based on a nonparametric estimated density. They also evaluate the loss of efficiency of the quasi-maximum likelihood estimator, which falsely assumes normality.

Bühlmann and McNeil (2002) proposed a nonparametric approach to GARCH modeling. Hou and Suardi (2012) considered Bühlmann and McNeil (2002)'s nonparametric approach to model and forecast crude oil price return volatility. They use 4845 daily observations on crude oil spot prices from West Texas Intermediate, from 6 January 1992 to 30 July 2010, in their application. According to their results on forecasting accuracy, the nonparametric GARCH model has superior performance to parametric GARCH models. They prefer their nonparametric approaches because of the non normality of distribution of oil prices. There are other papers on forecasting volatility of crude oil markets. Similar results that refer to effectiveness of GARCH models and extensions of GARCH models in oil market to ISE have been concluded in the applications respectively (Wei, et al., 2010).

In the next section we briefly introduce Bühlmann and McNeil (2002)'snonparametric GARCH model before applying the method on ISE 100 returns.

2.1 Nonparametric GARCH Models

Bühlmann and McNeil (2002)proposed an algorithm for fitting the nonparametric GARCH models of first order (Bühlmann and McNeill, 2002). They have observed whether the nonparametric models give better estimates of the volatility process than parametric ones with the GARCH models and suggested the new estimator to compute dynamically changing measure of risk. In this paper, we apply this nonparametric method that does not require the specification of the functional form of the volatility and that does not regard to the distributional form of the innovation distribution.

Moreover, nonparametric GARCH models allow the conditional covariance matrix of the dependent variables to follow a flexible dynamic structure. In this paper the stationary stochastic process $\{\varepsilon_t; 1 \leq t \leq n\}$ has the nonparametric GARCH(1,1) form given in (Bühlmannand McNeill, 2002):

$$\varepsilon_t = \sigma_t Z_t$$
$$\sigma_t^2 = f(\varepsilon_{t-1}, \sigma_{t-1}^2) \quad \textbf{(6)}$$

In the nonparametric GARCH approach the exact form of $f: \mathbb{R} \times \mathbb{R}_+ \to \mathbb{R}_+$ is unspecified and is estimated using a bivariate nonparametric smoothing technique which is less sensitive to model misspecification such as neglected asymmetric volatility(Bühlmannand McNeill, 2002, s. 666).

Assuming that $\{\varepsilon_t; 1 \leq t \leq n\}$ coming from a process satisfying (5), the estimation of a nonparametric GARCH model is applied with the following steps as proposed in (Bühlmann and McNeill, 2002):

1. Firstly, at the m=0 step, an estimate of volatility $\{\hat{\sigma}_{t,0}^2; 1 \leq t \leq n\}$is obtained by fitting an ordinary parametric GARCH(1,1). Then the predictions from the GARCH(1,1) model are extracted which gives the $\hat{\sigma}_{t,0}^2; 1 \leq t \leq n$ estimates for the m=0 step of the algorithm. Since the first value is not estimated in returns, it is set as equal to the mean.

2. In the m=1 step,ε_t^2 is regressed with a nonparametric smoothing technique against $\varepsilon_{t-1}$and $\hat{\sigma}_{t-1,0}^2$ which are obtained from the parametric GARCH(1,1). The squared values of the residuals are obtained from the ARIMA model and the lagged values are the first lag of the residuals of the ARIMA model. The estimated variance of the return series is obtained from the previous step of the algorithm.

3. At the m'th step, the algorithm is repeated and the $\hat{\sigma}_{t,m}^2$is estimated by ε_{t-1} and $\hat{\sigma}_{t-1,m-1}^2$.

To compare the performance and the accuracy of the volatility estimates both an average squared estimation error and an average absolute estimation error for each iteration of the method are calculated. These performance measures are given as follows:

$$MSE(\hat{\sigma}_{.,m}) = \frac{1}{n-r}\sum_{t=r+1}^{n}\left(\hat{\sigma}_{t,m} - \sigma_t\right)^2$$
$$MAE(\hat{\sigma}_{.,m}) = \frac{1}{n-r}\sum_{t=r+1}^{n}\left|\hat{\sigma}_{t,m} - \sigma_t\right| \quad \textbf{(7)}$$

With the nonparametric approach, it is expected to obtain a substantial improvement on the parametric estimates.

Another important reason in the development of nonparametric models is the lag selection procedure. The usual nonparametric models have less than satisfactory performance when dealing with more than one lag especially in the curse of dimensionality case. Alternative lag selection criteria have been studied for nonlinear autoregressive processes. Auestad and Tjøstheim (1990) and Tjøstheim and Auestad (1994) mention heteroscedasti city in financial returns and propose to use a nonparametric version of the final prediction error (FPE). Tschernig and Yang (2000) derived a nonparametric version of the Final Prediction Error for lag selection in nonlinear autoregressive time series under very general conditions including heteroscedasticity. Yang, et al. (1999) introduce a new nonparametric auto regression with multiplicative volatility and additive mean to have better estimations. Also Wang et al. (2012) proposed a new efficient semi-parametric GARCH modeling of volatility by taking account lag selection procedure.

3. DATA AND PARAMETRIC GARCH ESTIMATES

The data used in this paper is the daily stock returns of ISE100 market from November 1991 to November 2012. Daily stock returns are calculated using the Equation given in (2). All the calculations and estimations are done in R Statistical Environment (R, 2008). For the ARIMA and GARCH models, an R package by Pfaff and Stigler (2011) called "urca" is used (Pfaff and Stigler, 2011). The graphical representation of daily logarithmic returns is given in Figure 1 and the summary statistics are displayed in Table 1.

Figure 1: ISE 100Daily Logarithmic Stock Returns 1991:1-2012:11 (logR91)

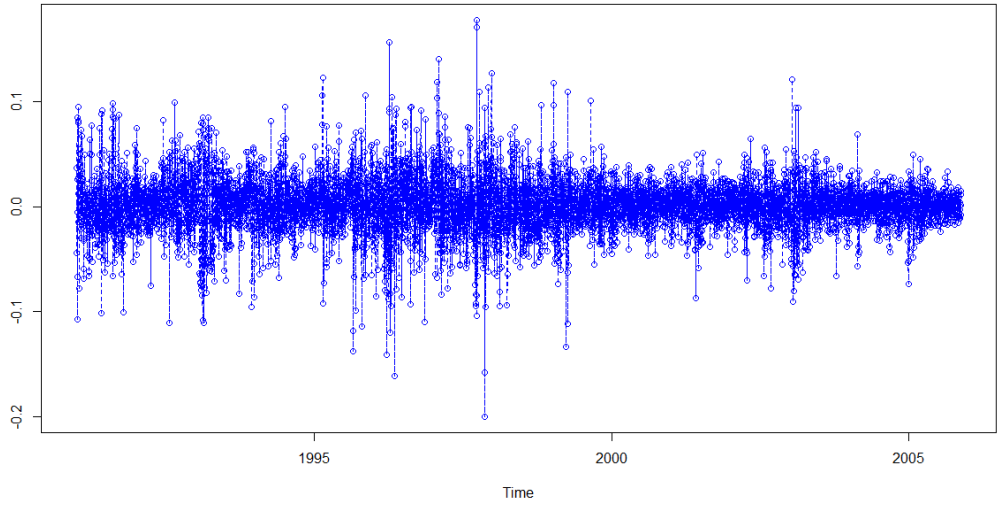
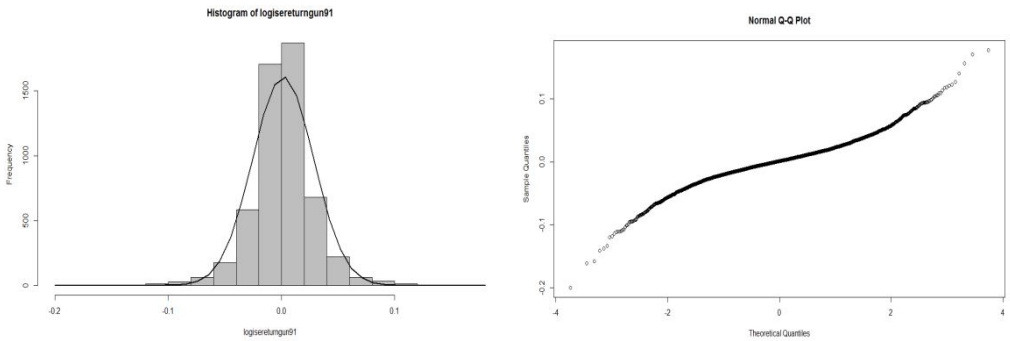


Figure 2: Histogram (a) and Q-Q Plot (b) of ISE 100 Daily Logarithmic Stock Returns 1991:1-2012:11 (logR91)



(a) **(b)**

In Figure 2, we plot the histogram of ISE100 logarithmic returns over the period of 1991:1-2012:11 along with the normal curve. We see that this distribution is peaked and fat-tailed relative to the normal distribution. The Q-Q plot on the right side of Figure 2 shows that the tails of the ISE 100 returns are extreme relative to the normal distribution. Fat tails and peak distributions indicate that variances differ along time. As a result the volatility is not staying constant.

Table 1: Summary statistics for the logR91

	logR91
Mean	0.001418
Median	0.001420
Maximum	0.177736
Minimum	-0.199785
Std. Dev.	0.026955
Skewness	-0.034534
Kurtosis	10.217549
Jarque-Bera	4027.775
Probability	0.000000
Observations	5433
Test of the Mean (H_0 : μ=0)	3.876266 (0.0001)

As it is seen from both Figure 2 and the summary statistics table in Table 1, the stock returns are not normally distributed and the kurtosis is high with an excess kurtosis value of approximately 10. Moreover, Jarque-Bera normality test (Trapletti et al., 2012) indicates that the logarithmic daily returns are not following a normal distribution. Therefore it is believed that the stock returns contain a conditional volatility.

In order to build an ARCH model, firstly any linear dependence in the daily log stock returns of manufacturing sector in ISE is removed. This is done by estimating an ARMA model with Maximum Likelihood estimation. Before performing an ARMA model the time series data is tested against stationarity. In most of the time series analysis methods the first step is to find out if the series is stationary or not. A time series (r_t) is said to be strictly stationary if the joint distribution of ($r_{t-1}, \dots, r_{t-k}$) is invariant under time shift (Tsay, 2002, pp. 23). On the other hand, a time series is weakly stationary if both the mean of r_t and the covariance between $r_t$and $r_{t-1}$are time-invariant, where 1 is an arbitrary integer (Tsay, 2002, pp. 23). In the finance literature, it is common to assume that return series is weakly stationary (Tsay, 2002, pp. 23).

The basic stationarity examination is to plot the time series so that it could be examined from a graph if the series has a trend or not. Though, a more precise way of exploring the stationarity of the series is applying unit root tests. Here we employed Augmented Dickey Fuller (ADF) and Philips Perron (PP) unit root tests and the results are provided in Table 2.

Table 2: ADF and Philips Perron (PP) Unit Root Test Results

		ADF Test Statistics		**PP Test Statistics**	
	Lag	None	Trend & Intercept	Intercept	Trend & Intercept
LogR91	1	-68.62963**	-68.84677**	-68.62888**	-68.84661**

*, ** show the significant values at 5% and 1%, respectively.

Here, we see that according to both of the unit root test results we can reject the null hypothesis that says there is a unit root. Therefore it is concluded that the logarithm of the stock returns is stationary at level.

After having seen that the returns are stationary at level, an ARMA model is built for modeling the average returns since an ARCH effect can be examined in a data that has zero mean. From the descriptive statistics table we see that the mean of the logarithmic returns is 0.001418 in the period of analysis. This mean is significantly different than zero[1]. Therefore the average returns should be modeled in order to obtain a zero mean residuals. We have fitted an ARMA(1,0) model (which can be briefly called as AR(1) model) having observed both the autocorrelation function (ACF) and partial autocorrelation function (PACF) plots. The AR(1) model is estimated as follows:

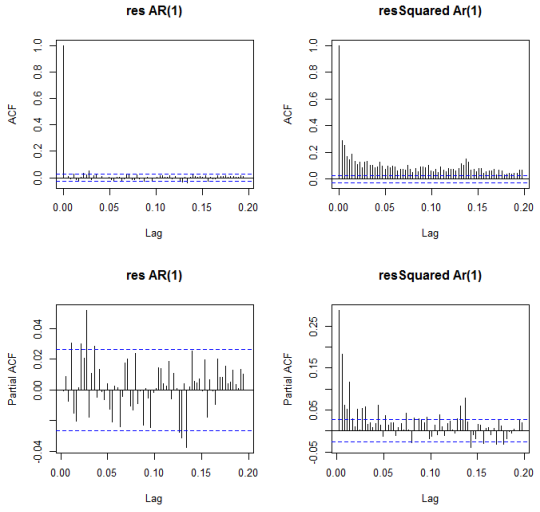
Logreturns91 $$\hat{r}_t = 0.001427 + 0.068757\, r_{t-1} \quad \textbf{(8)}$$

t values [3.641] [5.080]

p values (0.0003) (0.0000)

After building the model, the residuals are obtained which have a zero mean (with a value of 0.000022136). Finally, an ARCH model is generated using these residuals. To identify if there is a need for an ARCH model the ACF and PACF of the squared residuals given in Figure 3 should be examined as well testing the squared residuals for conditional heteroscedasticity. The ACF and PACF clearly show the existence of conditional heteroscedasticity since there are no significant AC values in the ACF plot of the residuals of the AR(1) model. On the other hand, there are many significant AC values in the squared residuals of the AR(1) model.

Figure 3: Sample ACF and PACF of the squared residuals: (a) ACF of the squared residuals, (b) PACF of the squared residuals (lower left)



[1] Significance value for a one sample t test with a test value of zero is 0.0001.

Apart from observing the ACF and PACF of the squared residuals of the ARMA model, Ljung-Box test could be applied to the squared residuals of the ARMA model to check for the conditional heteroscedasticity (Graves, 2012). The results are summarized in Table 3.

Table 3: Box-Ljung test for the residuals of AR(1) model

		Test Statistic	df	p-value
LogR91	Box-Ljung test	1771.707**	12	0.0000
	ArchTest	409.6759**	12	0.0000

*, ** show the significant values at 5% and 1%, respectively.

The output of the Ljung-Box test given in Table 3 and the examination of the ACF and PACF for various functions of the residuals indicate that there is conditional heteroscedasticity effect. Therefore GARCH model estimation is clearly necessary.

Following the literature that has well documented that ISE100 stock returns are very well modeled using a GARCH(1,1) model, we use a GARCH(1,1) parametric approach to estimate the first step volatility values. Table 4 provides the estimates and the significance levels of the estimates. It is clearly seen that the GARCH(1,1) estimates are significant.

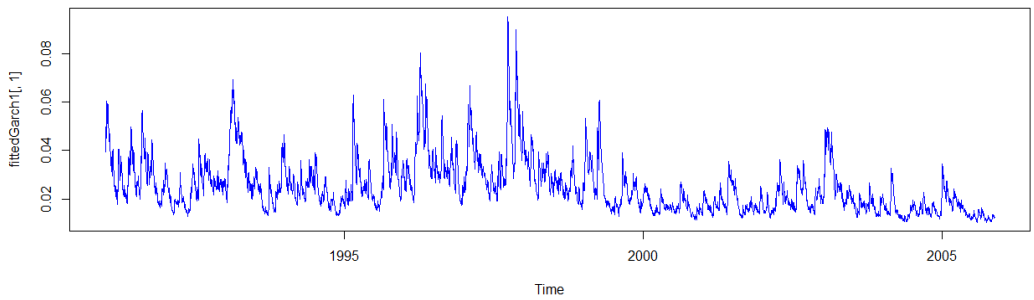
Table 4: GARCH(1,1) Estimates

		Estimate	**Std. Error**	**t value**	**Pr(>|t|)**
LogR91	**a0**	0.000007	0.000001	6.740268	0.0000**
	Resid^2	0.105703	0.005862	18.03295	0.0000**
	Garch	0.888319	0.005343	166.2521	0.0000**
	Jarque-Bera test statistic:696.9948(d.f.:2), p-value: 0.0000				
	ARCH-LM Ftest statistic: 7.62061 (d.f.: 1,5430), p-value: 0.0058				

It is also explicit that the residuals of GARCH(1,1) is not normally distributed and that they have ARCH effect in them.

The volatility estimates obtained from the parametric GARCH(1,1) model is displayed in Figure 4.

Figure 4: Parametric GARCH(1,1) Volatility Estimates

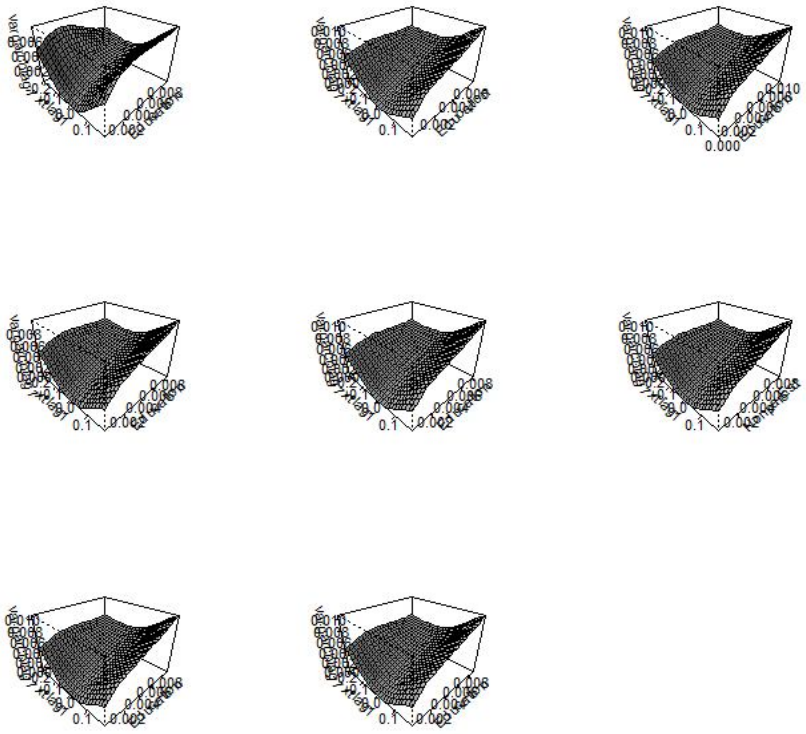


It is evident that volatility moves through time. In the next section we will use a nonparametric approach to estimate the volatility. The estimates obtained from the parametric GARCH(1,1) will be used as a starting point for the nonparametric process.

4. ESTIMATION OF A NONPARAMETRIC GARCH MODEL FOR THE ISE MARKET

Following the steps given in the previous section, the iterative smoothing process based on 7 iterations is applied in R using the default Loess function. The reason we stopped the iterative process at 7 was that the MSE and MAE measures were almost the same after a few iterations. The graphical output of the estimated surfaces obtained for the nonparametric GARCH method could be seen from Figure 5.

Figure 5: Nonparametric GARCH(1,1) estimates



The first estimated surface at the top left of Figure 5 belongs to the parametric GARCH(1,1) estimation and we see that once the nonparametric smoothing technique is applied the volatility surface is getting smoother and capturing the real volatility better. In order to compare the parametric and nonparametric results we calculated MSE and MAE terms at each iteration and these measures are given in Table 5.

Table 5: MSE and MAE measures of Nonparametric GARCH(1,1) in 7 steps

Step	MSE	MAE
Garch(1,1)	0.000346	0.014119
m=1	0.000335	0.013968
m=2	0.000336	0.014022
m=3	0.000334	0.013984
m=4	0.000333	0.013981
m=5	0.000334	0.013991
m=6	0.000334	0.013991
m=7	0.000333	0.013956

When we look at the mean errors we see that the largest improvement in the error figures is obtained mainly at first iteration. After the first iteration there is very little improvement. We can conclude that we obtained a sufficient improvement in the estimation of volatility even with only one step iteration using a nonparametric smoothing technique.

5. CONCLUSION

In this paper we model the volatility of daily stock returns of ISE 100 market from January 1991 to November 2012 data using the nonparametric approach to GARCH models proposed by (Bühlmann and McNeill, 2002). Many researches have been done on the analysis of volatility of ISE stock returns. When we look at the empirical literature review we see that GARCH(1,1) is found to be the best model for modeling the variance of the stock returns. Though most of the papers on stock return data of ISE have proposed that stock returns have the following properties: firstly, the distribution of returns has heavy tails and is leptokurtic and secondly, the volatility of financial time series changes over time. Using parametric methods when the returns have these properties can result in misleading conclusions. Therefore there is a need for an alternative method that is free of distributional assumptions on return series and that can capture fat-tailed and asymmetric distribution of the return process. Among the many alternatives, flexible and computationally simple nonparametric estimators are successful from this point of view and have been popular.

With this reason, Bühlmann and McNeil (2002) proposed an algorithm for fitting the nonparametric GARCH models of first order (Bühlmann and McNeill, 2002). It is well documented in their paper that the nonparametric models give better estimates of the volatility process than parametric ones with the GARCH models. In this paper, we applied this nonparametric method to ISE 100 daily stock returns. This is an iterative smoothing process based on 7 iterations which was applied in R using the default Loess function. In order to find the level of improvement we calculated the mean squared and absolute errors for both the parametric GARCH(1,1) and nonparametric GARCH(1,1). We observed an improvement in the errors of the estimations obtained with the nonparametric version even at first step of the iteration process.

