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Sales-Maximization vs. Profit-Maximization: Managerial Behavior at Japanese Regional Banks 1980-2009*

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Abstract

In this paper, we analyze the managerial behavior of firms by estimating a nested objective function consistent with the framework of Fershtman and Judd (1987). Using data for Japanese regional banks for FY 1980-FY 2009, we focus on oligopolistic behavior in the domestic loan market and examine the intensity with which managers attempt to maximize sales and profits. We find that sales-maximization explains the behavior of Japanese regional banks more adequately and appropriately than profit-maximization. In particular, yearly fluctuations of the degree of managerial objectives suggest that the effort to maximize sales has intensified after full-scale liberalization of interest rates.

Keywords: firm objective, strategic delegation, managerial incentives, financial liberalization and banking

JEL classification: L13, L21, G21

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1 Introduction

Traditional microeconomic theory generally regards profit-maximization as the sole objective of business firms. However, Baumol (1959) argued that managers exercise discretion in setting goals and that maximizing sales revenue was a more likely short-run objective than maximizing profits in oligopolistic firms. Many economists criticize the profit-maximization hypothesis. Strategic delegation literature, in particular, introduced the use of managerial incentive contracts to consider the outcomes of alternative firm behavior. For instance, Fershtman and Judd (1987) and Sklivas (1987) showed that in oligopoly, strategic interaction with rivals in a product market may induce firms' owners to prefer aggressive competition over maximizing profits.

On the other hand, recent literature has paid less attention to examining managerial objectives empirically. Earlier studies (Hall, 1967; Lackman and Craycroft, 1974) supported the sales-maximization hypothesis empirically by directly estimating the objectives of managers. In particular, Amihud and Kamin (1979) found that revenue-maximizing behavior is prevalent among large firms, a finding consistent with Baumol's (1959) theoretical prediction. Moreover, they conclude that market power influences firms' behavior more than their form of ownership and control.

However, these studies do not consider alternative managerial objectives simultaneously, while few others directly examine the legitimacy of profit-maximization¹. Difficulties in handling the theoretical premise of profit function may explain this shortage of studies. For instance, as Farrell and Klemperer (2007) suggested, testing the profit-maximization hypothesis is complicated because the uniqueness of equilibria cannot be guaranteed and possible equilibria often are sensitive to the details of the model. Moreover, it is empirically difficult to account from published data for the multiple and heterogeneous products observed in many industries.

Without estimating the utility or profit functions directly, this paper empirically investigates maximizing sales as a deliberately chosen alternative to maximizing profits. To simultaneously take dual managerial objectives into account, we propose a simple nested objective function using the framework of Fershtman and Judd (1987). Thus, we are able to examine the intensity with which managers seek to maximize sales and profits. As per our knowledge, this paper is the first to investigate both objectives simultaneously. We choose Japan's regional banking sector as our subject of empirical study because its primal product loans is regarded as fairly homogeneous, thereby removing the concerns raised about earlier studies. Also, although Japan's mega banks have expanded aggressively into non-interest income activities, lending remains the main revenue base of regional banks.

Another reason to focus on managerial objectives of Japan's regional banks is that

¹Instead, several studies examine profit efficiency through estimating stochastic frontier profit functions based upon the premise that firms seek to maximize profits. Direct estimation of the dual profit or normalized profit frontier has been studied in Hollas and Stansell (1988), Kumbhakar and Bhattacharyya (1992), and Kumbhakar (1996).

few earlier studies suggested a non-competitive market structure by examining expense preference behavior or the practice of *amakudari*, accepting ex-senior officials from the regulatory authorities (Izawa and Tsutsui, 1998; Yamori, 1998; Horiuchi and Shimizu, 2001)². In particular, Izawa and Tsutsui (1998) provided evidence that profit-maximizing behavior was absent during the mid 1980's despite the progress of financial liberalization. Furthermore, Uchida and Tsutsui (2005) found that competition was weaker among regional banks than among city banks even though the overall competition in the Japanese loan markets has strengthened during the final quarter of the 20th century. Their findings are consistent with Uchida and Nakagawa (2007) that herding behavior has been observed among regional banks.

This paper is structured as follows. Section 2 presents the methodology used to investigate the bank's mixed managerial objectives. Section 3 describes our data. Section 4 presents and interprets our empirical results. Section 5 summarizes and concludes.