In conclusion, we can easily say that when the distribution of the stock returns is unknown or has heavy tails and is leptokurtic, we can use the nonparametric volatility estimation method developed by Bühlmann and McNeil (2002), which is based on an iterative nonparametric process. Moreover, higher levels of GARCH model scan be investigated by this nonparametric method. The reason we have only applied a GARCH(1,1) nonparametric approach is that it is well documented in the literature that the volatility of ISE100 returns follow a GARCH(1,1) process.

Regarding our conclusion on ISE 100 return data, we have consistent results with the similar papers that apply this method. As a final note, referring to the effectiveness of nonparametric GARCH models for the univariate case, the multivariate nonparametric version of this approach could be developed for multivariate GARCH models.

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Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

THE EU DEBT CRISIS: A REFLECTION ON FINANCIAL SECTOR OF THE WESTERN BALKANS

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KEYWORDS

EU debt crises, foreign banks, Western Balkan, banking indicators , European bank subsidiaries.

ABSTRACT

The main objective of this article is to analyze the certain financial variables in order to have asses transmission effects of the EU debt crises on stability and efficiency of financial sector of Western Balkan (WB). Also, this study uses a cross-country comparison methodology and examines the following aspects: Capital adequacy, liquidity position and efficiency of the banking sector of the WB in pre crisis and crisis period as well as financial sector size, structure, and trends in financial developments for the WB region in pre crisis and crisis period. The paper is divided into six sections. Section 2 deals with the literature review. Section 3 contains an explanation of the data and methodology. Section 4 analyze trends in financial developments for the WB region. Section 5 gives an overview of the implications ofEU debt crises for WB financial system while the focus of the section 6 is on an analysis of changes in perceptions by European bank subsidiaries in WB countries in context of the European debt crisis.

The findings and discussion presented in previous sections of this article ends with conclusions that impact of EU debt crises has been transmitted on the position banking sector of WB through several sources, especially through: decline in profitability, credit growth has dropped significantly and asset quality has deteriorated markedly.

1. INTRODUCTION

Four years ago the whole world was concerned about the global crisis since global economy was affected by adverse developments in the United States. At a time when the global economy began to show positive signs of recovery European Union-27 (EU-27) has remained on the sidelines. The crisis apparently has deeper roots than those seen on the surface. In other words, European debt crises has had a far wider range and complexity of the problem than it has been discussed for years. The general atmosphere of inherited and created disputes and wrong economic decisions only made the EU -27 more divided. Year 2008 marked as beginning of the debt crisis in EU-27 caused collapse of the banking system in Iceland. As opposed to defuse the situation and improve the atmosphere in the rest of the world the EU has remained rough area with a lot of chronic problems and acute debt crisis. The transmission of the crisis to other EU-27 countries, including Greece, Ireland and Portugal in 2009 further multiplied the negative impact of the crisis for EU

market, but also in countries that are more integrated with the region. The crisis has reached its first peak in early 2010 as a result of major structural problems with the deficit in Greece increasing cost of financing government debt. By its nature the current debt crisis in EU-27 is structural. The causes of European debt crises are complex but related to series of obvious abuses in fiscal and economic policies. It turned out the previous history of European integration that the membership of a number of countries in the euro area and EU with different levels of economic development constitutes an obstacle to the harmonization of economic policies. There is a significant gap between the EU-27 countries in terms of GDP per capita expressed in purchasing power parity (PPP). Data released by the Eurostat show that the indicator of PPP for the 16 euro area countries amounted to 108 percent of average EU-27 by the end of 2010. It was noted that this indicator was only 72 percent in Slovakia, 78 percent in Portugal and Malta, 86 percent in Slovenia, 95 percent in Greece and 98 percent in Cyprus. In this context it must be mentioned that not all members of the euro area successfully adopted an innovative model of development, which would provide a guarantee that European countries continue to maintain a competitive advantage. The causes can be found in the fact that in some countries on the periphery of the EU-27 that have not been able to transform its uncompetitive economy and adapting them to conditions of globalization. Some countries used membership in the EU-27 and the euro area to take advantage of improving the living standards of their citizens, for example, in the framework of a supranational regional policies, and not to exploit any synergistic effects (such as national companies access to new markets, selling or developing cooperation in the field of production) .

The following serious objection is that the international statistics formally even put several troubled EU countries in group of developed countries, simply because they are EU members. However, in terms of productivity, they are lagging far behind the leading European countries. Poor quality of education, which is common of southern Europe, also indicates a low level of human capital, and the slow process of assimilation and integration of population in modern information technology developments. A number of countries on the periphery of the EU-27 has lived for years beyond their means, because wages are generally growing faster than output per person employed. The adverse consequences of sustained large budget deficits, troubling social security system and inefficient administration worsened the social situation (A. Dynkin, 2010, pp. 7-9). Furthermore, in order to understand seriousness of the situation it's important to point out that in 2009 the level of EU-27 budget deficit stood at -6.8 percent, and at the level of the euro area (EU 16) -6.3 percent (Eurostat, 2011, p.66).

The spillovers from EU debt crisis fully hit the economies of WB and led in 2009 to the deepest recession since early transition. The countries of the WB have faced significant challenges since the latest financial crises began in 2008. However, 2009 has proved to be a difficult year for all economies of the WB countries. The credit expansion of Western banks caused instability in many transition economies where these banks had operations. Equally important is that in the pre crisis period (2003-2007) the economies of the WB had enjoyed solid economic growth mainly fuelled by large inflows of bank credits, enabling increased domestic borrowing. In some cases, notably Montenegro, average annual rates of credit growth exceeded 90 percent. Over this period, in Bosnia and Herzegovina, Macedonia, Serbia, and Albania, average annual rates of credit growth were between 20 percent and 30 percent. On the other hand, Croatia managed to keep the rate of credit growth within reasonable bounds, averaging 15 percent over the period.

2. LITERATURE REVIEW

In the most recent systemic banking crises around the world it can be concluded that they have typically been caused by an adverse macroeconomic shocks that have weakened the whole financial system, rather than the impact of the transmission of panic that followed the failure of a

single bank. (Claudio, B., 2003). In some countries, it took several years to clean up the balance sheets of the banking sector because of the concealment nonperforming loans from regulatory authorities. Such delays in action of the restructuring the banking sector can cotter financial intermediation and credit crunch as well as to lead to non-banking private sector. In some developing countries, dealing with a banking crisis often results in large fiscal expenditure since that the rescue of the banking sector was a serious threat of sound and sustainable government budget positions.

The banking system is particularly important for small and open economies because of their size as a rule, while other segments of the financial markets are small and underdeveloped. In other words, for these countries banking system is the most important source of liquidity for the real sector of the economy. Therefore, the banking crisis in these countries may have a much greater negative implications and much greater potential to spread crises from the financial to the real sector. Also, it may be particularly at risk for those small economies that have a disproportionately high value of financial assets to GDP. Banking business is very sensitive in every country because it could cause market instability. Even the bankruptcy of small banks can generate financial instability, because depositors may be concerned about their deposits in other banks, and begin withdrawing their deposits – sparking a real bank run. Due to concentrated nature of the banking system, even bankruptcy of individual bank generally can have a negative impact on the whole banking industry. Therefore, the banking crises are more dangerous in small economies due to high concentration of individual depositors and thus widespread panic that potentially can cause a collapse of the financial system. Also, by definition, small economies have to be very open, and therefore are more susceptible to external shocks transfer from abroad, or "imports" of banking crises.

As pointed out by Mendis (2002) in small opened economies (SOEs) worsening terms of trade, reduced inflow of foreign capital, large fluctuations in exchange rates or limited access to international financial markets have great potential for developing into a crisis. Also, his study found strong association between the frequency of occurrence of external shocks and banking crises in SOEs. Key macroeconomic factors such as negative income shocks, level of debt and the real exchange rate represented the main determinants of the crisis while negative trade shocks, were responsible for a large number of banking crises in the sample.

This means that the financial crisis more easily spread in SOEs than in the case of large countries with less share of external sector. This made mono-cultural country to be particularly vulnerable as well as a country of exporting primary products.

One of the significant analyses to take such a perspective was probably De Haas and and Van Lelyveld's article on multinational bank subsidiaries in Central and Eastern Europe (CEE) countries (2006) and (2010). They find that a lower solvency, liquidity and profitability of parent banks can lead to lower credit growth of multinational banks' subsidiaries that are located in CEE. Analyzing different components of the multinational banks' subsidiaries that are located in CEE they provided evidence that if only a limited number of local banks are part of a multinational bank holding, or if many banks are part of a multinational bank but these banks are headquartered in quite different home countries, aggregate bank lending in the host country will become less dependent on local economic development and thus be less procyclical. This contrasts with a situation in which a substantial share of the banking sector is taken over by parent holding companies from one single home country.

Kaminsky and Reinhart (2001) examined the potential for contagion through exposure to a common lender. They found evidence that common bank lenders have played a significant role in

the spread of currency crises—indeed, the bank-lending channel outperforms trade channels in explaining the vulnerability of a country to contagion.

3. DATA AND METHOD

The implications of the EU debt crisis have demonstrated specific effects on the economy of the WB. Due to the reduction of external capital inflows and low accumulative capacity of the domestic economy, there was a shortage of resources for lending by commercial banks. In the foreground are banks because they occupy the largest share of the financial system. Commercial banks' share of total financial assets is at over 80%, measured by total assets. This indicates the huge importance that banks maintain a prevailing position in the financial sector's structure in compared to other financial intermediaries that have on the overall economy of the region. The remaining market share was divided among the other financial intermediaries (investment fund, leasing companies, insurance companies, and pension funds) which market share is almost neglected. In other words, it confirms a fact that financial systems of the WB countries are bank-centric while the other financial markets in the WB are still shallow, narrow and thin. This means that beside of banks there are only a few institutions that are able to adequately fulfill the role of financial intermediaries. The main objective of this article is to analyze the certain banking variables in order to have asses effects of the European debt crises on stability and efficiency of banking sector of Western Balkan in pre crisis and crisis period. To achieve the goals, we used the method comparison of the performance of the banking system in the region of WB over the past decade. The analysis covered six national banking system of the WB: Albania, Bosnia and Herzegovina, Croatia, Macedonia, Montenegro and Serbia. In our analysis we use annually data series which are sourced from the following IMF databases: International Financial Statistics (IFS), and Global Financial Stability Report (GFSR), from the national central banks, their annual reports. The data covers the period between 2003 – 2011.

The main hypotheses used in this article are based on the following assumptions: First, banks are the dominant channel of trade finance and the economy of WB countries; second, the main effects of the first wave of the crisis on banks' balance sheets are the increase in credit risk (NPL) and reduce their profitability; third, over crises period in countries of WB recorded trend changes in the maturity structure of European banks towards deleveraging over the share of short- term and middle –term claims and leveraging of the share of long-term claims.

4. TRENDS IN FINANCIAL DEVELOPMENTS FOR THE WB REGION

There is substantial evidence that is credit expansion definitely improvement in the living standards of the countries of the region. However, credit expansion has increasingly resulted in borrowing on the unrealistic assumptions. The problems of high levels of concentration of risk by banks to private companies impacted on banks to be focused on the retail segment.

In some WB countries foreign banks had acquired substantial holdings in the domestic banking sectors and were easily able to expand their operations due to the growing demand for credit. The high penetration of foreign banks in the region is evident if one takes into account that the market share of foreign-owned bank in Croatia, Albania, Bosnia and Herzegovine and FYR Macedonia is higher from 90 percent. By the end of 2011, in Serbia share of foreign-owned bank was 72.7 percent.

Table 1 shows the trends in financial sector development, proxied by five indicators of financial deepening, in both pre- crises and during the crises period. These indicators are banking deposit liabilities to GDP ratio, ratio of domestic credit to private sector to GDP, ratio of total credit to GDP as well as Stock Market Capitalization to GDP and Insurance Premiums to GDP. The most

important feature of the financial sector WB countries is that its size in relation to the size of GDP is smaller.

Table 1: Financial sector size, structure and trends in financial developments for the WB (weighted average over GDP)

	Pre-crises Period			Crises Period		
	Avg	Min	Max	Avg	Min	Max
Domestic credit to private sector (% of GDP)	43.91	20 (B&H)	80.26 (Montenegro)	48.52	23.45 (B&H)	71.4 (Montenegro)
Deposits (as % of GDP)	54.31	35.45 (Serbia)	72.4 (Croatia)	53.34	38.26 (Serbia)	77.48 (Croatia)
Credit (as % of GDP)	58.05	35.42 (Serbia)	83.97 (Montenegro)	61.99	44.05 (FYR Macedonia)	82.14 (Croatia)
Stock Market Capitalization (as % of GDP)	85.72	34.1 (Macedonia)	119.1 (Croatia)	40.78	18.08 Macedonia)	82.83 (Montenegro)
Insurance Premiums (as % of GDP)	1.89	0.62 (Albania)	3.29 (Croatia)	1.79	0.67 (Albania)	2.85 (Croatia)

Source: Author's elaborations on data: International Financial Statistics (IFS), Global Financial Stability Report (GFSR), Partners for Financial Stability Program (PFS), Central bank annual reports.

The banking trends documented over the recent crisis and pre crisis period reveal a relatively low depth of the financial sector (table 1). In terms of GDP share of credit to the private sector on average was below 50 percent. The initial level of bank credit to the private sector in terms of gross domestic product in countries in transition was generally much lower than in the EU, which is caused by underdevelopment of domestic financial (banking) system at the beginning of the transition process. The expansion of bank credit began with a low level of financial intermediation in these countries attempt to "catch up" the level of financial deepening with the developed countries of the EU. Therefore, it was expected that total loans-to-gross domestic product ratio grew consistently faster in transition countries as compared to developed countries. Rapid growth in bank credit to the private sector is primarily financed by the high level of domestic savings. The strong growth of bank deposits was the result of growing confidence in the banking sector, the inflow of money from abroad, and the relatively high level of interest rates on deposits. Over the last two years private sector lending by domestic banks has been stabilized at 49.12 percent of GDP, and generally in re-expanding, but at a much more modest (and more sustainable) rates than before the crisis.

Although growth of banks' total gross loans is mainly driven by an increase in deposits of residents, inflows of funds from abroad - either from parent banks or borrowing on international financial markets - are getting more important. Main driving force of capital inflows from abroad represented an opportunity to achieve significant profits on credit markets in transition countries.

Low levels of bank lending during the crisis period can be explained by the negative consequences of the EU economic debt crisis, resulting in a recession and a drop in GDP in most selected economies except Albania.

Another a popular measure that reflects the position of the banking sector in the financial system of transitional economies and the subject of this analysis is the ratio of total deposits to GDP. The global financial crisis has led to protracted difficulties in funding via financial markets. Although in an environment of slower deposit growth versus loan growth in some countries of WB there has been recorded an increase in the ratio of deposits to GDP in relation to the crisis period. The average ratio of deposits to GDP in the crisis period (53.34 percent of GDP) is slightly lower than the pre-crisis period (54.31 percent of GDP). The most developed market of deposits in the region has Croatia, with the average ratio of deposits to GDP of 77.48 percent, as well as Serbia with a ratio of deposits to GDP of 38.26 percent. After the sudden withdrawal of deposits from the banking sector in 2008, when the average GDP share of deposits in the countries of the region fell below 50 percent of GDP, the recovery process was recorded in 2010. The total amount of deposits in the region in 2011 was higher to the pre-crisis level with exception in Montenegro.

Taken as an indicator of the level of financial intermediation ratio credits-to-GDP increased in pre crises (58.05 percent) to 61.99 percent in crises period. It is interesting that this indicator as the primary indicator of financial deepening, increased significantly in most of the countries, as a result of rapid credit growth relative to economic growth. In crises period the level of financial intermediation remains relatively low in the WB region, with the exception of Croatia (82.14 percent).

Most of the countries analyzed first felt the impact of the crisis on their most sensitive part of the financial markets - the stock market. Given the characteristics of the under-developed capital markets of WB countries, it was considered that the impact of the EU debt crisis on this sector will be limited. However, the unstable political environment in early 2008 (Serbia, Bosnia and Herzegovina, FYR Macedonia) reduced investment and the speed of further withdrawal of foreign capital that adversed effects on future developments in stock markets. EU debt crisis is initially expressed in the economies of the WB over liquidity in the global financial markets resulted in growth of interest rate. This caused a slowdown of external funding and the reduction in domestic demand, as well as an increase in domestic interest rates and a slowdown in economic activity. The stock market decline in 2009 by more than 70 percent annually exerted influences on withdrawal of foreign institutional investors from the financial market. If we neglect Albania where there is no trade and therefore can not be expressed any capitalization, ratio of Stock Market Capitalization (as % of GDP) is halved compared to the pre-crisis period.

In contrast to the trends and results in the banking sector, the situation in other financial market segments in the countries of former Yugoslavia is unsatisfactory. A decline in global investor confidence contributed to a reduction in capital inflows and investment in the financial markets of the region. As a result, weak activity had been observed only in capital markets, in which debt market liquidity may be reduced. New issue of securities applies only to the bond market, where the bond market is dominated by state as a major issuer of securities. The greater part of the funds raised by issuing securities government are generally used to cover government budget deficits rather than boosting the investment cycle. Due to the deteriorating credit ratings of most of these countries have abandoned the international bond issues. It can be concluded according to the previus trends of key indicators of financial markets the following:

- ✓ WB stock exchanges are small as gauged by the ratio of market capitalization to GDP and they are dominated by few stocks. In addition, liquidity, as measured by the yearly turnover ratio per stock market capitalization in all countries of former Yugoslavia is too modest.
- ✓ a depth of financial markets is insufficient because the trading activity in the stock market is in general much lower than those for banking development; and

- ✓ Low liquidity of capital markets and an increased sensitivity of the financial markets to the movements of speculative capital.

The insurance sector is in its infancy with the exception of Croatian.

5. IMPLICATIONS FOR WB FINANCIAL SYSTEM - LOANS RAPIDLY BECAME NON PERFORMING

In spite all the turmoil in the EU the banking system of WB countries can be characterized as well healthy also well capitalized with the average capital-adequacy ratio (CAR) higher than set by capital requirements. The CAR has been slightly decreasing from 18.9 percent in pre crises period to 17.1 percent in crises period. Among group of analyzed countries Croatia is the only country showing progress in increase of CAR in the crisis period than it was in late 2007. In the second group can be included Serbia with the highest CAR in pre crises (26.3 percent) as well as in crises period (20.7 percent). Finally, CAR of the third group - all the other Western Balkan countries experienced relatively sharp declines in crises period relate to pre crisis period. Table 2 shows the levels of activity in the crisis period compared to the pre-crisis period.

Table 2: Evidence of change in the size selected banking indicators in the region

	Pre-crises Period			Crises Period		
	Avg. 2006-2007	Min	Max	Avg. 2008-2011	Min	Max
Bank Regulatory Capital to Risk-Weighted Assets	18.9	15.2 (Croatia)	26.3 (Serbia)	17.1	16.1 (Albania)	20.7 (Serbia)
Bank Capital to Assets	11.5	7.2 (Albania)	19.8 (Serbia)	12.4	9.1 (Albania)	20.1 (Serbia)
Bank Nonperforming Loans to Total Loans	5.4	3.3 (Albania)	8.4 (Serbia)	11.3	8.1 (B&H)	15.6 (Serbia)
Bank Return on Assets	1.4	0.9 (B&H)	1.8 (Macedonia)	0.5	-1 (Montenegro)	1.5 (Serbia)
Bank Return on Equity	13	8.8 (B&H)	20.4 (Albania)	3.5	-10.3 (Montenegro)	9.7 (Croatia)

Source: Author's elaborations on data: International Financial Statistics (IFS), Global Financial Stability Report (GFSR), Partners for Financial Stability Program (PFS), Central bank annual reports.

It is worth noting that, banks in the WB countries held at the end of 2011 average ratio of capital to risk weighted assets (CAR) at almost 17.9 percent (table 2), that is significantly higher than set by capital requirements.[1] This capital adequacy indicator provided adequate protection against shocks originating in the domestic economy and the banking system.

[1]Minimum capital requirements: Albania (12%), Bosnia and Herzegovina (12%), Croatia (10%), Macedonia (8%), Montenegro (10%), Serbia (8%).

The main effects of the first wave of the crisis on banks' balance sheets are the increase in credit risk (NPL) and decline of their profitability. The latest financial global crisis has left an indelible mark on the banking of WB. As shown in Table 2, the average ratio of NPL to total loans for the 6 countries of WB increased from 5.4 percent in pre crises to 11.3 percent in crises period. This is the first significant increase in NPL ratio after more than ten years and period of banking reform began in the 1990s. These very high levels of NPLs have shown significant deterioration of loan quality. When we compare the results from table 2 it can be concluded that in the years preceding the EU debt crises were characterized by strong credit growth. In pre crisis period, NPLs ratios kept on falling substantially in all countries of Western Balkan. Recorded data on the movement of NPLs show that the banking system in the crisis period is facing major challenges in the process of preserving the stability of their banking system as a whole and the stability of the entire economic system. Available data indicate that in Albania, Bosnia and Herzegovina, and Montenegro ratio Banks' Non-Performing Loans to Total Loans is already an issue. The share of NPLs in total loans jumped in Albania, Bosnia and Herzegovina and Montenegro to 13.9 percent, 11.4 percent and 21 percent respectively in 2011 from 3.4 percent, 3 percent and 3.20 percent respectively in 2007. In Serbia the share of NPLs in total loans in 2011 recorded at 16.90 percent.

Since provisions are a deduction from profits, increases in loan-loss provisions appeared to have a substantial impact on banks' profitability indicators (ROA and ROE). The increasing level of provisions reflects also the declining asset quality. Thanks to the increasing participation of NPLs and there was a significant increase in allocation of reserves to cover potential loan losses that had significant effect on earnings and regulatory capital.