2 Methodology

We assume that banks compete *à la Cournot* in the loan market. Therefore, the strategic variable of bank i is its supply of loans x_i ³. The aggregate supply of loans X determines the loan rate $p(X)$. In order to account for the hybrid managerial objectives of regional bank managers, we define the objective function that is coincident with the framework of Fershtman and Judd (1987) as follows:

$$O_i = \mu\{p(X)x_i - c_i x_i\} + (1 - \mu)p(X)x_i \quad (1)$$

where $p(X)$ denotes the inverse demand function for bank loans. x_i and c_i are the loan amounts and marginal cost for bank i . μ is the parameter representing the degree of managerial objectives of regional bank managers. Higher values for μ imply greater intensity of profit-maximizing behavior; therefore, if $\mu = 1$, profit-maximization can be considered as the objective of regional bank managers. In contrast, lower values μ imply greater intensity of sales-maximizing behavior. Thus, $\mu = 0$ implies that regional bank managers regard maximizing sales as their primary objective.

Differentiating the bank manager's objective function above, we derive the first order condition. This equation can be transformed in terms of price elasticity of loan demand, which is given by

²Among studies outside the banking industry, Weinstein and Yafeh (1995) suggest that manufacturers owned by Japanese financial groups (*keiretsu*) are heavily influenced by their banks to raise production levels beyond those warranted purely by maximizing profits.

³The banking literature presents no consensus about the presumption of competition. Since our sample covers periods before full-scale liberalization of interest rates, Bertrand competition may not be appropriate. In previous studies, not for Japanese banks, some models assume Cournot competition (Calem and Carlino, 1991; Berg and Kim, 1994).

$$p(X) \cdot \left(1 - \frac{s_i}{\epsilon}\right) = \mu c_i \quad (2)$$

where ϵ is price elasticity of loan demand ($\epsilon = -p(X)/Xp'(X)$), and s_i is the loan market share for bank i , defined as the ratio of each regional bank's loan to the aggregate supply of loans X (i.e., x_i/X)⁴. Price elasticity of loan demand is obtained from the loan demand function, given by

$$\ln X = \alpha - \epsilon \ln p + Z\beta \quad (3)$$

where Z is an exogenous variable vector and α , ϵ , and β are parameters to be estimated.

Each bank's marginal cost is transformed from a translog functional form.

$$\begin{aligned} \ln C = & \alpha_0 + \sum_k \alpha_k \ln y_k + \sum_l \beta_l \ln w_l + \frac{1}{2} \sum_k \sum_j \alpha_{kj} \ln y_k \ln y_j + \frac{1}{2} \sum_l \sum_h \beta_{lh} \ln w_l \ln w_h \\ & + \sum_k \sum_l \delta_{lk} \ln y_k \ln w_l + \sum_t \eta_t DM_t + \sum_r \eta_r DM_r + \sum_r \eta_{ry} DM_r \ln y \quad (4) \end{aligned}$$

where C , y , and w are variables denoting total cost, outputs, and input prices, respectively. DM_t is a set of year dummy variables. α , β , δ and η are estimation parameters. To account for diversifications of regional loan markets, we include a set of regional dummy variables (DM_r) and interaction terms with loan output⁵.

In the empirical investigation, we first estimate the cost function in Eq. (4). We then compute the marginal cost of loans for each bank by differentiating the cost function with respect to output for loans⁶. Next, using these calculated marginal costs, we estimate Eqs. (2) and (3) simultaneously to obtain estimates for degrees of managerial objectives (μ) and the price elasticity of loan demand (ϵ). By considering empirical simplicity, μ is transported from the right to the left side in Eq. (2), and then $1/\mu$ is estimated as a new parameter. Further, to ascertain the degree of managerial objectives each year, μ in Eq. (2) is identified with a set of year dummy variables as follows:

⁴This definition is employed because Tsutsui and Kano (2003) found that Japanese regional banks' loan markets are not segmented at the prefectural level. Indeed, many regional banks expand their branch networks beyond prefectures where their headoffices are located in, their activities are not limited to the prefectural level.

⁵We constructed regional dummies by dividing Japan into nine representative regions following the district boundary of the local finance bureau (Hokkaido, Tohoku, Kanto, Tokai, Hokuriku, Kansai, Chugoku, Shikoku, and Kyushu).