In the pre-crisis period, the rate of return on assets (ROA) and return on equity (ROE) in the WB countries recorded positive growth. As a confirmation it can be concluded in the pre-crisis period, the average rate of ROA was 1.4 percent and the rate of ROE of 13 percent. Table 2 show that in WB countries earning indicators continue to weaken, as ROA and ROE have worsened since the start of crises. Thus, in the crisis period the average rate of ROA in the banking sector of the WB was 0.5 percent and the average rate of ROE of 3.5 percent.

6. CHANGES IN PERCEPTIONS BY EUROPEAN BANK SUBSIDIARIES IN WB COUNTRIES

Austria was among the first countries that recognized the market potential of the region of Central and Eastern Europe and the WB. It also was naturally taking into account the historical ties, cultural and economic relations with this region. It is therefore not surprising that commercial banking from Austria were among the first that were more willing to take risks in the markets of the region. The major Austrian banks (Raiffeisen, Erste Bank, Volksbank, BAWAG P.S.K., Bank Austria Creditanstalt) have been among the main players that went beyond national borders in searching of a leading position in most countries WB markets. Spheres of interest by foreign banking groups divided by the WB countries in a way that banks in Austria and Italy, played a dominant role in B&H, Croatia, Montenegro and Serbia, while the banking sector FYR Macedonia and Albania is heavily influenced by banks in Greece. In the last decade foreign banks established subsidiaries and daughter companies in the region, due to the relatively high returns available in emerging markets with underdeveloped financial systems. In a very short period foreign banks are proved to have access to cheap capital that can be quickly placed in countries where demand for corporate and retail loans is very high. The region has unusually strong banking-sector linkages with high-income Europe, both in terms of ownership links and day-to-day financing. Share in the total assets held by foreign banks in these countries is significant (about 89% of the total), where the foreign presence in some cases involves significant financing of local business affiliates. With that in mind, it is clear why the presence of local subsidiaries of foreign banks creates another

channel of potential transmission of EU debt crises to the WB region. Several large banking groups from Austria, Germany and Italy controlling a high percentage of banking assets in the region and thereby generate significant vulnerability in the event of any repatriation of funds. The nature of European banks' holdings in the region underscores its vulnerability to deleveraging.

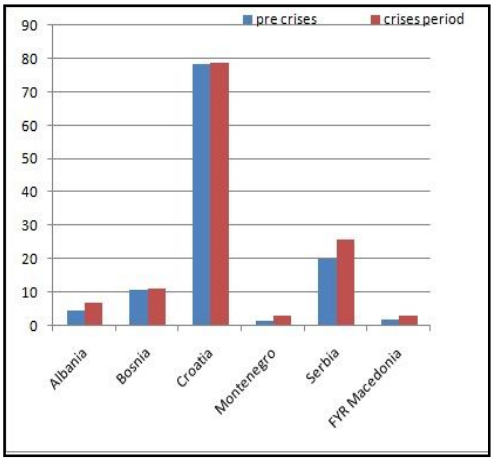
The financial sector of WB countries is significantly exposed to a financial crisis in Europe compared to other regions. One of the primary reasons is that European banks (by Austrian, Italian and German banks) have a significant presence in the region. The most significant risk to the region of WB associated with EU debt crisis is that an escalation of the crisis could result in financial risks created within the domestic financial sector. The growth of credit markets in the WB has grown at a faster pace before the global crisis. However, after a temporary slowdown in late 2010, credit growth in almost all countries on a higher level than in relation to the beginning of the EU debt crisis. Foreign banks in the region of WB use cross-border lending from their parents to finance their loan portfolios. According to loan-to-deposit ratios most exposed is Montenegro (152 percent), followed by Bosnia and Herzegovina (128 percent), Serbia (118 percent), FYR Macedonia (92.06 percent) and Albania 60.06 percent.

Since the banking sector of WB countries is highly concentrated and largely foreign owned, the behavior of the parent banks in Austria, Italy, Germany and Greece is extremely important for the liquidity and solvency of banks in the region. Also, the WB region is characterized by a comparatively high share of Greek- and Italian-owned banks. Austrian banks also have a significant presence in the region although these banks face less risk in their own sovereign debt market. Macedonia is vulnerable to economic developments in Europe - due to strong banking and trade ties - and dependent on regional integration and progress toward EU membership for continued economic growth. As a result, banks are extremely vulnerable to a cut-off of lending, let alone to an active effort by parent banks to recover funds either by selling assets or calling loans where possible. Funding pressures will add to the stress in the domestic banking sectors that are already at risk to a sharp increase of Banks' Non-Performing Loans to Total Loans. Due to the effects of the EU debt crises, these developments could occur much sooner than currently expected, considering all of the limited liquidity of foreign markets and the increasing reluctance of banks to accept the risk.

Subsidiaries of international banks (by Austrian, Italian and German banks) in the region of WB is financed a significant part of the of their investments in retail markets at local level, and partly through their European parent banks. Out of total foreign claims European banks accounts for more than 98% of total foreign bank borrowing by countries of WB. (Figure 1 and figure 2). Available data suggest further growth foreign banks involvement (in crises period) as measured by Total foreign claims by major EU banks on WB countries. In compare with pre crises period during crises period WB countries experienced a rise in the foreign bank claims: on average by 9.9 percent. The most marked rise in foreign bank claims was occurred in Albania 45.79 percent and Serbia (28.04 percent).[2]

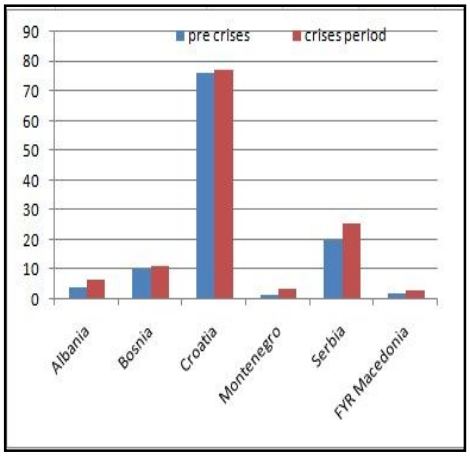
[2]Foreign claims are defined as the sum of cross-border claims and local claims of foreign affiliates.

Figure 1: Total foreign claims in pre crises and crises period



Source: BIS, author's calculation.

Figure 2:Claims by EU banks in pre crises and crises period(% of all claims)



Source: BIS, author's calculation.

Furthemore, in according to BIS-reporting banks, it can be concluded that Austria is far the most important creditor countries of WB accounting for 39.25 percent of foreign bank funding to the region, followed by Italy 35.17 percent, Greece 8.13 percent as well as France 7.99 percent (Figure 3). Also Greece is the most important foreign creditor for Macedonia FYR, Albania and Serbia. The shares of Greece banks claims range from 48.95 percent of total foreign claims on Macedonia FYR, to 27.9 percent on Albania while it accounts for 22.8 percent of total foreign claims on Serbia.It is suggesting that the sensitivity financial sector of these three countries to economic conditions in Greece might be significant.

Out of total foreign claims on WB it accounts 43.30% on banks from Greece and Italy (figure 3).

Another important fact, which will in the medium and long term impact on the performance of banking, is the high external dependence of national banking systems of on *external*borrowings as well as *dependent* on their foreign "parent companies". Also, dominant foreign banks were holders of rapid growth in credit in the pre-crisis period. The number of *foreign banks* is used a large difference in interest rates between the market of WB and the EU and consumed large stocks of capital. Raising domestic savings, on which they were primarily oriented local banks, were not sufficient to finance the expansion of credit or by volume, not by maturity structure because it was dominated by demand deposits.

Therefore, the inflow of foreign savings was the primary source of credit restoration activities for all countries included in this analysis. A common feature of all the national banking system of WB is that the expansion of credit supply mainly relies on locally funded, mostly through deposits but partly in the form of Western European parent banking groups financing. Local companies often through the mediation of local affiliates from the composition of the pan-European parent banking groups supplement their financing by cross-border borrowing directly from foreign banks (Austrian, Greek and Italian) to fund their expansion.

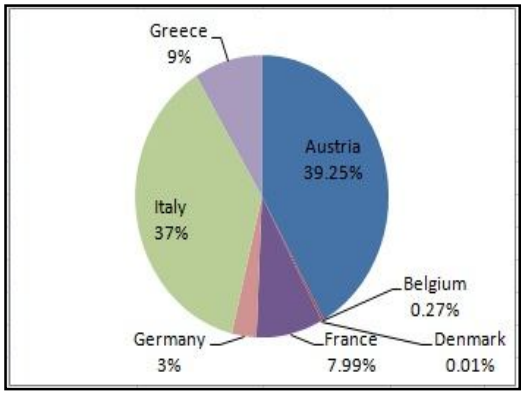
International Claims by Maturity (foreign bank claims) have changed in crises period across WB countries. Figure 4, figure 5 and figure 6 show the maturity breakdown of international claims on

WB countries. Based on Figure 4, it can be concluded that in countries of WB recorded trend changes in the maturity structure of European banks towards deleveraging over the share of short- term claims (Up to and including one year) in the range of 5.97 percent (Serbia) - 44.19 percent (FYR Macedonia) over the period 2009-2011. When compared to other WB countries, Croatia and Serbia has a relatively large share of International Claims from foreign banks up to and including one year (together with 83.65 percent of total amount all WB countries).

Also, it is recorded average decline of the share of midle-term claims (One year up to two years) in the range of 0.87 percent (Albania) - 31.29 percent (Bosnia and Herzegovina) over the period 2009-2011 (figure 5). By contrast, rise of the share of long-term claims (International Claims by Maturity Over two years) is recorded over the same period for 16.11 percent indicating a greater dependence on sources of funding that come from outside the local banks (figure 6).

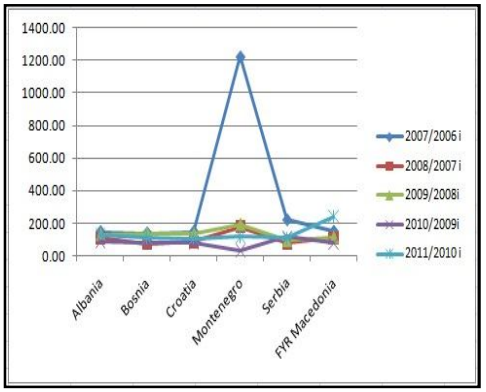
The banking system of WB countries is much less exposed to the risk of refinancing short-term credit lines, while is recorded a growing share of long-term credit lines to finance the banking sector. Out of total amount of international claims from foreign banks at the end of 2011 the share of claims by maturity over two years was 51.46 percent. This share of claims by maturity over two years in markets of WB can be seen as positive because it reduced the dependence of the so-called average short-term funding from 56.5 percent (2008) to 48.53 percent (2011) .

Figure 3: Geographic structures of consolidated foreign bank claims in WB countries



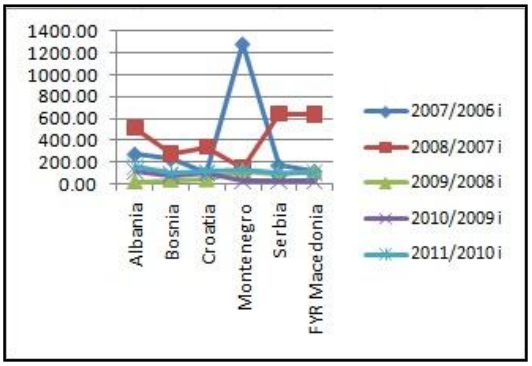
Source:BIS, author's calculation.

Figure 4: International Claims by Maturity Up to and includingone year



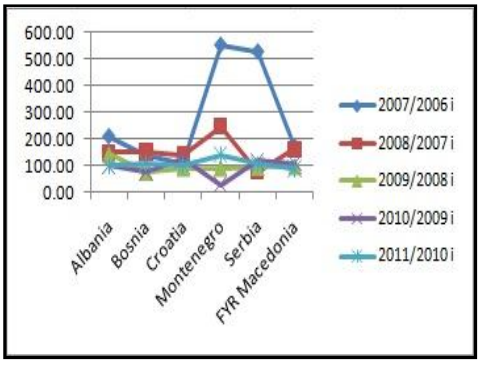
Source: BIS Consolidated International Banking Statistics, author's calculation.

Figure 5: International Claims by Maturity Over one year up to two years



Source: BIS Consolidated International Banking Statistics, author's calculation.

Figure 6: International Claims by Maturity Over two years



Source: BIS Consolidated International Banking Statistics, author's calculation.

7. CONCLUSION

The financial sector of countries WB has not yet emerged from the most recent recession. Confidence in the banking sector, but also the entire financial system is not fully restored, because certain banks are concerned about facing a high risk of litigation outside WB countries. Commercial banks are in mitigating of negative effects of the EU debt crisis adopted a restrictive credit policy by setting high interest rates, which constricts credit growth as well as increasing levels of capital and maintenance of liquidity planning.

One of the most significant risks to the economy of WB is high level of NPL that are still growing and exposure to sectors that has been particularly affected by the crisis, such as through decline in trade volumes , manufacturing export activities, and construction. Because of the need of recapitalization of European banks as 'collateral victims' can fall their subsidiaries, including those that operate in the WB. According to the current conjuncture and expectations in the banking sector in the near future, we should not expect significant growth in bank loans, as well as serious a positive boost economic growth. In the case of excessive levels of indebtedness European periphery countries and bankruptcy (Greece) investors may be motivated by fears so that they may lack immediate access to their deposits (eg. FYR Macedonia, Albania, Serbia). Another problem for WB countries is the lack depth of domestic financial markets. European banks are significant to finance local borrowers in the region much higher than in other advanced countries in transition.

We should also bear in mind the significant reduction of bank profitability in those countries. Technically, reducing the profitability is the consequence of the decline in net interest margins and rising impairment losses and provisions for losses. Reducing the interest rate margin is the result of increasing competition and reducing demand for loans due to the strong recessionary pressures. It should also be noted that those factors will affect the future performance of banks in the WB. As we mentioned, almost all the banks in the region of WB are coming from EU countries. However, the WB region is characterized by relatively large share of banks in the Greek and Italian ownership. Along with calls from across the EU to increase the capital of the leading banks, any additional stress on the financing of parent banks can be a strain on local banks owned by foreign banks to provide liquidity or dividends to their parent banks. This could potentially cause another credit crunch in the region. Strong expansion of European banks in the region of WB increased

consolidated balance sheet of the banking systems in home countries such as Austria, Italy, Greece and Germany - far above the historical value of the loan and the ratio of the sum of the GDP of their national financial systems.

The growth of risk during the last decade has dramatically raised the question of stability of this structure. The real question to be asked is whether these banking systems can maintain solvency in the long run?

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Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

INTERNAL AUDIT POSITIONING - FOUR STAGE MODEL

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KEYWORDS

Positioning of internal audit, maturity of internal audit, competency of internal auditors, internal audit in Turkish companies.

ABSTRACT

The objective of this paper is to introduce a new model about positioning of internal audit. There are only a few studies about this subject. Studies about positioning of internal audit function are made for individual research subject such as internal audit's position in public companies, in private companies, in big firms, in a country, etc. However, there are not many models which show dynamics of internal audit function with a macro approach for positioning as to its maturity, skill sets, independence and governance for private industrial companies. The positioning model outlined in this paper aims to contribute to literature by providing a generic guideline and a tool for assessing the position of any internal audit function and to increase the awareness among stakeholders; thus, motivate decision makers of Turkish organizations to interrogate and challenge what they should be expecting from internal audit function. It will also help the Chief Audit Executives to make more effective audit planning, budgeting, staffing, training, and execution.

1. INTRODUCTION

As defined by the Institute of Internal Auditors (IIA), internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes.

In parallel to the economic developments in the world, the internal audit profession has evolved. At the early twentieth century, the internal auditor was seen as a verifier, or a "detective," to protect organizational assets, focusing on only financials. Over time, internal auditors became heavily involved with operational audits, internal controls, risk management, governance and IT concepts. Thus, in addition to their assurance duties, internal auditors started to give consultancy services which became quite popular until the global economic crisis in 2001. After the passage of the Sarbanes-Oxley Act (SOX) in 2002, internal auditors were redeployed to help their companies comply with the documentation and testing of internal controls required under Section 404. As compliance with Sarbanes-Oxley requirements became largely routine, a balanced approach has started to be applied. As indicated in one of Ernst and Young's reports in April 2011, 'internal

audit is undergoing its second transformation in a decade' (Tapestry Networks, Ernst & Young, 2011).

As aforementioned, the positioning model outlined in this paper aims to contribute to literature by providing a generic guideline and a tool for assessing any internal audit function and to increase the awareness level among stakeholders; thus, motivate decision makers of Turkish organizations to interrogate and challenge what they should be expecting from internal audit function.

The remainder of the paper is organized as follows. In the second section, Four Stage Model conceptual framework is described. Following the conceptual introduction, further insight and calculation mechanics of the model are provided. Then, conclusive remarks are made at the end.

2. FOUR STAGE MODEL - CONCEPTUAL FRAMEWORK

Studies about positioning of internal audit function are made for individual research subject such as internal audit's position in public companies, in private companies, in big firms, in a country, etc. However, there are not many models which show dynamics of internal audit function with a macro approach for positioning as to its maturity, skill sets, independence and governance for private industrial companies. Literature search on this topic reveals that there are two studies made that have some positioning concept and some similarities to the model presented in this paper.

The first study is made by the Institution of Internal Auditors (IIA) Research Foundation that published the Internal Audit Capability Model (IA-CM) for the Public Sector in 2009. The developed model by the IIA is intended for self-assessment, capacity building, and advocacy under two phases; overview and application. The IA-CM provides a framework for assessing the quality, impact, cost-effectiveness of an internal audit activity and for identifying the fundamentals needed for effective internal auditing and describes the levels and stages through which internal audit activity can develop and improve processes and practices. The IIA model consists of five progressive capability levels, each describing the characteristics and capabilities of an internal audit activity at that level. As indicated in the website of the IIA, the levels are as follows (IIA Research Foundation, 2009):

Level 1. Initial - No sustainable, repeatable capabilities; dependent on individual efforts.

Level 2. Infrastructure - Sustainable and repeatable internal audit processes.

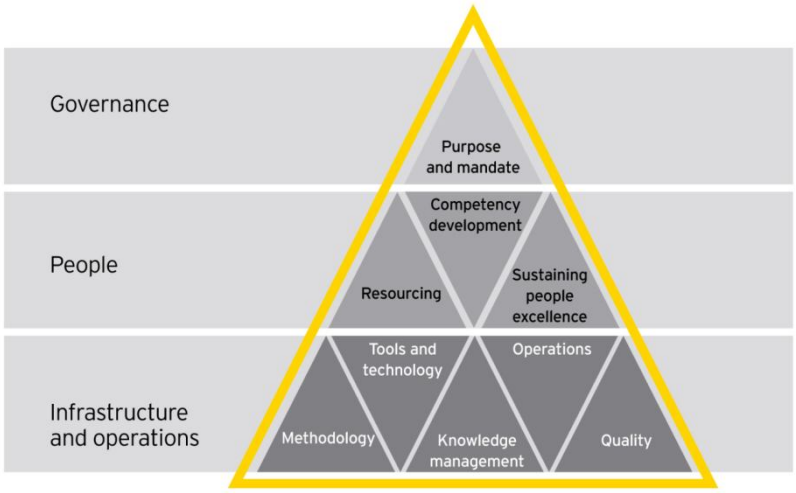
Level 3. Integrated - Internal audit and professional practices uniformly applied.

Level 4. Managed - Internal auditing integrates information from across the organization to improve governance and risk management.

Level 5. Optimizing - Internal auditing learns across the organization to improve governance and risk management from inside and outside the organization for continuous improvement.

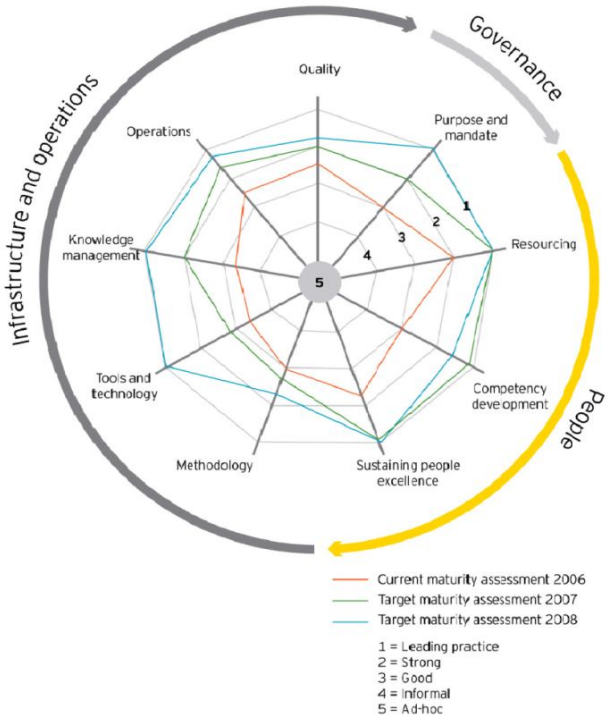
The second study is made by Ernst & Young, in conjunction with the Rio Tinto Corporate Assurance function that has developed a sophisticated maturity model that can help assess internal audit function performance. This model starts with three primary considerations – governance, people and enablers – which expand into nine building blocks of a successful internal audit function: operations, quality, knowledge management, tools and technology, methodology, sustaining people excellence, competency development, resourcing, purpose and mandate (see Figure 1). Reviewing any internal audit function against the model's behavioral criteria reveals current maturity level for each building block which helps to develop an action plan (see Figure 2) (Ernst & Young, 2009).

Figure 1: The Maturity Model



Source: Ernst & Young, 2009, Metamorphosis, Part 2.

Figure 2: Spider Diagram of Maturity Gaps

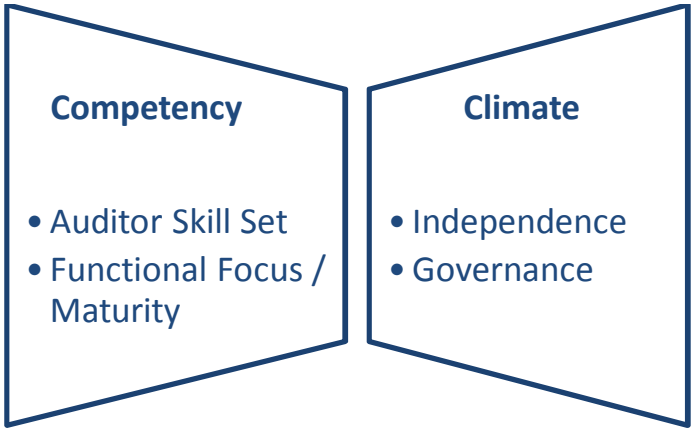


Source: Ernst & Young, 2009, Metamorphosis, Part 2.

On the other hand, the following model presented in this study aims to represent a macro and generic easy-to-use positioning tool that provides the internal audit profession a measure to assess and compare different internal audit functions with a scientifically researched benchmark of their status and competency qualities among them. Understanding and benchmarking the position of internal audit function of any organization and acknowledging the capabilities and maturity of the function will help the decision makers and responsible people to determine right actions for more effective internal audit function. Therefore, this model is expected to be used as a tool to help audit executives and the Board of Directors to create appropriate action plans in order to develop /improve their audit functions and add value as the ultimate goal.

The model is called 'Internal Audit Positioning Four Stage Model'. Positioning the four stage model has two components; "Competency" and "Climate". And the subcomponents of competency are set as "auditor skill set" and "functional focus/maturity" while the sub-components of "climate" are set as "independence" and "governance". The relationship matrix of the components is shown in the figure below:

Figure 3: Subcomponents of Competency - Climate Relationship Matrix



Each subcomponent is explained in Section 3 in detail.

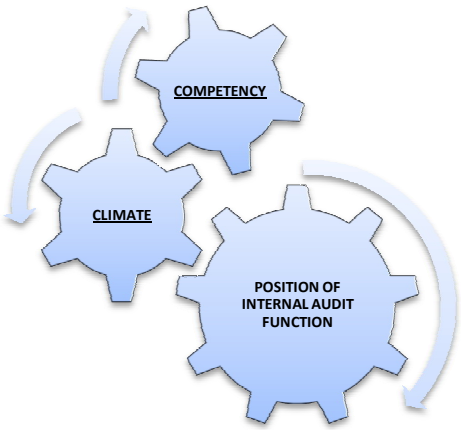
The Model is a multi-dimensional assessment tool that can help all the stakeholders determine how their internal audit function is positioned among a spectrum of characteristics as outlined in Section 4.

With respect to the components mentioned above, positioning internal audit function consists of all sub-components as shown below:

Figure 4: All the Dynamics of the Positioning Model at a glance

In evaluating individual internal audit functions, there are many models or evaluation methods in the literature that considers only one dimension at a time which is mainly related with the competency of internal auditors or the audit scopes (what type of audits are conducted in which areas). On the other hand, this Model presented here assumes that in order to evaluate an internal audit function, all the required elements of an effective internal audit function need to be incorporated in a single platform in a multi-dimensional way. These elements or measurement components are auditor skill set, functional focus/maturity, independence and governance. These elements are further grouped under the headings 'competency' and 'climate' as follows: Auditor skill set and functional focus/maturity which are the two hard measurement components make up the competency component while independence and governance which are the two soft measurement components make up the climate. Depending on where an internal audit function lies in a spectrum of competency and climate component measurements grid, the positioning is determined (this is explained in section 4 with an example). Thus, the situational marking of competency and climate identifies the position level of the internal audit function as shown below:

Figure 5: The Two Components of the Positioning Model



This assessment tool is intended for audit functions of any size and any industry. It helps stakeholders to determine where their function falls across a range of positioning levels so that it guides audit functions to work towards moving into the desired positioning. The measurement components used within the model are derived from various white papers, IIA recommended practices and published researches.

3. FOUR STAGE MODEL - FURTHER INSIGHT

3.1. Competency

The first one of the two main components of the model is named as 'Competency'. A competency is a set of defined behaviors and skills that provide a structured guide enabling the identification, evaluation and development of the behaviors in individual people / function / department / unit / etc... 'Some scholars see "competence" as a combination of knowledge, skills and behavior used to improve performance; or as the state or quality of being adequately or well qualified, having the ability to perform a specific role' (Ensel E., O'Neal E., Stelzer M., Testa D., 2012). As outlined in Wikipedia also, competency is used as a more general description of the requirements of human beings in organizations and communities.

In this context, the 'Competency' component in the model represents the same concept over specific internal audit function being analyzed. Its subcomponents are 'Auditor Skill Set' and 'Functional Focus / Maturity'.

3.1.1 Auditor Skill Set

As indicated by Neelakantan: Internal Audit teams, normally, are set up as a separate department with no operational responsibilities, a practice followed to ensure independence. Traditionally, personnel in these functions are limited to accounting and finance background, and not necessarily with expertise in process and performance improvement tools. Having a right mix of personnel with experience in operations, management, financial analysis, process evaluation, performance tools and business excellence models would serve well to set up a team which can complement each other's capabilities and work towards serving the common objective of establishing the Internal Audit function as a model for sustained business improvements (Neelakantan K., 2011).

The Institute of Internal Auditors (IIA) developed an Internal Auditor Competency Framework that identifies several key skills divided across the following knowledge areas – Interpersonal Skills, Tools and Techniques, Internal Audit Standards, and Theory, and Methodology. Individual components within these knowledge areas are vast (Berry R., 2012).

According to the IIA Australia's Competency Framework of Internal Auditors which was developed to answer a need in Australia for well trained internal auditors and adapted from existing competency frameworks developed by IIA Global and IIA UK and Ireland, competencies outline the critical behaviors required for effective performance as an internal auditor and provide the basis for a broad range of practices including recruitment and selection, reviewing performance, training and development, talent management and succession planning as can be seen in Table 1 below.

Table 1: Internal Auditor Competency Framework issued by the IIA Australia

Standards	Technical Skills	Interpersonal Skills	Knowledge Areas
The International Professional Practice Framework (IPPF)	• Research and investigation • Business process and project management • Risk and control • Data collection and analysis • Problem solving tools and techniques • Computer aided auditing techniques (CAATS)	• Influence and communication • Leadership and teamwork • Change management • Conflict resolution	• Financial and Management • Accounting • Regulatory, Legal and Economics • Quality and control • Ethics and fraud • Information technology • Governance, Risk and Control

Each competency area above is described in terms of the behaviors required to perform effectively across four different job levels. These levels are: (1) New Internal Auditor, (2) Practising Internal Auditor, (3) Internal Audit Manager, (4) Chief Audit Executive.

Core Competencies for Today's Internal Auditor, is one of five deliverables of The IIA's Global Internal Audit Survey: A Component of the CBOK Study which is the most comprehensive study ever to capture current perspectives and opinions from a large cross-section of practicing internal auditors, internal audit service providers, and academics about the nature and scope of assurance and consulting activities on the profession's status worldwide. It identifies the attributes of an effective internal audit activity and what internal auditors really need to know to perform their jobs with due care while adding value to their respective organizations. The analysis is based on 13,582 responses of IIA members and nonmembers in more than 107 countries (IIA Research Foundation, 2010).

The survey noted that the following core competencies were highly ranked for all levels of the internal audit activity (staff, management, and Chief Audit Executive).

- Communication skills
- Problem identification and solution skills
- Keeping up to date with industry and regulatory changes and professional standards.

The survey considered technical skills very important and ranked them in the following order:

- Understanding the business
- Risk analysis and control assessment techniques
- Identifying types of controls

The following knowledge areas are considered very important and ranked in the following order:

- Auditing
- Internal audit standards
- Ethics

- Fraud awareness
- Enterprise risk management

The following were the highest ranked audit tools and techniques:

- Risk-based audit planning
- Other electronic communication
- Analytical review
- Statistical sampling
- Electronic work-papers

The survey predicts that computer-assisted audit techniques will replace statistical auditing in the next five years in the list of top five audit tools and techniques. In addition, internal auditors predict the use of data mining and continuous/real-time auditing will significantly increase over the next five years (Nissley E., 2011).

According to a recent survey by the Institute of Internal Auditors (IIA), corporate internal-audit work this year will focus on operating risks the most (over 25% in comparison with compliance risks that make up 15% and Sarbanes-Oxley testing that make up 12%). The IIA survey, based on a survey of 461 internal-audit professionals who work for Fortune 500 companies based in North America, the following are the top five skills sought for new internal auditors:

1. Analytical and critical thinking (73%)
2. Communication skills (61%)
3. Data mining and analytics (50%)
4. General IT knowledge (49%)
5. Business acumen (46%)

'IIA president and chief executive officer Richard Chambers notes that companies are looking beyond the finance department for potential internal auditors. "The ability to mine and analyze data has been high on the list for the last couple of years," he says. The IIA has been insisting in recent years that the internal-audit profession has moved away from acting solely as finance and compliance cops and now must act as advisers and experts who can opine on broader matters, including strategic risks to the business' (Johnson S., 2012).

As the expected skill set for internal auditors in the year 2015, Deloitte has the following comments: 'The one skill the Internal Auditor should focus more on in the future is business insight. All parties, including the Internal Auditors, recognize this. Real business insight is still found to be lacking. This is the most important framework the Internal Auditor should benchmark his observations/recommendations against (next to the Internal Audit standards of course). Communication skills (orally and written) in terms of final reporting (to Executive Management and Audit Committee) but also during the project/audit (to convince and gain respect from operational management) and focus on a limited number of real business risks, is something Executive Management and Audit Committee members consider very important and should get more attention towards the future. Finally, more focus on IT skills (whether or not outsourced) is a common view of all included parties' (Deloitte, 2009).

3.1.2 Functional Focus / Maturity

In recent years, the role of internal audit functions has increased significantly following a number of major corporate scandals and the financial crisis which stressed the need for a better, more comprehensive view of the internal and external risks faced by organizations. In response, PwC has developed the Internal Audit Maturity model, with the objective for organizations to review and improve their existing internal audit functions. This model is based upon a set of attributes (role, scope, quality and spend) and measures these against various maturity levels (immature, established, performing and leading), as described below (Wery P., 2012).

The four attributes in the Model can be summarized as follows:

1) Role of the Internal Audit Function: This attribute refers to the relationship between an organization's internal audit function and its senior management, along with the organization's level of human capital investment into its internal audit function. At the top end of the model, the members of a "leading" internal audit function will report directly to those charged with governance, including senior management and those outside senior management (i.e. non-executive directors), to give them a clear and comprehensive picture of the risks faced by their organization. "Immature" internal audit functions are at the bottom end of the maturity model and their role is limited. In such a configuration, there are few lines of communication between senior management and internal audit, meaning that those responsible for governance will have little awareness of the risks their organization faces.

2) Scope of the Internal Audit Function: The "scope" essentially relates to the approach taken by the internal audit function in performing its work, to the risk level covered and to the overall goals the internal audit function aims to achieve. Leading" internal audit functions provide dynamic risk assessments which cover a full spectrum of risks and which are based on various internal and industry factors. At the bottom end of the model, the scope of "immature" internal audit functions largely depends on available resources, and such functions are unlikely to have sufficient dedicated resources in place.

3) Quality of the Internal Audit Function: The quality of the internal audit function relates to the amount and quality of the human capital allocated to the internal audit function and to the methodology and tools adopted by the function to carry out its work. According to the model, a "leading" internal audit function must comprise highly trained individuals who have strong knowledge of audit methodology and techniques, along with a thorough understanding of the organization's internal structure and of the risks it faces. "Immature" internal audit functions have a limited or non-existent audit methodology and are unlikely to be able to cover all risks faced by the organization.

4) Spend: This attribute relates to the budget allocated to the internal audit function. At the top end of the model, "leading" internal audit functions concentrate their budget on investment and innovation, providing sufficient funding to cover any market development that would require greater involvement on the part of the internal audit function. At the bottom end of the scale, an "immature" function will have little or no flexibility in the overall internal audit budget, meaning that it will have little room for maneuver in addressing any additional risks the organization might face in the short or medium term.

As indicated by Neelakantan: 'Internal audit teams require a paradigm shift from 'Transaction verification' to 'Process Walkthroughs', a shift from focusing on 'what' to 'how'. Shifting the focus of Internal Audit from an inspection to an advisory mode would, over a period of time, create a collaborative approach across the entire organization for driving improvements, with the

Internal Audit function playing a very crucial enabling and facilitating role. (Neelakantan K., 2011). According to PwC's most recent research on internal audit (2012), some internal audit functions have begun to rethink their fundamental value propositions by shifting from an internal audit model focusing on controls assurance to a risk-centric model where risk and control assurance are based on the effectiveness of risk management processes developed by management. For a relative handful of companies, this shift is already under way, as reflected in Table 2 below. For other companies, the shift will occur over time as corporate risk management frameworks and control processes reach advanced levels of maturity (PwC, 2012).

Table 2: The Shifting Focus of Internal Audit

The 20th-century Internal Audit Model	Today's Typical Internal Audit Model	The Risk-Centric Internal Audit Model of Tomorrow
Controls assurance based on cyclical or routine audit plans	Controls assurance based on risk-based internal audit plan	Assurance on the effectiveness of risk management in addition to controls assurance

Source: PwC, 2012, Internal Audit 2012, A Study Examining the Future of Internal Auditing and the Potential Decline of a Controls-centric Approach.

The model is explained by PwC as follows:

Adding risk management capabilities would inevitably help internal audit align itself more closely with an organization's maturing risk management functions. But doing so would require something not always associated with today's internal audit function: a risk-centric mindset. A risk-centric mindset means that internal auditors adopt an all-inclusive, conceptual approach to audit, risk assessment, and risk management that extends well beyond a narrow focus on controls. With such a mindset, internal auditors would increase their functional value at a time when risk assessment and risk management have become primary stakeholder concerns. As organizations enhance their risk management capabilities, they progress through four stages of risk management maturity. The ability of internal audit to provide value stemming from the delivery of risk assurance depends largely on the maturity of a company's risk management organization and structure—the more mature and developed the structure, the more effective internal audit can be in delivering a risk-centric value proposition.

Stage 1: Internal control: At the first stage of risk management maturity, management is focused on providing assurance that selected key internal controls, typically those in higher-risk areas, are functioning as designed. However, the organization probably has not embraced a formal internal control or risk management framework at this stage, and although it has designed controls, these controls are often not well documented. When an organization is at Stage 1, its management has yet to formally conduct and document an enterprise-wide risk assessment. In fact, its internal audit function may be the only organizational entity to have developed a comprehensive risk assessment. At this stage, the testing and monitoring of internal controls is often viewed primarily as an audit activity as opposed to a management activity. In addition, controls are largely people-dependent, with little or no formal training or communication of control activities taking place.

Stage 2: Sarbanes-Oxley compliance: The Sarbanes-Oxley Act of 2002 requires companies to adopt a common definition of internal control, such as the one promulgated by COSO, and to formally document their internal control activities. The Act also provides the impetus for many companies to formalize their approach to the management, monitoring, and testing of internal controls. Initially, most companies dedicated significant resources to Sarbanes Oxley compliance.

This changed over time as organizations streamlined their compliance processes and improved their abilities to document and monitor internal control efficiency and effectiveness. At Stage 2, the focus of internal controls has broadened beyond that of an audit activity to embrace management ownership of controls. In addition, some corporate management groups have begun to develop formal enterprise-wide risk assessments to strengthen their Sarbanes-Oxley compliance efforts.

Stage 3: Informal risk management: At the third stage of risk management maturity, management develops its own enterprise-wide risk assessment (ERM) and seeks to define ERM for the organization. Management may be setting risk appetites, developing risk management processes, and reporting to the board on its risk management activities. The organization likely has standardized controls, with periodic testing and reporting of results, and it may be employing automated tools to support enterprise-wide reporting of risk and control activities.

Stage 4: Functional enterprise-wide risk management: At the final stage of risk management maturity, management defines and implements formal risk management processes. Management has adopted a formal definition for ERM, such as the COSO enterprise risk management framework, and it has conducted a comprehensive, enterprise-wide risk assessment. Management also sets risk appetites for the organization, manages and monitors responses to risk management issues, and provides assurance to the board as to the effectiveness of the organization's risk management processes. A Stage 4 organization might have a chief risk officer. It might have real-time management and monitoring of risks and control activities. And it might have automated tools in place to support control activities and allow the organization to make rapid changes to those activities in anticipation of emerging risks.

Richard Chambers, the President of the IIA, thinks that internal auditing's focus is also likely to continue evolving. As he mentioned while much of the past decade was spent on auditing financial controls, 2009 and 2010 have seen a resurgence of internal audit coverage in areas of such critical risks as operational, compliance, and fraud. According to a recent IIA survey, internal auditors plan to increase coverage over the following areas (Chambers R., 2010):

- Operational risks – (51%)
- Effectiveness of risk management – (48%)
- Compliance risks – (45%)
- Fraud risks – (44%)
- Cost reduction or containment – (35%)

Chambers mentioned that a number of additional trends are also likely to continue:

- Further emphasis on recruiting non-accounting talent into internal audit functions.
- Continued quests by many internal auditors to enhance their knowledge of the business.
- Increased involvement by internal auditing in promoting and assisting with the establishment of enterprise risk management.
- A surge in the number of external quality assessments by internal audit functions
- Continued discussion/debate on how internal auditing can measure and report on the value it adds.

3.2 Climate

Likewise, the second main component of the model is named as 'Climate'. According to Cambridge Dictionary, climate is (1) the type of situation that exists at a particular time, including the feelings and opinions that are common; (2) the general weather conditions usually found in a particular place. In this context, the 'Climate' component in the model represents the same concept over specific internal audit function being analyzed. Its subcomponents are 'Independence' and 'Governance'.

3.2.1 Independence

For internal auditors, auditor independence refers to an attitude that is free from bias or undue influence. It also embodies the reporting structure of an internal audit function, which includes reporting to the audit committee and the CEO, in order to allow for an appropriate level of organizational freedom and a lack of restriction in their work and access to records. There are often no statutory regulation covering or requiring the independence of internal auditors. While The IIA standards use the word independence to describe internal auditors in certain places, objectivity might be a better word to describe one of the primary characteristics that internal auditors need to exhibit (Protivity, 2009, p.9).

In 2001, the IIA published 'Independence and Objectivity: A Framework for Internal Auditors' (IIA, 2001) as a guide for managing threats to objectivity. The framework identifies seven key threats: these are (I) self-review, where the internal auditor reviews his/her own work; (ii) social pressure, where the internal auditor is exposed to pressure from the auditee, or others on the audit team; (iii) economic interest, resulting, for example, from incentive payments or from auditing the work of someone who has the power to affect the internal auditor's employment or salary; (iv) personal relationship, where the internal auditor is a relative or friend of the auditee; (v) familiarity, resulting from a long term relationship with the auditee including having worked in the unit being audited; (vi) cultural, racial and gender biases arising in multinational organizations when the auditor is biased or lacks an understanding of local culture and customs; and (vii) cognitive biases resulting from preconceived notions or the adoption of a particular psychological perspective when performing the audit. These threats can also occur at the internal audit function level, particularly when the function is involved in both consulting and assurance activities (Stewart J., Subramaniam N., 2009, p.7-8).

According to the IIA website information referring to the Professional Practices Framework and Practice Advisories 1000-1,1100-1,1110-1,1120-1 of IIA:

'Internal auditors are independent when they render impartial and unbiased judgment in the conduct of their engagement. To ensure this independence, best practices suggest the CAE should report directly to the audit committee or its equivalent. For day to day administrative purposes, the CAE should report to the most senior executive (i.e., CEO of the organization). The CAE should have direct communication with the audit committee which reinforces the organizational status of internal auditing, enables full support and unrestricted access to organizational resources, and ensures that there is no impairment to independence. This provides sufficient authority to ensure broad audit coverage, adequate consideration of engagement communications, and appropriate action on recommendations. Independence is further enhanced if the CAE reports to the board through its audit committee on the planning, execution, and results of audit activities. The audit committee is also responsible for the appointment, removal, and fixation of compensation of the CAE. The committee should safeguard the independence by approving the internal audit charter

and mandate periodically. Objectivity is a mental attitude which internal auditors should maintain while performing engagements. The internal auditor should have an impartial, un-biased attitude and avoid conflict of interest situations, as that would prejudice his/her ability to perform the duties objectively. The results of internal audit work should be reviewed before they are released in order to provide a reasonable assurance that the work has been performed objectively. Internal auditors should not assume any operational responsibility. Objectivity can be presumed to be impaired when internal auditors perform an assurance review of any activity for which they had any authority or responsibility within the past year or a period significant enough to influence their judgment or opinion. Internal auditors should not accept gifts or favors from others such as employees, clients or business associates. The internal auditors should adopt a policy that endorses their commitment to abiding by the Code of Ethics, avoiding conflicts of interest, disclosing any activity that could result in a possible conflict of interests. Staff assignment of internal auditors should be rotated periodically whenever it is practicable'.

As indicated in Chrsitopher, Leung and Sarens' study, the importance of internal audit independence has also been highlighted by Krogstad et al (1999) who asserted that internal auditors add value when their reports are objective and insulated from underlying pressure or motivation for a particular outcome or recommendation. Chapman (2001) argues that the primary goal of the individual auditor is objectivity, which involves an unbiased attitude and the avoidance of conflicts of interest which can only be achieved if it is appropriately placed in the organizational structure. Chapman (2001) describes organizational independence as the placement of the internal audit function in the reporting structure so that it is free to determine its scope and perform its work without interference. Bariff (2003) appropriately deals with how the internal audit function can maintain independence from management by noting the following quote from a PricewaterhouseCoopers report (Christopher J., Leung P., Sarens G., 2007):

"Internal audit departments need to ensure organizational posture allows them to operate successfully on strategic issues. This means both the independence and mandate to deal with significant strategic business risks and issues. If inappropriately positioned within the company, internal audit deals with tactical issues and is viewed only at that level. Inappropriate positioning can also raise serious concerns about the overall independence of the function" (PWC, 2002).

Van Peursem (2005) found that internal auditors' close relationship with management can place their independence from management at risk (Stewart J., Subramaniam N., 2009, p.33). Sarens and De Beelde (2006) found that, when internal audit operates primarily in a management support role, there is a lack of perceived objectivity and the relationship with the audit committee is weak (Stewart J., Subramaniam N., 2009, p.33). Hudaib and Haniffa (2009) demonstrated in their paper that 'auditors construct the meanings of independence in appearance and in fact through their social interactions at three levels: micro (personal self-reflexivity through ethical reasoning and reputation of individual auditor); meso (organizational culture through range of commercial activities and image management) and macro (through political, de jure, and socio-economic structure)' (Hudaib M., Haniffa R., 2009). Christopher, Sarrens and Leung (2009) analyzed the independence of the internal audit function through its relationship with management and the audit committee. With respect to the relationship with management, threats identified to independence include: using the internal audit function as a stepping stone to other positions (this threat is also discussed in Christopher, Leung and Saren's study in 2007); having the chief executive officer (CEO) or chief finance officer (CFO) approve the internal audit function's budget and provide input for the internal audit plan; and considering the internal auditor to be a "partner", especially when combined with other indirect threats. With respect to the relationship with the audit committee, significant threats identified include CAEs not reporting functionally to the audit

committee; the audit committee not having sole responsibility for appointing, dismissing and evaluating the CAE; and not having all audit committee members or at least one member qualified in accounting (Christopher J., Sarrens G. and Leung P., 2009). Ahmad and Taylor (2009) concluded that both the role ambiguity and role conflict are significantly negatively related to commitment to independence. The underlying dimensions found to have the greatest impact on commitment to independence are: first, ambiguity in both the exercise of authority by the internal auditor and time pressure faced by the internal auditor; and second, conflict between the internal auditor's personal values and both management's and their profession's expectations and requirements (Ahmad Z., Taylor D., 2009).

3.2.2 Governance

The World Bank defines Governance as follows (Lipchak A., 2002, p.2):

"Good governance is epitomized by predictable, open and enlightened policy-making, a bureaucracy imbued with professional ethos acting in furtherance of the public good, the rule of law, transparent processes, and a strong civil society participating in public affairs. Poor governance (on the other hand) is characterized by arbitrary policy making, unaccountable bureaucracies, unenforced or unjust legal systems, the abuse of executive power, a civil society unengaged in public life, and widespread corruption."

Therefore governance is about rule of law, oversight, accountability and transparency in a structure. A proper governance strategy establishes policies, rules and regulations, implements means to monitor and keep track of what is going on, takes steps to ensure compliance with agreed policies, and provides for corrective action in cases where the rules have been violated or not complied. In this context, the 'Governance' component in the model represents the same concept over specific internal audit function being analyzed.

Governance of the audit function can be grouped into the following categories:

- Establishment and compliance with internal audit objectives, policies, procedures, documentation standards, processes formally approved by the Board of Directors
- Utilization of adequate tools and techniques to be used in the internal audit activity that are formally approved by the Board of Directors
- Establishment and compliance with the plan of organization, statements of job requirements, position descriptions, and professional development plans of the internal audit activity, the continuous improvement activities formally approved by the Board of Directors
- Compliance with applicable laws and regulations, government, industry, or other relevant standard including IIA's standards and guidance (The International Professional Practices Framework)
- Maintenance of ongoing review of activities, periodic assessment and reporting of performance and achievements including both internal and external assessments.

The internal audit charter approved at board level must state the professional standards expected from all staff in the function. Quality of performance in the function and its continuous improvement requires a total commitment, measured and reported at board level through key performance indicators, and feedback from its customers. The purpose of a quality program is to provide reasonable assurance that the internal audit activity's work conforms to the IIA's Standards, the Code of Ethics, the internal audit activity's charter, and other applicable standards (Ridley J, 2009).

The IIA states the following in its website:

'A Quality Assurance and Improvement Program (QAIP) enables an evaluation of the internal audit activity's conformance with the Definition of Internal Auditing and the International Standards for the Professional Practice of Internal Auditing (Standards) and an evaluation of whether internal auditors apply the Code of Ethics. The program also assesses the efficiency and effectiveness of the internal audit activity and identifies opportunities for improvement.

All internal audit activities, regardless of industry, sector, or size of audit staff — even those outsourced or co-sourced — must maintain a QAIP that contains both internal and external assessments. External assessments enhance value, as they enable the internal audit activity to evaluate conformance with the Standards; internal audit and audit committee charters; the organization's risk and control assessment; the effective use of resources; and the use of successful practices. An internal audit activity must obtain an external assessment at least every five years by an independent reviewer or review team to maintain conformance with the Standards.

Internal assessments are ongoing, internal evaluations of the internal audit activity, coupled with periodic self-assessments and/or reviews. This will establish a benchmark of the internal audit activity that can be used to establish metrics. Over time, these metrics will indicate improvement in areas of partial conformance or nonconformance with the Standards and successful practices'.

4. FOUR STAGE MODEL - CALCULATION MECHANICS

As aforementioned, the Four Stage Positioning Model has two components; "competency" and "climate". And the subcomponents of competency are set as 'auditor skill set" and "functional focus/maturity" while the sub-components of "climate" are set as "independence" and "governance".

Each of these individual components needs to be measured (as outlined below) for any internal audit function before they are plotted on a four-stage grid to determine the positioning of this internal audit function. The measurement weights of each subcomponent are considered as equal (meaning that both auditor skill set and functional focus/maturity subcomponent measures have fifty percent weight in representing the competency component; likewise, both independence and governance subcomponent measures have fifty percent weight in representing the climate component).

The Positioning Model includes four stages –'baby/child', 'teen', 'adult', 'elderly'- with each stage designating a different characteristic of that age group for the specific internal audit function being analyzed. To determine which stage an internal audit function falls within, rated scores of 'competency' and 'client' are mapped into the positioning grid with competency component on one axis and client component on the other axis.

Each quadrant in the grid has a name that the characteristic of that stage can be associated with the characteristics of that name. These characteristics are summarized in Table 3 below:

Table 3: Four Stage Model's Quadrants

QUADRANT 1 – BABY/CHILD: BABY: Almost no competency, climate not appropriate at all for effective internal audit function to exist. Just like a baby is dependent on parents to maintain his/her life (e.g. can't eat alone, shouldn't walk alone, etc...), internal audit function is unable to perform its duties effectively and add value. CHILD: Very little competency and relatively improved climate but still unsatisfactory. Just like a child, capabilities to do many things alone increase but parental supervision is important. As a child is still un-protective but self-sufficient in basic life-maintaining matters, internal audit function at this stage is able to perform some of its duties but is still not performing effectively and adding value. This is the least desired zone for the audit function to be.
QUADRANT 2 - TEEN: High competency, climate not appropriate. As a teen's talents and capabilities increase significantly; as teen becomes very energetic but still not considered as a person in legal terms (e.g. can't buy alcohol, cigarettes, can't vote, can't get a driving-license though could be able to drive), the internal audit function has the potential (ability) to perform but due to poor climate conditions, can't perform effectively and add value as it should.
QUADRANT 3 - ADULT: High competency and ideal climate. As a healthy adult living in a first-world modern country do what is expected of him/her and is mature and his/her actions are considered legally legitimate and binding, the internal audit function is able to perform its duties quite effectively. This is the desired zone for the audit function to be (most productive, adding value).
QUADRANT 4 - ELDERLY: Climate is appropriate but competency is low. Just like an elderly, although mature and legal person as in the adult case, because of the reason that talents and capabilities deteriorate as a result of aging, performance in doing things significantly decreases (e.g. can't drive the car well, can't do sports actively, etc...). Despite good climate conditions, the internal audit function at this stage is unable to perform effectively as it should.

The positioning grid can be read as follows: As both competency and climate ratings are low (Quadrant 1 – Baby/Child), the internal audit function is at immature level, not performing effectively and not adding value at all. Internal audit functions that are at their early stages of formation are generally located in this quadrant. If competency is high but climate rating is low (Quadrant 2 – Teen), internal audit is not performing effectively and adding value as it should despite it has the potential means to do so. For instance, if internal audit function is not independent and governed by the appropriate policy and procedures, no matter how qualified and rightly staffed, the desired output will not be maintained. If both competency and climate ratings are high (Quadrant 3 – Adult), then internal audit is functioning effectively and adding value as it should which is the ideal position for the internal audit function to be. At this quadrant the internal audit functions can be seen as a world-class, visionary, in compliance with the best practices. If competency rating is low and climate rating is high (Quadrant 4 – Elderly), then internal audit is not performing effectively and adding value as it should despite it has the appropriate set-up, working infrastructure and environment. As the ideal positioning is in Quadrant 3 (Adult), internal audit functions that are positioned in the other quadrants should implement strategies and take actions to move towards this quadrant. Quadrant 1 (Baby/Child) internal audit function decision makers should take actions that would improve competency and climate conditions (please see the attachment for all factors that are considered under competency and climate headings). Quadrant 2 (Teen) internal audit function decision makers should work on the climate site so that the high competency can pay off. Quadrant 4 (Elderly) internal audit function decision makers should take actions to get younger so that the function can move to the desired positioning by increasing competency.

The model calculation basically works in three steps: the first two steps in the calculation are to rate competency and climate components and to come up with final scores for them. In the third stage, these final scores are mapped into the positioning matrix to determine in which quadrant/stage internal audit function falls into.

Two different internal audit departments will be positioned as two cases by using the Model.

Case 1: XX Internal Audit Department

Case 2: YY Internal Audit Department

As indicated, the three step approach will work as follows:

Step 1: Measure and calculate component 1. 'Competency' is defined as component 1.

Step 2: Measure and calculate component 2. 'Climate' is defined as component 2.

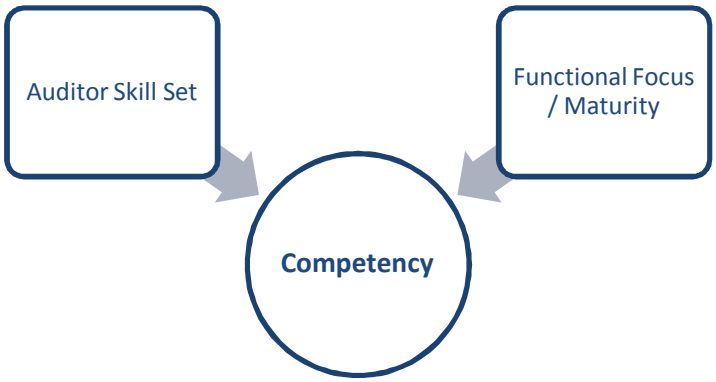
Step 3: Map component 1 and 2 in the Four Stage Model Grid to determine the positioning of the related internal audit department.

The details are explained with examples below:

Step 1: Measure and calculate component 1 in accordance with list 1 in the appendix section (measurement required in a scale of 1 to 10)

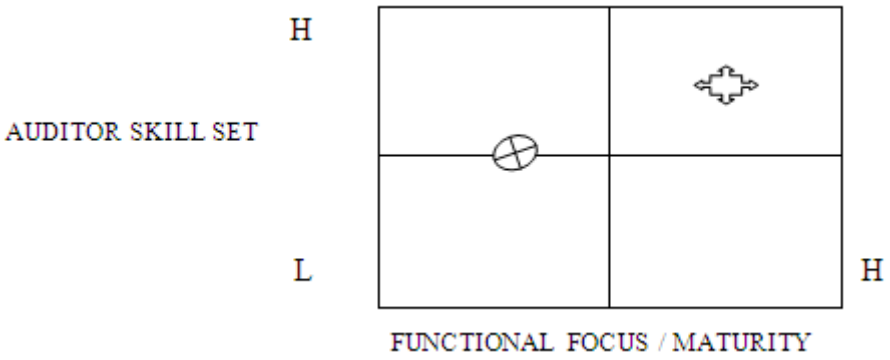
Component 1 -represents 50% share in the Model- Competency Map (A)

Figure 6: Subcomponents of the Competency Component



Each subcomponent is measured by conducting a survey to the audience (e.g. the board of directors, chief audit executive, top management) for all the assertions indicated in list 1 in the appendix section with a measurement scale of one to ten. The overall average of all the responses will be the grading to be mapped on the following grid:

Figure 7: Internal Audit Competency Status



Case 1. Grading Assumptions - Independence: 6; Governance: 4

Climate component grading of Case 1: 6 * (0,50) + 4 * (0,50) = 5 (final grading)

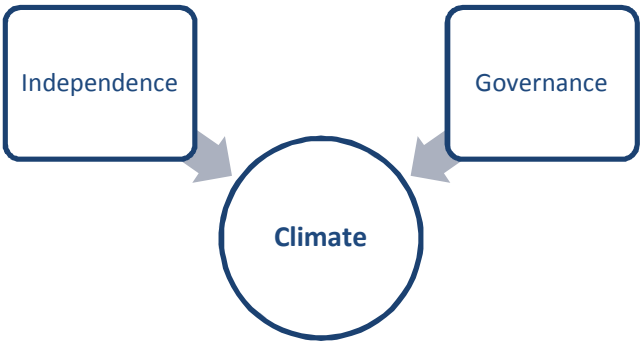
Case 2. Grading Assumptions - Independence: 7; Governance: 7

Climate component grading of Case 2: 7 * (0,50) + 7 * (0,50) = 7 (final grading)

Step 2: Measure and calculate component 2 in accordance with list 2 in the appendix section (measurement required in a scale of 1 to 10)

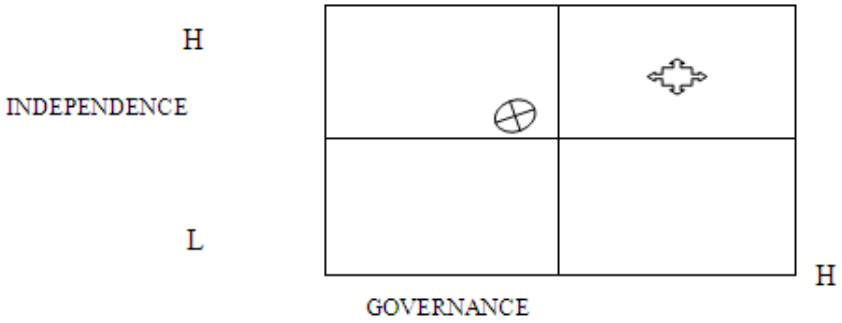
Component 2 -represents 50% share in the Model- Climate Map (B)

Figure 8: Subcomponents of the Climate Component



Each subcomponent is measured by conducting a survey to the audience (e.g. the board of directors, chief audit executive, top management) for all the assertions indicated in list 2 in the appendix section with a measurement scale of one to ten. The overall average of all the responses will be the final grading to be mapped on the following grid:

Figure 9: Internal Audit Climate Status



Case 1. Grading Assumptions - Independence: 6; Governance: 4

Climate component grading of Case 1: 6 * (0,50) + 4 * (0,50) = 5 (final grading)

Case 2. Grading Assumptions - Independence: 7; Governance: 7

Climate component grading of Case 2: 7 * (0,50) + 7 * (0,50) = 7 (final grading)

Step 3: Map component 1 and 2 in Four Stage Model

Internal Audit Positioning / Four Stage Model

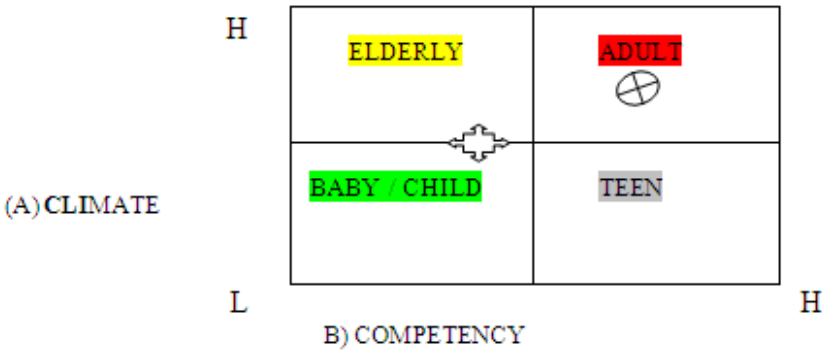
Combined Effect – (A) X (B)

The last step in order to position the related internal audit department on a platform, final grading of each component is mapped on the following grid:

Case 1. Competency grading: 4; Climate grading: 5

Case 2. Competency grading: 7; Climate grading: 7

Figure 10: Mapping of the Internal Audit Function in the Four Stage Model



As can be seen in the above grid, case 1 internal audit function is positioned in quadrant 1 and can be considered a small child while case 2 internal audit department is positioned in the ideal quadrant 3 and can be considered an adult.

5. CONCLUSIONS

With respect to the evolvement of the internal audit in Turkey in comparison with the best practices outlined by the IIA, the application of the Four Stage Model can be very useful for the decision makers to direct the allocation of resources to the internal audit function. It will also assist the Chief Audit Executives to make more effective audit planning, budgeting, staffing, training, and execution; thus, it will be a means for more effective utilization of the resources already available and those that will be available. Everything in the modern internal audit is about 'adding value'. The Internal Auditing Four Stage Modeling will be a guideline and indispensable effective tool for this purpose.

As mentioned within this research, the evaluation of auditor skill sets, functional focus & maturity, independence and governance which are the main aggregate components to assess the level of internal audit function need to be made objectively and measured accurately. The scoring of individual factors identified for each component need to be based on scientific research as much as possible to make the best use out of the model. These are the critical success factors for the use of this model.

The increasing complexity of business transactions, more dynamic regulatory environment, efforts to reduce unrecorded economy and significant advances in information technology are developments that have resulted in opportunities and challenges for internal audit. In the next periods the scope of internal auditing will be extended and current regulations will be restructured in accordance with international standards. In this line, the expectations of stakeholders towards the internal audit function are increasing. Although the internal audit function plays a vital role in the financial and real sectors, particularly in terms of corporate governance, risk management, fraud prevention and detection and cost containment processes, the internal audit practice and framework in Turkey should be improved.

It is crucial that the function of internal audit as it is practiced by international standards and the added value that it brings to the organizations needs to be marketed to wider audiences in Turkish business community. This study aims to contribute to increase the awareness level; thus, motivate decision makers of Turkish organizations to interrogate and challenge what they should be expecting from internal audit function.

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Appendix

List 1: Competency factors to be considered in assessment under each heading

Auditor Skill Set

An internal audit department is considered as having good auditor skill set if the following conditions are met:

- Auditors should have working knowledge of internal audit techniques and methodologies (know-how)
- There should be practical knowledge in the department on the use of the CAAT (Computer Assisted Auditing Techniques) tools
- Auditors should possess good MS Office (or its equivalent) skills (e.g. Excel, Visio, Word, Power Point, Access) and that they are IT literate
- Auditors should have adequate business exposure to understand business dynamics, processes, organizational dynamics and key risks
- Auditors should be well trained and informed about corporate governance, internal control and risk management concepts
- Auditors should have extensive ERP exposure
- There should be practical knowledge in the department on using IT audit skills (e.g. employs IT auditor)
- There should be practical knowledge in the department on fraud related investigations and special assignments
- Auditors should possess research and investigation, data collection/analysis, basic statistics, problem solving technical skills
- Auditors should possess the following soft skills: effective communication, job management, team play
- Auditors should have an analytical mind and an investigative spirit
- Auditors should have high ethical standing
- Auditors should possess effective project management skills
- The auditor mix in the department should allow multidisciplinary knowledge transfer among auditors (e.g. auditors with financial and managerial accounting background, industrial engineer background, law background, experience in security, administration, production, quality, occupational health & safety, regulatory, ethics, and other related areas...)
- Auditors should have effective report writing skills
- Auditors should be hard working, result oriented and systematic
- Auditors should hold credible occupational certifications such as CIA (Certified Internal Auditor, the most desired one), CCSA, CGAP, CFSA, CFE, CRMA, CMA, CFA, CPA
- There should be good knowledge about internal audit standards and guidance issued by the IIA (Institute of Internal Auditors)
- There should be continuous training programs in effect

Functional Focus / Maturity

The left side of the box is at one extreme edge of the maturity spectrum (not mature) and the right side of the box is the other end of the spectrum (mature)

Factors to be considered in the Functional Focus / Maturity Component

Detective	Preventive (risk focused)
Policeman	Business Enhancer / Consultant
Reactive	Proactive
Transaction focus	Process focus
Stand Alone	Participate with Management
Financial Risk Management	Enterprise Risk Management
Financial Controls	Internal Controls
Financial Audit	Risk-Based Operational Audit
Investigating Fraud	Internal Control Systems
Audit planning based on function/ department/location & time since last audit	Risk-Based Process Oriented Audit Planning
Compliance Audits	Operational Audits, Performance Audits, IT Audits
Compliance focused tight controls	Value Adding/flexible controls (cost/benefit)

List 2: Climate factors to be considered in assessment under each heading

Independence

Independence is at very good levels if all the following conditions are met:

- Auditors should be free to write audit findings as they see appropriate
- Auditors should not be involved with operational duties (conflict of interest)
- Auditors should not be given the responsibility to set the risk appetite of the management
- Chief Audit Executive (CAE) should be able to report to the Board of Directors and the Audit Committee without any restriction
- Functionally, CAE should not be reporting to line management (e.g. CFO) including CEO
- Auditors should not be dictated as to what to audit and how
- Auditors should have unlimited access to any information for their work purposes
- CAE's compensation (and performance evaluation) should only be decided by his/her functional reporting authority (e.g. Board of Directors, President of the Board of Directors)

Governance

Governance is at high level if all the following conditions are met:

- The audit activities should be governed by an audit charter approved by the Board of Directors / Audit Committee
- Formal and approved internal audit objectives, policies, procedures, documentation standards and processes should direct the auditors' efforts
- Formal and up-to-date job descriptions and development plans should exist
- Regulatory bodies and / IIA's International Professional Practice Framework heavily regulates and dictates the work of internal auditors and that there is satisfactory compliance with these
- Approved tools and techniques should be used in the internal audit activity
- Audit report recommendations should be seriously acted upon and followed up by management with required/needed attention
- Audit function's effectiveness and its alignment with the Internal Auditing Standards and Guidance issued by the Institute of Internal auditors should be assessed by a credited 3rd party

Ongoing review of activities, periodic assessment and reporting of performance should include internal assessments as well as external.

Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

HOW REGRESSIVE ARE STATE AND LOCAL TAXES?

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KEYWORDS

Welfare economics, taxation, state and local government.

ABSTRACT

State and local income, sales and property taxes are combined and tax regression is measured for each state and the District of Columbia. All direct tax systems are regressive and there are large differences across states. State and local tax systems are ranked in terms of both the Reynolds-Smolensky and Kakwani indexes of global progression. The most regressive state is 75 to 88 times more regressive than the least regressive state. Inspection of the data underpinning the Gini-based indexes reveals that 49 of the 51 tax systems are unambiguously regressive at every measured point within the income and direct tax distributions.

1. INTRODUCTION

State and local taxes in the United States account for approximately 40 percent of the overall tax burden and totaled more than $1.29 trillion in 2010. The constitutional provisions underpinning U.S. tax law permit great diversity in the structure of taxes at the federal, state and local levels. All rights, including the right to tax, not expressly granted to the federal government are constitutionally reserved to individual states. States, in turn, delegate certain powers to tax to the cities, counties (parishes) and school districts within their borders. As a result of this wide discretion, there is considerable variation in the structure of state and local tax systems across the U.S. Thus, not only do state and local tax structures differ from the federal tax system, there are also significant differences among the states. An important dimension of tax structure is the degree of progression and regression, which is closely related to the question of who bears the burden of taxation. It is well known that, on balance, federal taxes are progressive, which is attributable to both the size and graduated rate structure of the individual income tax. In contrast, many state and local taxes are believed to be regressive. For example, sales taxes and property taxes are perceived to be regressive. On the other hand, state income taxes are widely interpreted to be progressive.

On balance, tax distribution tables derived from the Institute on Taxation and Economic Policy's (ITEP) microsimulation model strongly suggest that most, if not all, state and local tax systems are regressive.[1] In contrast, the federal tax distribution tables derived from the ITEP model indicate a highly progressive tax structure.[2] However, Gale and Potter's estimates before and after the Bush tax cuts of 2001 reveal decreasing relative federal tax burdens for high income recipients and rising relative burdens for low and middle income families, which implies tax cut induced decreases in overall federal tax progressivity. In this paper we use microsimulation estimates of family incomes and direct tax burdens from the ITEP model to calculate and compare exact summary measures of overall progressivity among the fifty state and local tax systems and for the District of Columbia. The purpose is to provide a precise answer to the question raised by the title of the paper: How Regressive are State and Local Taxes? Progressivity is measured using Gini-based indexes and state and local tax systems are ranked. Consistent with the findings of Chernick (2005)[3] the results indicate that state personal income taxes are important in explaining observed differences in the degree of tax regressivity across states. To shed additional light on this issue we combine the 51 state and local tax systems into two broad groups: states with personal income taxes and states without any form of personal income tax. Results are reported for each broad group and comparisons are made to the overall regressivity of all state and local tax systems combined.

The next section reviews progressivity and regressivity measurement issues and outlines the procedures used in calculating the two Gini-based summary indexes employed in the empirical analysis. This section also briefly discusses the ITEP data highlighting its strengths and limitations. The third section presents the basic results and makes comparisons across state and local tax systems. We first report regressivity measures and rank tax systems using absolute values of two summary measures across all states. We then normalize the measures by setting the overall index for all state and local tax systems combined to 100.0 and report the indexes of the 51 state and local tax systems as percentages of the observed overall degree of regressivity. Next, state and local tax systems are combined into two groups consisting of those that do not levy personal income taxes and those imposing personal income taxes as a part of portfolio of revenue sources. Regressivity comparisons are then made across groups and to overall regressivity in all state and local tax systems combined. The final section summarizes and concludes.

2. LITERATURE REVIEW

A distinct literature focusing on tax induced changes in the distribution of income and income inequality originated with Musgrave and Thin's (1948) classic paper on tax progression. The literature distinguishes two broad concepts of progressivity that are referred to as "local" and "global" progression. A tax is locally progressive (regressive) if the average tax rate rises (falls) as income increases, in a given income range.[4] Thus, local indicators of tax progression provide a

[1] Inspection of ITEP distribution tables indicates that state and local average tax rates generally decline as average income rises.

[2] Gale and Potter (2002) use the ITEP model to construct tax distribution tables that show rising average combined direct federal tax rates as income increases. Their ITEP results are consistent with other studies of the distribution of direct federal tax burdens and incomes.

[3] Chernick pools three state specific data sets for 1976, 1985 and 1991 to investigate the determinants of state and local tax progressivity. He notes (2005, 94, fn. 1) that income and sales tax shares explain 58% of the cross-sectional time series variation in measured degrees of progression. However, Chernick's main purpose is to explore other political and economic determinants of the degree of tax progression. So, income and sales tax shares are not included in his main regression.

[4] Pigou (1929) was the first to formalize the concept of tax progressivity and suggested two distinct but related local measures – average rate and marginal rate progression. Arc elasticities are often employed in calculating these point measures with values greater (less) than one indicating progressive (regressive) taxes.

measure at two points within an income distribution. For this reason, local progressivity measures are often referred to as "point" measures. Local measures are intuitive and easy to explain. However, a difficulty with point measures is that they almost always vary within an income distribution, and it is generally not possible to know the overall progressivity by calculating a series of local measures. In fact, based upon local measures a tax system can be regressive in some income ranges and progressive in others.

In contrast to local indicators, a global measure provides an index of the overall degree of progression or regression. There is wide agreement that global progressivity measures are more appropriate techniques for assessing overall progressivity and comparing entire tax systems. If a tax system is in part progressive and in part regressive, then global measures net out the differences and present the result in the form of a single number that summarizes overall progressivity. A number of such indexes have been developed, which provide distinct but related measures of global progression. All global indexes belong to one of two broad classes of progressivity measures, which involve conceptually different approaches to the meaning and measurement of overall progression. Kiefer (1985) emphasizes that one basic approach to measurement involves the use of distributional indexes. Musgrave and Thin's (1948) measure of effective progression pioneered this method. Global indexes of this type belong to the "redistributive class" of progressivity measures. The essence of this approach involves measuring the redistributive effects of taxes by calculating their impact on overall income inequality. A tax is globally progressive (regressive) if it causes the after-tax income distribution to be more (less) equal than the before-tax income distribution.

The second approach to global progressivity uses indexes that measure deviations from a proportional or flat tax system. Blackorby and Donaldson (1984) refer to summary indexes of this type as the "tax-scale-invariant class". Measures fitting into this class focus on the relative distribution of taxes as it relates to the relative distribution of before-tax income. All scale invariant indexes measure the departure of a tax system from proportionality. Under this approach, a tax is progressive (regressive) if taxes are more (less) heavily concentrated on those with higher incomes. A characteristic of the scale invariant class of measures is that proportionate changes in all taxes leave progressivity unchanged. Thus, a doubling of taxes or any other proportionate tax surcharge does not affect the overall index of progression. This characteristic leads to the key difference between scale invariant and redistributive class of progressivity indexes measures. An across the board tax surcharge increases the average tax rate and leads to greater progressivity (or regressivity) for all indexes belonging to the redistributive class. However, the same tax surcharge leaves scale invariant progressivity indexes unchanged.

Suits (1977) emphasizes that income distributions play an integral role in the construction of any summary measure of tax progression. There is broad agreement in the literature that Lorenz curves and the data underpinning them provide the most general indicators of relative income inequality. Additionally, concentration curves are also widely applied when examining tax burdens ordered by pre-tax incomes. Differences in Lorenz and tax concentration curves show deviations from proportionality, which are at the heart of all scale invariant measures of tax progressivity. Similarly, differences in before and after-tax Lorenz curves show the effects of taxes on the relative distribution of income and are at the heart of redistributive measures of progressivity. Thus, Lorenz curves and concentration curves provide the foundations for the two classes of global progressivity and regressivity measures.

The two broad classes of global progressivity measures each contain a number of specific indexes that differ depending upon the number of data points used and weights attached to them. For example, Chernick's (2005) study of the determinants of subnational tax progressivity uses an index from the scale invariant class that is equal to the ratio of average tax rates in the top and bottom quintiles of state income distributions. This index has the advantage of being easy to calculate, but it gives zero weight to income and tax distribution data for quintiles 3, 4 and 5.[5] Pfähler (1987) shows that new indexes from each of the broad classes can be created by changing the weights assigned to income and tax distribution data. Pfähler (1987) also establishes that indexes from the same class that use similar weights tell essentially the same story about progressivity and yield virtually the same rankings of tax systems. We now consider Gini-based progressivity indices that are similar to Gini coefficients of income inequality. These summary indexes make use of the natural weights inherent within the Lorenz curves and tax concentration curves underpinning all global progressivity measures.

Gini-based Indexes of Global Progression and Regression

Gini coefficients (G) and related concentration coefficients (C)[6] are closely related to Lorenz and concentration curves and can be derived from basic income and tax distribution data. There are a number of advantages in using Gini coefficients and associated concentration coefficients to evaluate the degree of tax progression and regression. First, these indexes are intuitively appealing and have simple geometric interpretations, which make them readily understandable. Moreover, the measures are the most widely applied techniques for evaluating the overall degree of tax progressivity. In addition, Gini-based indexes make use of all available data points in the income and tax distributions and, as noted above, apply the natural weights inherent in Lorenz curves and tax concentration curves. Furthermore, Gini-based indices from both the redistributive and tax scale invariant classes of progressivity measures are available. Finally, there is a fundamental relationship, discussed in detail below, between two specific Gini-based indexes drawn from each of the broad classes. This relationship turns out to be useful in explaining observed differences in the structure of state and local tax systems.

Despite the advantages and appeal of Gini based measures of tax progression, the use of such indexes is not without difficulty. Two problems warrant discussion. First, Gini coefficients and associated concentration coefficients are only one of a number of possible indexes that could be employed to evaluate income inequality and global tax progressivity. Second, the Lorenz curves and/or concentration curves that underpin the indexes may intersect, which may cause the progressivity index to be less than completely informative. Such crossings signify that a tax system contains elements of both progression and regression,[7] i.e. some local measures are progressive while others are regressive. A tax system containing both regressive and progressive

[5] Chernick (2005) notes this weighting problem and considers alternative scale invariant indexes that use ratios of average tax rates for alternative pairs of income distribution quintiles, e.g., top to middle quintile ratio and middle to bottom ratio. In addition, Chernick uses average tax rates in specific quintiles as progressivity measures. The quintile specific tax rates are essentially local measures, while the ratios of quintile average tax rates are global measures. Chernick's purpose is to identify determinants of progressivity using pooled time series regression analysis. Measures for all states are not reported.

[6] Gini coefficients and concentration coefficients, respectively, measure how close a given Lorenz curve or concentration curve is to the line of equality and can be defined as two times the area between the Lorenz curve or concentration curve and the line of equality. See Lambert (2001) for a more concise definition and mathematical representation of each coefficient.

[7] Davies (1980) was the first to discuss the crossing problem in the context of global progressivity measures. Another problem worth mentioning is that statistical inference procedures are unavailable for Gini based indexes calculated from distribution tables. Bishop, Formby and Zheng (1998) provide inference procedures for Gini based measures of tax progressivity, but only for indexes calculated from large samples using micro data.

taxes in different segments of the income distribution cannot be identified using a summary index. Crossing can only be detected by inspecting the Lorenz curves and relevant concentration curves, which provide the basic data underpinning all summary measures of progression.

The two problems noted above are somewhat interrelated. If no crossings exist, then any two global indexes from the same class necessarily tell essentially the same story about tax progression and regression. The absence of crossings results in unambiguous conclusions concerning the progressivity of a tax system irrespective of the particular global index (from the same class) that a researcher may employ. However, if crossings exist then conceivably alternative global indexes that weight the progressive and regressive segments of the tax and income distributions differently could provide contradictory conclusions concerning whether the tax systems is, on balance, progressive or regressive. The crossing problem is discussed further below.

3. METHODOLOGY AND DATA

We apply two widely used Gini-based indexes, one from each of broad classes of global progressivity measures described above. Specifically, we use the Reynolds-Smolensky (Π_{RS}) index and the Kakwani (Π_K)[8] index to investigate the redistributive effects of state and local tax systems in the U.S. Reynolds and Smolensky (1977) developed the most widely used global progressivity measure in the redistributive class, while Kakwani (1977b) developed one of the two most widely applied global progressivity indexes in the tax-scale-invariant class of measures. Suits (1977) developed the other. The Kakwani and Suits' indexes differ by a weighting factor equal to the slope of before-tax Lorenz curve.[9] We use the Kakwani index rather than Suits index because it has well known relationship to the Reynolds and Smolensky index, which we discuss below.

The Π_{RS} measures the tax induced change in income inequality using the absolute difference in Gini coefficients of before and after-tax incomes. In contrast, Π_K measures the deviations of a tax system from proportionality using the absolute difference between before-tax Gini coefficient and the associated tax concentration coefficient. The details of the specific indexes are as follows. Denoting the before-tax Lorenz curve as L_X and the after-tax Lorenz curve as $L_{X\text{-}T}$,[10] then the Reynolds-Smolensky index is:

$$\Pi_{RS} = G_X - G_{X\text{-}T}, \tag{1}$$

where G_X is the pre-tax Gini coefficient and $G_{X\text{-}T}$ is the post-tax Gini. G_X and $G_{X\text{-}T}$ are calculated from the before-tax and after-tax Lorenz curves respectively. If $G_X - G_{X\text{-}T}$ is positive, i.e., the Gini coefficient for post-tax income is smaller than the pre-tax Gini coefficient, the tax system has an equalizing effect on the distribution of income and the tax system is globally progressive. The larger the index, the greater is the degree of measured progressivity. Conversely, when Π_{RS} is negative, then state and local taxes induce greater inequality and the tax system is regressive. For the redistributive class of global measures Figure 1.a illustrates a progressive tax system and Figure 1.b shows a regressive tax structure. If taxes do not induce a change in inequality then, G_X

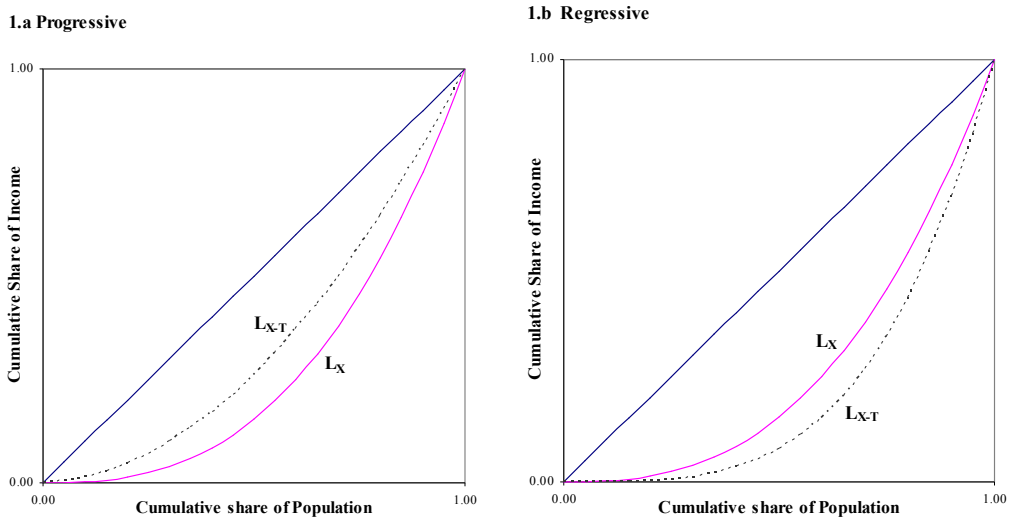
[8] Tax equity issues are often divided into vertical and horizontal components. Vertical equity (VE) is based on the ability to pay principle of taxation, which asserts that individuals with larger incomes should pay more taxes. Horizontal equity is a fairness principle that asserts that individuals with equal incomes should pay equal taxes. VE (see Kakwani, 1984) is related to tax progressivity, which is the focus of this research. Regressive taxes are vertically inequitable (VI). Π_{RS} and Π_K can be thought of as measures of VE and VI.

[9] On this point see Formby, Seaks and Smith (1981).

[10] Unless otherwise noted, all notation for distributional measures and related indexes is identical to that used by Lambert (2001) and other editions of this well known work.

= $G_{X\text{-}T}$, Π_{RS} = zero, and the tax system is classified as proportional. In Figure 1.a Π_{RS} is a positive number equal to twice the area between L_X and $L_{X\text{-}T}$. In Figure 1.b Π_{RS} is a negative number equal to twice the area between L_X.and $L_{X\text{-}T}$.

Figure 1: Progressive and Regressive Tax Systems for the Redistributive Class of Global Indices



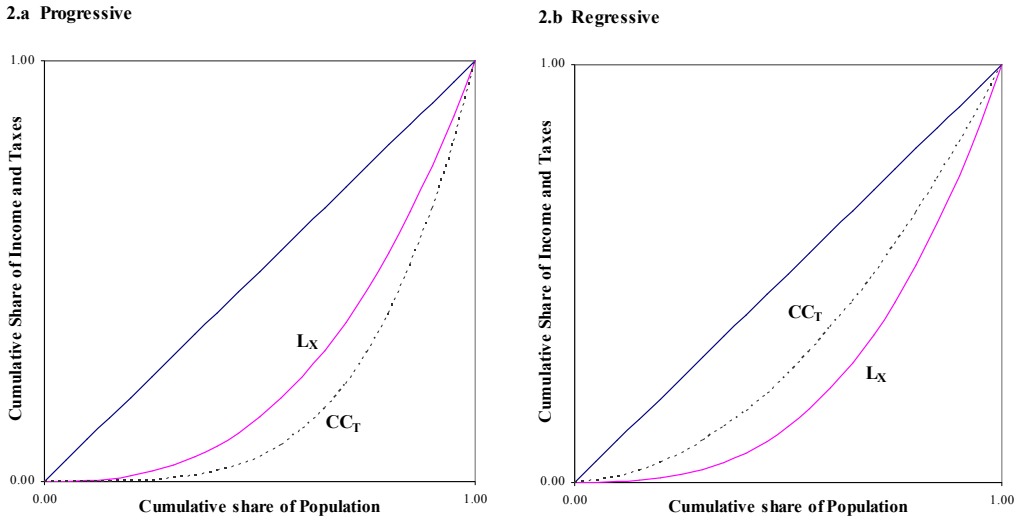
The Kakwani index is:

$$\Pi_K = C_T - G_X, \tag{2}$$

where G_X is as defined in equation (1) and C_T is the tax liability concentration coefficient. Positive index values again denote progressivity, negative values indicate regressivity, and a value of zero represents proportionality. For the tax scale invariant class of measures Figure 2 provides simple pictures of progressive and regressive tax structures using before-tax Lorenz curves and tax concentration curves. In Figure 2.a Π_K is a positive number equal to twice the area between L_X and C_T, while in Figure 2.b Π_K is a negative number equal to twice the area between L_X and C_T.[11]

[11] In addition to Π_{RS}, Gini-based measures of progressivity of the redistributive class include Musgrave and Thin's index of effective progression and the Pechman Okner index. In addition to the Kakwani and Suits indexes the scale invariant Gini-based measures includes the Khetan-Podder and Pfähler indexes. See Lambert (2001) for further information on these indexes and how they differ.

Figure 2: Progressive and Regressive Tax Systems for the Tax Scales Invariant Class of Global Indices



The following fundamental relationship between the Π_{RS} and Π_K indexes was demonstrated by Kakwani (1977a, 1977b):

$$\Pi_{RS} = \frac{g}{1-g}\,\Pi_K, \quad [12] \tag{3}$$

where g is the average effective tax rate. This relationship shows that both tax progressivity, measured by Π_K, and average tax rates influence the distributional impact of taxes. Holding Π_K constant, any change in the average tax rate necessarily alters progressivity as measured by Π_{RS}, but, leaves progressivity measured by the departure from proportionality unchanged. For two tax systems with the same average tax rate, equation (3) implies that Π_{RS}, is a monotonic transformation of Π_K. However, if average tax rates differ, as they do across states, there is no monotonic relation and rankings of tax systems using Π_K can diverge from rankings created by measures of Π_{RS}. Thus, when we observe variations in state rankings based upon Π_{RS} and Π_K we know immediately that they are caused by differences in average tax rates across tax regimes.

ITEP Data

Information on the distributions of tax burdens and income is required in order to estimate the Lorenz curves, concentration curves, and related coefficients described above. Distributions constructed using microdata for each household's income and tax burden would obviously provide the best possible information, but such data is generally unavailable at the state and local level. However, grouped data provided by the Institute on Taxation and Economic Policy (ITEP) is available for 2002. Therefore, ITEP data will be employed to explore the measures of interest in

[12] This version of Kakwani's fundamental equation assumes there are no tax induced income re-rankings. See Kakwani (1977b) and Lambert (2001). This version of the equation is the one that is appropriate for analyzing grouped data and distribution tables of the sort provided by the Institute on Taxation and Economic Policy (ITEP). ITEP data provides the basic data for our progressivity (regressivity) estimates and the ITEP model and estimation of taxes and after tax incomes ignores income re-rankings.

this paper. Specifically, Who Pays? A Distributional Analysis of the Tax Systems in All 50 States (ITEP, 2003) provides the foundation for estimating the global tax regressivity of state and local tax systems. The ITEP model provides estimates of mean incomes and tax burden data for the bottom four quintiles and three points within the top quintile of income recipients. For state and local taxes, ITEP includes separate estimates for sales and excise taxes, property taxes, personal income taxes, corporate income taxes, and any Federal income tax offset. At the Federal level, the ITEP model also includes payroll and estate taxes.

The reliability of the ITEP data warrants comment. We note that more is known about the distribution of tax burdens at the federal level compared to state and local tax burdens. Examination of Federal ITEP tables reveals results that are consistent with what is generally known about the distribution of federal taxes relative to income. Gale and Potter (2002) use the ITEP model to investigate distributional changes in federal tax law and comment that the ITEP results are similar to results obtained from other models and studies. Similarly, Sullivan (2001) remarks that the ITEP simulation model "… is of extremely high quality and in the past has produced results consistent with official Treasury analyses." Sullivan (p. 1751) further argues that there is no reason to question the accuracy of the ITEP distribution tables.

The reliability of the ITEP data at the federal level suggests that we can have confidence in state and local ITEP estimates. Nevertheless, before presenting results based upon the data we briefly discuss some limitations. First, ITEP considers only direct taxes when estimating total tax burdens and ignores indirect taxes. This necessarily leads to an underestimation of the total tax burden in each state. Furthermore, not all states have the same mix of direct and indirect taxation.[13] A second difficulty involves the use of non-elderly married taxpayers as the "representative family" in the ITEP data set. Although a majority of the population is a part of this group for a substantial part of their lives, demographic changes and the growing number single parent households suggests that using non-elderly married taxpayers to estimate total state and local tax burdens for each state may result in imprecise estimates. Unfortunately, the ITEP model provides the only readily available data for systematically investigating distributional tax issues across all state and local governments in the U.S. In the absence of better data it is impossible to know the exact degree of accuracy in the ITEP estimates of state and local tax burdens.

The first step in estimating the distributional effects induced by state and local tax systems is to use the ITEP tables to construct distribution tables analogous to those employed by Formby, Smith and Thistle (1992). Formby et al. use such tables to represent the distributional impacts of various tax reform alternatives. Here, similar tables derived from ITEP data are used to support the estimation of global progressivity indexes for each of the fifty states and the District of Columbia. Each table contains information for the four bottom quintiles and for three points in top quintile of income recipients. Thus, the ITEP data provides seven points within the income tax distributions that can be used in estimating tax progressivity. Each table contains the following 2002 conditional mean values: before-and after-tax incomes, total state and local taxes, sales and excise taxes, property taxes, total income taxes, personal income taxes and corporate income taxes. Thus, the tables contain the basic income and tax distribution data for all direct state and local taxes, as well as the specific burden for each type of tax. In addition to the state tables, similar tables have been constructed for all U.S. state and local tax systems combined as well as aggregations of all states that levy personal income taxes and all states that do not levy personal income taxes.

[13] Comparisons of ITEP average tax rates with tax burden data from other sources (e.g., Tax Foundation) reveals dissimilarities in tax rates and average state rankings. Such comparisons indicate that indirect and possibly exported state and local taxes may be important. However, the distributional implications of such taxes are not well understood or researched.

The distribution tables constructed from ITEP data are used to estimate before- and after-tax Lorenz curves, tax concentration curves, and corresponding Gini coefficients and concentration coefficients. However, a problem arises when constructing distributional measures and corresponding indexes when utilizing grouped data, which is the case when ITEP data are employed. Lorenz curves and concentration curves, as described above, can be constructed by drawing straight line segments between observed data points. Lambert (2001) provides a simple example. The problem with this approach was emphasized by Paglin (1975), who observed that the linear segments create a bias that understates income inequality when fewer than eight data points are available. The bias carries over to the distribution of taxes as well. The ITEP data employed in this paper is constructed using seven data points. To avoid the bias associated with linear segments we adapt the procedure first employed by Paglin (1975) and apply it to ITEP data. In the relevant literature, Paglin's procedure[14] is referred to as a smoothing technique. In this paper, we use a SAS statistical analysis routine to perform a smoothing procedure similar to the cubic-spline method employed by Paglin (1975). The integration procedures required to estimate the Gini and concentration coefficients are performed using SAS procedures.

Results

Table 1 reports regressivity estimates using two formats. Columns 1 and 2 show absolute values of the Π_K and Π_{RS} measures of global tax regression across states. The second series, reported in columns 3 and 4, normalizes the results by expressing regressivity estimates as a percentage of the overall regressivity for all U.S. state and local tax systems combined. This format makes the absolute regressivity measures of states easier to interpret by comparing them to the overall combined index, which is set at 100.0. Normalizing the results also allows a state to be assessed relative to all other states in a straight forward manner.

Table 1 also provides rankings of the degree of regressivity, with 1 representing the most regressive state and 51 the least regressive. Thus, a state and local tax system ranked first (1) by Π_K or Π_{RS} exhibits more regressivity than any other state and local tax system, and a ranking of fifty-first (51) indicates less regressivity than any other state. Column 5 presents state rankings based on the Π_K measure of regressivity while the Π_{RS} rankings are shown in Column 6.[15] Recall that the indexes are from two distinct classes of global progressivity measures. Based on the two indexes a state may or may not have the same regressivity ranking. A cursory review of columns 5 and 6 in Table 1 reveals that most states do not have the same regressivity ranking. As discussed previously, differences in rankings signify that there are important variations in the average tax rates contained in the underlying ITEP distribution data that are used to calculate the indexes. If tax rates were equivalent, Kakwani's fundamental relation (equation 3 above) insures that the Π_K and Π_{RS} regressivity measures would be simple monotonic transformations, implying identical rankings.[16]

[14] For a detailed review of Paglin's estimation procedure, see Campano and Salvatore (2006) p. 75 – 80.

[15] The normalization procedure does not alter the rankings of either index and therefore the rankings provided in Columns 5 and 6 denote a state's rank for both absolute and normalized results.

[16] The rankings based upon Π_K and Π_{RS} are highly correlated. The Spearman Rank correlation coefficient is 0.8933. Nevertheless, tax rates are not equivalent and the rankings are not the same.

Based on ITEP data and estimations of global progressivity, all state and local tax systems included in this analysis are regressive.[17] Table 1 shows that even though regressivity is present in each tax system, the degree of regressivity ranges broadly from 0.2187 to 0.0029 as measured by Π_K and 0.0176 to 0.0002 for Π_{RS}. Clearly, there are large differences in the extreme cases in Table 1. Washington is the most regressive state with indexes equal to -0.2187 for Π_K and -0.0176 for Π_{RS}. Delaware is the least regressive with Π_K equal to -0.0029 and Π_{RS} equals -0.0002. Thus, direct tax regressivity in Delaware is very close to zero. If the coefficients were exactly zero, then Delaware's tax system would be globally proportional. Instead, the coefficients are ever so slightly negative, which means that, on balance, direct taxes are regressive. Based on the Π_K index Washington is more than 75 times more regressive than Delaware and 88 times more regressive when measured by Π_{RS}.

Rankings provided in Columns 5 and 6 of Table 1 reveal that, as measured by Π_K, Washington (1),[18] Florida (2), Nevada (3), Wyoming (4), and Tennessee (5) comprise the five most regressive state and local tax systems in the United States. Washington [1], Florida [2], and Tennessee [3] are also ranked in the top five when measuring regressivity by Π_{RS} while Nevada drops to sixteenth and Wyoming moves to twenty-sixth. The dramatic difference in Wyoming's ranking is explained by very low average tax rates vis-à-vis other states. South Dakota [4] and Illinois [5] complete the five most regressive states utilizing the Π_{RS} assessment of regressivity. Π_K values for South Dakota and Illinois rank them sixth and eleventh, respectively.

Focusing on tax systems exhibiting low regressivity, Table 1 shows that the five states with the lowest degrees of regressivity as measured by Π_K includes South Carolina (47), Vermont (48), Maine (49), Montana (50), and Delaware (51). Again, rankings change depending upon which index of regression is used. The five least regressive tax systems as measured by Π_{RS} are Vermont [47], Maine [48], Alaska [49], Montana [50], and Delaware [51]. South Carolina is ranked 46th by Π_{RS}, while Alaska is ranked 38th by Π_K. While the degree of regressivity among the five most regressive states is somewhat concentrated, i.e. the states ranked first and fifth are only separated by twenty percent as measured by Π_K and sixty-percent under Π_{RS}; the same is not true when examining states that display low degrees of regressivity. Columns 1 and 2 reveal a sizable difference between Delaware, the least regressive state, and Montana, the state with the next lowest level of overall tax regressivity.

Columns 3 and 4 of Table 1 normalize the results provided in Columns 1 and 2 to the U.S. average.[19] This procedure provides a useful method for identifying similarities among states as well as comparing individual states to the overall combined state and local regressivity in the U.S., which equals 100. Thus, states with normalized values exceeding 100 are above the national average while states with values less than 100 indicate that a state's measured regressivity is below the national average.

Column 3 of Table 1 depicts the normalized Π_K index. Inspection reveals that 20 of 51 state and local tax systems (39.2%) exhibit greater regressivity than the overall combined state and local tax regression in 2002. Results for Π_{RS} are shown in Column 4, where 19 of 51 state and local tax

[17] As measured by the progressivity indexes Π_K and $\boldsymbol{\Pi}_{RS}$, each state and local tax system is regressive. For reporting purposes, only positive values for each index are shown in Columns 1 and 2 of Table 1 and all results are described as a degree of regressivity.

[18] Values in parentheses, ( ), denote Π_K rankings while values in brackets, [ ], indicate Π_{RS} rankings.

[19] Normalized values are obtained by dividing state values for each index by the U.S. average for the respective index and multiplying by 100. For example, the normalized Π_K index in Alabama is calculated as follows: (Π_K Alabama / ΠK U.S. Average)*100. Thus, the reported normalized values represent a percentage of the national average.

systems (37.3%) display a degree of regressivity that is above the level for all state and local systems combined. An examination of states displaying the largest degree of regressivity shows that only Washington has a tax system with both regressivity indexes more than twice as large as the combined level for all state and local systems. Two other states, Florida and Nevada, join Washington with degrees of regressivity greater than twice the U.S. average when considering only Π_K.

Furthermore, according to both global indexes, the five states with the lowest degree of regressivity exhibit less than half of the regressivity associated with the combined national average. Regressivity in South Carolina [46] is also less than half of the national average when examining only the Π_{RS} index. As noted previously, Delaware displays the smallest degree of regressivity by a sizeable margin. Montana possesses the second lowest amount of regression according to both Π_K (-0.0268) and Π_{RS} (-0.0018). However, according to both indexes, Montana is more than twice as regressive as Delaware.

Focusing on state and local tax systems in the middle of the rankings reveals smaller but still noteworthy differences in tax regressivity. Rhode Island is the median state in the rankings of Kakwani indexes, while Wyoming is the median in the Π_{RS} rankings. The quintile of states surrounding Rhode Island (states ranked between 21 through 31 in column 5 of Table 1 have Π_K indexes that range from 0.0782 (Virginia) to 0.0907 (North Dakota), a difference of 16 percent. The quintile of states surrounding Wyoming (states ranked between 21 through 31 in column 6) have Reynolds and Smolensky indexes ranging from 0.0070 (Iowa) to 0.0082 (Colorado), a difference of 17 percent. Two states in the Π_{RS} rankings, Kansas and Wisconsin, have indexes of regressivity almost identical to, but slightly larger, than Wyoming. In the Kakwani rankings New Mexico has a Π_K index only slightly smaller than Rhode Island. Seven of the 11 states in the middle of the rankings are the same in columns 5 and 6. The states and localities include the District of Columbia, Kansas, Mississippi, New Jersey, New Mexico, North Dakota and Rhode Island. The tax systems of these states are clearly "average", irrespective of the index used to measure tax regressivity.

As noted above, the Gini-based measures reported in Table 1 reveal nothing about crossing Lorenz and concentration curves, which signify possible problems with summary indexes of global tax regression. To investigate this issue we inspected and compared the relevant distribution tables and associated Lorenz and concentration curve ordinates for all 50 states and the District of Columbia using ITEP data. The results reveal that 49 of 51 comparisons for incomes and all direct taxes are free of relevant crossings. Only two states, Delaware and Montana, have crossing Lorenz and concentration curves in 2002. We conclude that the tax systems of 48 states and the District of Columbia are unambiguously regressive, which means that local measures of regressivity are always consistent with the global indexes. Delaware and Montana have progressive as well as regressive elements in their tax systems. On balance, however, Π_K and Π_{RS} indicate both states have regressive direct tax systems.

Tax System Regressivity in States with and without Personal Income Taxes

Inspection of Table 1 suggests that whether a state has a personal income tax is an important determinant of the state's overall degree of regressivity and its ranking. Seven states in the U.S. currently have no form of a personal income tax – Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming. With the exception of Alaska, all these states exhibit high degrees of

regressivity as measured by Π_K and/or Π_{RS}.[20] To illustrate the importance of the personal income taxes in determining the degree of state and local tax regressivity we combine states into two groups, states with personal income taxes and states without personal income taxes.

Table 1: State and Local Tax Regression, 2002

	Index of Absolute State and Local Tax Regression		**Normalized State and Local Tax Regression**		**State and Local Tax Regressivity Rankings**	
	Π_K	Π_{RS}	Π_K	Π_{RS}	Π_K	Π_{RS}
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
All States*	**0.098**	**0.0083**	**100**	**100**	–	–
Alabama	0.1407	0.0108	143.6	130.6	9	7
Alaska	0.0681	0.0021	69.5	24.8	38	49
Arizona	0.1283	0.0105	131	127.1	12	9
Arkansas	0.0737	0.0071	75.2	85.6	33	30
California	0.0567	0.0051	57.9	62.1	44	42
Colorado	0.1115	0.0082	113.8	99	17	20
Connecticut	0.1163	0.0092	118.7	111	13	17
Delaware	0.0029	0.0002	2.9	1.8	51	51
District of Columbia	0.0852	0.0075	87	90.4	25	27
Florida	0.2075	0.0152	211.7	184.3	2	2
Georgia	0.1024	0.0093	104.5	112.8	18	15
Hawaii	0.1023	0.0101	104.4	122.4	19	10
Idaho	0.057	0.005	58.2	60	43	43
Illinois	0.1296	0.011	132.3	133.5	11	5
Indiana	0.113	0.0097	115.3	117.8	16	13
Iowa	0.0717	0.007	73.2	84.5	37	31
Kansas	0.0791	0.0076	80.8	92.1	30	25

*Includes the District of Columbia.

[20] Tennessee, another state displaying a considerable degree of regressivity, does levy a personal income tax, but only on interest and dividend income. As a result, this tax affects only a small portion of families, and the tax rate is extremely low. In the ITEP data, the tax affects only the top quintile in Tennessee, and the tax rate for this group is only 0.14 percent.

Table 1: State and Local Tax Regression, 2002 (Cont'd)

	Index of Absolute State and Local Tax Regression		Normalized State and Local Tax Regression		State and Local Tax Regressivity Rankings	
	$\prod_K$	$\prod_{RS}$	$\prod_K$	$\prod_{RS}$	$\prod_K$	$\prod_{RS}$
	(1)	(2)	(3)	(4)	(5)	(6)
All States*	**0.098**	**0.0083**	**100**	**100**	–	–
Kentucky	0.0671	0.0063	68.5	75.9	39	36
Louisiana	0.1134	0.0094	115.7	114.3	15	14
Maine	0.0355	0.0036	36.2	44.1	49	48
Maryland	0.0737	0.0059	75.2	71.3	34	37
Massachusetts	0.0874	0.0067	89.2	81	24	34
Michigan	0.1148	0.011	117.2	133.3	14	6
Minnesota	0.0618	0.0058	63.1	70.2	40	38
Mississippi	0.0894	0.008	91.3	96.7	22	23
Missouri	0.0724	0.0063	73.9	76	36	35
Montana	0.0268	0.0018	27.3	21.4	50	50
Nebraska	0.0582	0.0053	59.4	64.6	41	41
Nevada	0.1975	0.0093	201.6	112.1	3	16
New Hampshire	0.1569	0.0067	160.2	81.6	8	33
New Jersey	0.0826	0.0071	84.3	86.3	28	29
New Mexico	0.0836	0.0081	85.3	97.8	27	21
New York	0.0801	0.0083	81.8	100.5	29	19
North Carolina	0.0751	0.0069	76.6	83.7	32	32
North Dakota	0.0907	0.0073	92.5	88.9	21	28
Ohio	0.0579	0.0058	59.1	70.1	42	39
Oklahoma	0.0878	0.0088	89.6	106.1	23	18
Oregon	0.0521	0.0042	53.2	51.1	45	45
Pennsylvania	0.1331	0.0099	135.9	119.4	10	11
Rhode Island	0.0841	0.0081	85.8	97.8	26	22
South Carolina	0.0472	0.0039	48.2	46.7	47	46
South Dakota	0.1793	0.0116	183	139.8	6	4
Tennessee	0.183	0.0125	186.7	151.3	5	3
Texas	0.1653	0.0108	168.7	130.1	7	8
Utah	0.1015	0.0098	103.6	118.8	20	12
Vermont	0.04	0.0038	40.8	45.5	48	47
Virginia	0.0782	0.0057	79.9	69	31	40
Washington	0.2187	0.0176	223.2	213.4	1	1
West Virginia	0.0497	0.0047	50.7	56.9	46	44
Wisconsin	0.0736	0.0077	75.1	93.1	35	24
Wyoming	0.1912	0.0076	195.1	92.1	4	26

*Includes the District of Columbia.

Table 2, below, shows the progressivity comparisons of these two groups of states and makes comparisons to all 50 states and the District of Columbia combined. Analyzing the regressivity results in columns 1 and 2 of Table 2 reveals that states without personal income taxes have much larger regressivity measures than states that have personal income taxes. This result holds for both measures of global progression. The ΠK coefficients are -0.0819 and -0.1827 for states with and without personal income taxes, respectively. The corresponding ΠRS values are -0.0071 and -0.0105. Thus, as measured by ΠK, average regressivity in combined states without personal income taxes is more than twice the level found in states whose tax systems include an individual income tax. Utilizing the ΠRS measure of regressivity, we find somewhat smaller differences in the degree of regressivity between the two groups of state tax systems. The redistributive measure of tax regressivity shows states without personal income taxes to be approximately 1.5 times more regressive. The explanation of these differences is provided by average tax rates across groups. States without personal income taxes are low tax states when compared to states that have personal income taxes. The lower average tax rates cause the regressivity to have smaller redistributive effects. Hence, the differences in overall regressivity are smaller when measured by ΠRS. Finally, columns 3 and 4 of Table 2 show that the average regressivity in states without personal income taxes is larger than the U.S. average as measured by each progressivity index while the degree of regressivity is below the U.S. average for the state and local tax systems that levy personal income tax.

Table 2: State and Local Tax Regression in Combined States, 2002

	Indexes of Absolute State and Local Tax Regression		**Normalized State and Local Tax Regression**	
	$\prod_K$	$\prod_{RS}$	$\prod_K$	$\prod_{RS}$
	(1)	**(2)**	**(3)**	**(4)**
All States and the District of Columbia	**0.098**	**0.0083**	**100**	**100**
All States with Personal Income Taxes*	0.0819	0.0071	83.5	85.8
All States without Personal Income Taxes	0.1827	0.0105	186.5	127

*Includes the District of Columbia.

4. CONCLUSION

This paper uses ITEP data from 2002 to measure the degree of regressivity in state and local tax systems across the United States. Two widely used indexes of tax regressivity, one from each of the broad classes of global progressivity measures, are applied to direct taxes and income distributions in the 50 states and the District Columbia. The scale invariant Kakwani index (Π_K) is calculated and used to rank states in terms of regressive deviations from a proportional or flat tax distribution. The Reynolds-Smolensky index (Π_{RS}) from the redistributive class of measures is calculated to rank states in terms of tax induced increases in income inequality.

All state and local tax systems are found to be globally regressive by Π_K and Π_{RS}. Both indexes show that there are tremendous differences in the degree of regressivity across states. Average tax rates also differ across states, which accounts for the observed divergences in state ranking when the Kakwani and Reynolds-Smolensky indexes are used to measure regressive taxes. However, the regressivity rankings are highly correlated. Washington has the most regressive state and local tax system and Delaware has the least regressive system. While both states have regressive taxes, Washington is 75 times more regressive than Delaware in terms of Π_K and 88 times more regressive according to Π_{RS}.

Global indexes of regressivity are summary measures and may not illuminate all aspects of the distribution of incomes and tax burdens of interest. Inspection of the Lorenz curves and concentration curves underpinning the global indexes reveals that 49 of the 51 state and local tax systems are unambiguously regressive, which means local measures are consistent with global measures at all points within the tax and income distributions. The direct tax systems of Delaware and Montana have a mixture of regression and progression, which results in crossing Lorenz and concentration curves. These crossings mean that local measures of progression are inconsistent with the Gini-based indexes at some points in the Delaware and Montana income and tax distributions. Overall, both states have regressive direct tax system when measured using either Π_K or Π_{RS}, but local measures are progressive at one or more points within the income distribution.

Comparisons of regressivity measures across state and local tax systems suggest that whether a state has a personal income tax is an important determinant of the regressivity rankings. When ITEP data for states without income taxes are merged and compared to merged data for all states without income taxes we find large differences in global measures of regressivity. The Kakwani index for combined states without personal income tax is more than twice as large as in combined states with personal income taxes. The difference in the Reynolds and Smolensky indexes is somewhat smaller, slightly less than 50 percent greater in states without personal income taxes compared to states that have personal income taxes. The differences in Π_K and Π_{RS} in combined states with and without personal income taxes is explained by the fact that states without income taxes (Alaska, Florida, Nevada, South Dakota, Texas, Washington, and Wyoming) are, on balance, also low tax states when compared to the 44 combined state and local systems that impose personal income taxes. An interesting extension of this article would be to examine other years for which ITEP has published state and local tax burdens and determine how regressivity has changed over time.

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Journal of Business, Economics & Finance ISSN: 2146-7943

Journal of Business, Economics & Finance
Year: 2013 Volume: 2 Issue: 1

UTILISATION OF MICRO-FINANCE INSTITUTIONS' FUNDS BY BORROWERS IN ARID AND SEMI-ARID LANDS IN KENYA

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KEYWORDS

Borrowed funds utilization, economic characteristics, literacy levels.

ABSTRACT

Despite a lot of efforts in terms of resource mobilisation in Arid and Semi-Arid Lands (ASAL) , the poverty levels are still very high and the defaulted loans from the four Micro-Finance Institutions (MFIs) in Maralal town amounts KES 15 million. The study sought to establish whether economic characteristics of entrepreneurs and whether literacy levels affect application and usage of borrowed funds in the ASAL regions of Africa. The study was limited to Maralal Town, one of the main towns in the ASAL region of northern Kenya. An *ex-post facto* study design was considered appropriate for the research. Data collection was done using questionnaires from a population of 40 MFIs staff and 10,600 MFIs Clients who accessed credit in the last five years. The data collected was analyzed through both descriptive and inferential statistics and presented in form of tables. The study has established that economic characteristics of entrepreneurs determine the use of borrowed funds from MFIs. Literacy levels were found to have a significant relationship with use of borrowed funds. The findings of the study are useful to, the Government and other researchers interested in this field.

1. INTRODUCTION

The economic mainstay of Kenya's Arid and semi arid lands areas is livestock production and it experiences the highest levels of poverty at 65%. The region is also home for 12 million Kenyans. During the last two decades, microfinance has evolved from an informal sector into a semi-mature, professional industry. Microfinance institutions are now facing some of the main challenges of regular retail banks: dealing with competition, offering goods and services at low cost and monitoring credit risks. The latter is particularly important when microfinance institutions become big or start to accept savings.Since 1980, microfinance services have generated considerable infers among academics, donors and development practitioners as alternative to the documented failure of government rural credit assistance to reach low income household (Mansuri and Sunjay, 2003).The failures are attributed to cause such as urban- biased credit allocation, high transaction costs, interest rates restrictions, high default rates and corrupt practices. The reasons for poor loan recovery are related to inappropriate design feature leading to incentive problems and politicization that made borrowers view credit as a political largesse (Hulme and Arun, 2009).

The development of the microfinance sector is based on the assumption that the poor possess the capacity to implement income generating economic activities but are limited by lack of access to and inadequate provision of savings credit and insurance facilities. This approach also breaks from the directed credit strategies by reducing the government's involvement paying close attention to the incentives that drive efficient performance (Carey, 1998). The developments in microfinance services have been based on the prototype delivery model that is considered the best answer to capture financial needs of the poor in various socioeconomic and institutional systems.

Large data sample over a time frame of 10 years in Kenya has been used to calculate the loss distribution for two portfolios of loans, one consists of loans granted to male clients, the other comprises loans granted to female clients. The loss distributions are calculated with a re-sampling technique similar to the one used by Carey (1998), Calem and LaCour-Little (2004) and Schmit (2004) to estimate credit risk in private debt portfolios, in mortgage loan portfolios and in the leasing industry respectively. Inadequate financial infrastructure is a major problem in most developing countries. Financial infrastructure includes legal, information, as well as regulatory and supervisory systems for financial institutions and markets. Most governments in developing countries have focused on creating institutions or special programs to disburse funds to the poor with little attention to building financial infrastructure that supports, strengthens, and ensures the sustainability of such institutions or programs and promote participation of private sector institutions in microfinance (Basel Committee, 2004)..

Kenya's microfinance industry has come a long way since the 1980s, and particularly since the landmark Microfinance Intermediaries Act of 2006. The country now has five deposit-taking microfinance intermediaries (MFIs) operating under a regulatory framework assessed by the Economist Intelligence Unit (EIU) as the best in Africa (EIU 2010). Overall, the EIU rates Kenya as having the second best business environment for MFIs in all of Africa and one of the top ten in the world

Kenya has the second largest borrower base in the continent and Schmit (2004), and its largest savings and credit cooperatives (SACCO) movement and Schmit (2004). This is not unrelated to the country's world-leading position in mobile banking (EIU 2010), which has been proven to be a significant driving force in financial inclusion

Nonetheless, the microfinance industry globally is meeting difficulties as funding dries up, delinquencies rise and sceptics begin to question its efficacy in driving poverty reduction and development. Much of this critique focuses on some of the bolder claims, made more often by policymakers and consultants, than by practitioners themselves. (Schmit 2004).

The main economic activity in the Kenyan Arid and semi arid lands areas is livestock production. The region is home for 12 million Kenyans. The area experiences the highest levels of poverty incidence at 65%. Access to financial service has been identified as a major problem experienced by many in attempt to do business in Kenya. Though there have been sustained efforts to finance the low income earners of the society which has been facilitated by the upcoming microfinance institutions which operate in most parts of Kenya including Maralal town. Despite all these interventions, a large percentage of the rural people are still living below the poverty line yet microfinance institutions have continued to offer financial service to these members of the society for a long period. Given that, the defaulted loans in Maralal town amounts to Kshs. 15 million (KWFT, 2010). The study was carried out in Maralal town and targeted all the MFIs within the town. Maralal town is a very key town in the ASAL region in Kenya. The study was carried out between October 2011 and June 2012.

Large percentage of the rural poor have been unable to effectively service the credit borrowed from micro-financial institutions (EIU, 2010).Whether this is as a result of problems in applicability and usage of the credit from the MFIs remains to be seen. Therefore this study examined the applicability and use of credit from MFIs and sort to answer the following questions:

i. What particular economic characteristics of entrepreneurs affect applicability and usage of funds borrowed from MFIs?

ii. Do literacy levels of borrowers affect applicability and usage of funds borrowed from MFIs?

The findings of this study are useful to both microfinance organizations and individual all over the world. Foremost, the study can form a basis for future research by scholars who are interested in studying microfinance in Maralal town. The study also benefits the Microfinance institutions, currently engaged in lending out their credit to the economically marginalized groups.

The borrowers of micro-finance credit also benefits from this study in the sense that they will understand their responsibility in servicing the credit. This will enable the MFIs to recover their credit in time and consequently lower the default rates.

Currently, the government is working towards the realization of vision 2030. To realize this vision, the MFIs must compliment the government efforts towards poverty alleviation and sustainable development. This cannot be overstated when it comes to ASAL regions of Kenya were realization of the sustainable development, through poverty alleviation is key to the Kenya Government.

The paper contains four (4) main sections. Section 1: Introduction, gives the general background of the study as well as an introduction to the field of study. Section 2: Methodology, outlines the research design used, target population, sample size, data collection, data analysis techniques employed and data presentation. Section 3: Results and Findings, presents the results and findings of the study. The results and findings are presented based on the research questions addressed by the study. The last section is Section 4: Summary of Findings and Conclusion. This section gives a summary of the findings as per the study questions. It also gives research recommendations based on the study findings.

2. METHODOLOGY

The study was quantitative research in the sense that it typically involved a large number of subjects and elaborate statistical analysis (Cohen et al, 1996). Since the relationship between the main variables (independent and dependent variables) already exists, *ex-post facto* study design was considered appropriate for the research. According to Fraenkel and Wallen (1996), *ex post facto* study design, also known as causal – comparative research design, involves comparing groups in order to explain the existing differences between the variables of interest. Kothari (2003) argues that the main characteristics of the causal comparative design is that the researcher has no control over the variables but can only report what has happened or what is happening. Consequently, this study examined the existing relationships, the applicability and usage of funds by borrowers of micro-financial institutions. The researcher did not have control over the independent variable because the manifestations have already occurred or they are inherently not manipulatable (Kerlinger, cited in Black, 1999). Thus, this study was concerned with the existing relationship between the applicability and usage of funds by borrowers of micro-financial institutions

The study was carried out in Maralal town and targeted all the MFIs within the town. Maralal town is a very key town in the ASAL region in Kenya. The study was carried out between October 2011 and June 2012.

The target population involved all employees and customers of the four micro-financial institutions in Maralal Town, namely; Kenya Women Finance Trust, Faulu Kenya, Samburu Teachers Saccco and Samburu Traders Employees. The employees consisted of all the three levels of management that is, management, middle and lower levels. The customers consisted of those who have accessed credit facilities from the MFIs for the last five years. There are a total of 40 employees in the five MFIs. On the other hand, the MFIs have a total of 10,600 customers who have accessed credit for the last five years. This can be broken down in the table below:

Table 1: Target Population

Micro-finance Institution	Employee	Customers
Kenya Women Finance Trust	5	1,500
Faulu Kenya	5	2,300
Samburu Teachers Sacco	10	2,500
Samburu Traders Employees	20	4,060
Total	**40**	**10,600**

Source: Survey data, 2011.

Out of the 10,600 customers, only 4,000 had accessed credit for the last five years and were currently servicing it. Therefore the study opted to include only those customers who had accessed credit for the last five years and were currently servicing it.

For this study, stratified random sampling method was used to divide the target population into three strata: strategic, tactical and operations. Then from each stratum simple random sampling was used to select cases that constituted the sample for the study. The division of the population into strata allowed a more representative sample in that a sample will be selected from each stratum. Employees in each stratum were asked to pick a paper from a container in which the papers were written 'yes' or 'no'. The total number of papers to be picked was 10% of the total number of employees and customers of MFIs. All the managers who picked 'yes' paper constituted the sample.

A sample of 10% of the total population is justified as representative of the active population in *ex-post facto* studies, according to Cohen et al (1996). Thus, from Cohen at al (1996) perspective, a sample of 10% of the total population was deemed representative enough. Consequently, the study targeted a sample of 416 cases.

Data was collected using the questionnaire administered to all cases that constituted the sample. The questionnaire comprised of 20 items covering all the objectives of the study. The 20 items were rated on a 5-point Likert Scale. The Likert Scale on the questionnaire provided the respondents with an opportunity to indicate the degree of agreement or disagreement on each statement concerning employee development programmes and organizational goals. The Likert scale questionnaire was preferred because of is extensively used to determine attitudes and behaviour or respondents in respect to existing phenomena.

The collected data was analyzed quantitatively. Inferential statistics was used to analyze the relationships between the variables in the objectives. Descriptive statistics was used to describe the

sample characteristics where measures of relationships do not apply. The level of significance for inferential statistical analysis was 0.05. According to Aiken (1994), this level of significance is most commonly used in behavioural science, hence its adoption in this study. The analysed data was presented using frequency tables and spearman rank correlation tables.

3. RESULTS AND FINDINGS

The study was based on two research questions. Data was collected so as to answer these research questions. The research questions are answered as follows:-

What is the effect of economic characteristics of entrepreneurs on the use of borrowed funds?

In order to answer this question, the respondents were asked to respond to the item on the questionnaire on the economic characteristics of entrepreneurs. The responses of economic characteristics of entrepreneurs were scored and the results prosecuted in Table 2.

Table 2: Economic characteristics of Entrepreneurs

Variable	Standard Deviation	Mean	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
Income levels	1.07	4.12	47.1	33.7	5.3	13.0	1.0
Poverty levels	1.34	3.80	42.8	28.1	7.9	12.0	9.1
Expenditure levels	1.07	4.13	47.6	33.2	5.3	13.0	1.0
Availability and access to credit	1.10	4.06	44.5	33.9	5.5	14.9	1.2

n = 416

Table 2 and Table 3 shows that there were four economic characteristics of entrepreneurs who had accessed credit from MFIs in Maralal town. These characteristics were income levels, poverty levels, expenditure levels and availability and access to credit. The results of descriptive statistics imply that the respondents were in agreement that income levels (80.8%), poverty levels (70.9%), expenditure levels (80.8%) and access to credit (78.4%) were positively perceived as the economic characteristics of entrepreneurs who had accessed /borrowed funds from MFIs. These characteristics therefore serve as indicators of use of borrowed funds. For instance the income levels, poverty levels, expenditure levels, and levels of access to credit show the extent of use of borrowed funds in various business ventures by the entrepreneurs.

In order to determine the relationship between economic characteristics and use of borrowed funds, Spearman Rank Correlations technique was used to correlate the two variables. Spearman Rank Technique was used because the data on the questionnaire was ranked in a scale of 1 to 5. The results of Spearman Rank Correlation showed that there was a significant positive relationship between the economic characteristics of borrowers and the use of borrowed funds.

Table 3: Relationship between economic characteristics of borrowers and use of MFI credit

		Income Levels	Poverty Levels	Expenditure Levels	Availability and access to credit	Use of borrowed funds
Income levels	**Correlation Coefficient**	1.000	.463(**)	.611(**)	.088	.289(**)
	Sig.(2-tailed)	.	.000	.000	.073	.000
	N	416	416	416	416	416
Poverty levels	**Correlation Coefficient**	.463(**)	1.000	.698(**)	.241(**)	.330(**)
	Sig.(2-tailed)	.000	.	.000	.000	.000
	N	416	416	416	416	416
Expenditure levels	**Correlation Coefficient**	.611(**)	.698(**)	1.000	.157(**)	.314(**)
	Sig.(2-tailed)	.000	.000	.	.001	.000
	N	416	416	416	416	416
Availability and access to credit	**Correlation Coefficient**	.088	.241(**)	.157(**)	1.000	.510(**)
	Sig.(2-tailed)	.073	.000	.001	.	.000
	N	416	416	416	416	416
Use of borrowed funds	**Correlation Coefficient**	.289(**)	.330(**)	.314(**)	.510(**)	1.000
	Sig.(2-tailed)	.000	.000	.000	.000	.
	N	416	416	416	416	416

** Correlation is significant at the 0.01 level (2-tailed).

The results of the Spearman Rank Correlation thus imply that there is a significant relationship between all the economic characteristics and use of borrowed funds.

What is the effect of literacy levels on the use of borrowed funds?In order to answer this research question; the respondents were asked to respond to the item on the questionnaire concerning literacy levels. The literacy levels were identified as: No formal education, primary level of education, secondary level of education. Respondents from each of these levels were scored, as the results presented in Table 4.

Table 4: Literacy level of borrowers

Variable	Standard Deviation	Mean	Strongly Agree (5)	Agree (4)	Neutral (3)	Disagree (2)	Strongly Disagree (1)
No formal education	1.11	4.02	42.1	35.6	6.7	13.2	2.4
Primary education	1.20	3.90	41.1	31.7	6.5	17.5	3.1
Secondary education	1.08	4.07	44.5	34.4	5.8	14.4	1.0
Tertiary education	1.08	4.07	44.5	34.4	5.8	14.4	1.0
University education	1.08	4.07	44.5	34.4	5.8	14.4	1.0

The results of descriptive statistics in Table 4 suggest that the respondents were in agreement that there are five literacy levels that affect the use of borrowed funds. These literacy levels were no formal education (77.7%), primary education (72.85), secondary education (78.9%), tertiary education (78.9%) and university education (78.9%).

Having established the literacy levels, the study further sought to determine the relationship between literacy levels and use of borrowed funds. Spearman Rank Correlation was used to correlate the two variables and the results presented in Table 5.

Table 5:Relationship between literacy levels and the use of borrowed funds

		Use of borrowed funds	Secondary education	Primary education	Tertiary education	University education
Use of borrowed funds	**Correlation Coefficient**	1.000	.854(**)	.730(**)	.854(**)	.854(**)
	Sig. (2-tailed)	.	.000	.000	.000	.000
	N	416	416	416	416	416
Secondary education	**Correlation Coefficient**	.854(**)	1.000	.862(**)	1.000(**)	1.000(**)
	Sig. (2-tailed)	.000	.	.000	.	.
	N	416	416	416	416	416
Primary education	**Correlation Coefficient**	.730(**)	.862(**)	1.000	.862(**)	.862(**)
	Sig. (2-tailed)	.000	.000	.	.000	.000
	N	416	416	416	416	416
Tertiary education	**Correlation Coefficient**	.854(**)	1.000(**)	.862(**)	1.000	1.000(**)
	Sig. (2-tailed)	.000	.	.000	.	.
	N	416	416	416	416	416
University education	**Correlation Coefficient**	.854(**)	1.000(**)	.862(**)	1.000(**)	1.000
	Sig. (2-tailed)	.000	.	.000	.	.
	N	416	416	416	416	416

** Correlation is significant at the 0.01 level (2-tailed).

The results of Spearman Rank Correlation show that there was a significant relationship between literacy levels and the use of borrowed funds. The literacy levels thus determine the accessibility and use of credit. The tables also imply that literacy levels increase as the accessibility and use of borrowed funds increase. Thus, education is a determinant factor in the borrowers' use of credit from MFI institutions. Education determines how, where, when and why MFI credit is being sought and how it will be used by borrowers.

4. SUMMARY OF FINDINGS AND CONCLUSION

Summary of Findings

Effect of Economic characteristics of borrowers on the use of borrowed funds:

The study has established that income levels, poverty levels, expenditure levels and access to credit are the key economic characteristics essential in the use of borrowed funds. These characteristics were positively perceived by the respondents as essential in the use of borrowed credit. The study established that the characteristics are indicators of use of MFI credit. Since the data sought in the questionnaire was ranked, Spearman Rank Correlation technique was used to determine the relationship between the economic characteristics and use of borrowed funds. The study finally established that there is a significant relationship between the economic characteristics of borrowers and the use of MFI credit.

Effect of Literacy levels on the Use of borrowed funds:

The literacy levels of borrowers were operationalized as the borrowers' level of education. This level of education ranged from no formal education, primary education, secondary education, tertiary education and university education. The descriptive statistics of these levels of education were ascertained and suggested that the respondents positively perceived the levels of education as essential in the use of borrowed funds. The results of Spearman Rank Correlation confirm a significant relationship between the literacy levels of respondents and their access and use of MFI credit. Education, that is, formal skills, is therefore a determinant of MFI credit use.

5. CONCLUSIONS

The study has established that income levels, expenditure levels, poverty levels and access to credit are factors that determine the use of borrowed funds from MFIs in ASAL regions of Kenya. These economic characteristics also are indicators of the use of borrowed funds from the MFIs. The study therefore concludes that there is a significant relationship between the economic characteristics of borrowers and their use of credit from MFIs by clients in the ASAL regions. To this extent, the first research question of the study is answered.

The literacy levels of borrowers identified in the study are no formal education, primary education, secondary education, tertiary education and university education. These literacy levels are a determinant of credit access and use from the MFIs. Besides, the literacy levels have a significant relationship with use of borrowed funds. There is a significant relationship between the literacy levels of respondents and their access and use of MFI credit. Formal education is therefore a determinant of MFI credit use in the ASAL regions. This might be attributed to the fact that this region experiences the highest levels of poverty incidences in Kenya at 65%.

From the study findings, the research recommends the following:-

i. The government is called upon to institute viable financial infrastructure such as legal, information and regulatory and supervising systems for financial institutions and markets. The government needs to refocus on special programmes that disburse funds to the poor to

ensure sustainability of such programmes and promote private sector institutions in micro-finance.

ii. The MFIs need to strengthen the capacity building initiatives that help promote credit use and recovery. This will educate borrowers on the proper utilization and investment of borrowed funds. This will in turn lower the default rate on credit.

Formal financial institutions need to focus more on the poor currently, these institutions do not focus on the poor because of perceived high risks high risks involved in small transactions, and how profitability as well as the inability of the poor to provide collateral for credit. By opening up to the poor, the burden on the poor relying on MFIs will be eased. This will diversify credit access.

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