⁶Following standard practice, we impose the restrictions on symmetry and linear homogeneity in the input prices in Eq. (4). Also, all the observations on independent variables except dummy variables are divided by their respective sample mean.

$$\mu = \theta_0 + \sum_t \theta_t DM_t \quad (5)$$

where θ_0 is a constant representing the degree of managerial objectives for a given year and θ_t is a set of parameters for each year other than a given year.

3 Data

We use data for Japan's regional banks from FY 1980 to FY 2009. There were 105 regional banks at the end of FY 2010. Japan features two types of regional banks: first tier and second tier. Although lending by former second-tier regional banks was restricted prior to the 1980s, we disregard differences between the two types because financial liberalization erased differences in their permissible lines of business⁷. We split the data into two periods to account for full-scale liberalization of interest rates in 1994 and examine time trends in managerial objectives. The earlier period spans FY 1980-FY 1994 while the latter FY 1995-FY 2009⁸.

With regard to output specifications for the cost function, we adopt an intermediation approach that assesses banks as financial intermediaries that employ labor and capital to transform deposits into loans and other earning assets. There are two outputs (y); total loans and total securities; three input prices (w); personal expenses per number of employees, non-personal expenses to total movable and immovable capital, and interest expenses to total deposits. Total costs (C) are the sum of the expenses for labor, capital, and interest. Financial statement data is obtained from the *Analysis of Financial Statements of All Banks* published by the Japanese Bankers' Association. In the loan demand function, the price of loans (lending rate) is identified as identical for all regional banks because we assume Cournot competition. Data for loan rates are derived from the long-term time series data of the main Bank of Japan statistics released on its website⁹. Descriptive statistics of variables are shown in Table 1.

⁷The present second-tier regional banks were former mutual savings banks that were allowed to become commercial banks in 1989. Unlike first-tier regional banks, they were allowed to finance only small firms, although installment financing was permitted

⁸Japan's financial system was highly regulated until the 1980s. Gradual liberalization of interest rates began in 1987.

⁹The Bank of Japan reports annual average loan rates for each financial institutions' business category. Therefore, we define the undifferentiated price of loans by calculating their geometric mean for regional banks and second-tier regional banks for each year.

4 Results

4.1 Changes in managerial objectives

The left of Table 2 shows the estimation results for the sample period FY 1980-FY 1994¹⁰. As shown in the estimate of ϵ , price elasticity of loan demand is statistically significant and positive; thus, it is consistent with economic theory because the sign of the parameter ϵ is positive in the loan demand function in Eq.(3). The estimate of β_1 has a significantly positive sign indicating that a higher market share relates to a larger demand for loans. Most importantly this paper estimates θ representing the yearly changes in the degree of managerial objectives. In Table 2, θ_0 denotes the constant term in Eq. (4), reflecting the degree of managerial objectives for FY 1980. Estimates of a set of parameters θ , as indicated by the subscript of year, indicate the differences from the constant term. Thus, degrees of managerial objectives for each year other than FY 1980 can be obtained by calculating the inverse of the sum of θ_0 and each yearly estimate of θ . As shown on the left of Table 2, most values are statistically significant at 1%. We can reject the null hypothesis that all coefficients of yearly dummy variables are zero at 1% significance level.

Figure 1 shows the yearly fluctuations calculated by the aforementioned formula. A drastic decreasing trend is observed: values of parameter μ representing the degree of managerial objectives fell from 0.0066 in FY 1980 to 0.0029 in FY 1994. These results suggest that sales-maximization is a more appropriate interpretation of Japanese regional bank's behavior before the full-scale liberalization of interest rates. However, a slight upward trend occurred in the late 1980s, Japan's bubble economy was at its peak, and its banks were lending expansively. Therefore, it seems that such aberrant economic conditions loosen the intensity sales-maximization behavior.

The right of Table 2 presents corresponding results for the sample period, FY 1995-FY 2009. Similar to previous results, since the estimate of ϵ has an expected positive sign and is statistically significant, the theoretically consistent loan demand function is obtained. With regard to the estimates of the set of parameters θ , almost values are also statistically significant at 1% levels. The null hypothesis that all coefficients of yearly dummy variables are zero also can be rejected at 1% significance level.

Figure 2 displays the corresponding yearly fluctuations in the degree of managerial objectives. Although the estimate of parameters θ for FY 1996 is insignificant, a consistent downward trend is observed. In addition, values of parameter μ are seemingly smaller than the results in Figure 1: the value for FY 2009 (0.0009) is less than one-fourteenth the value for FY 1980 (0.0066). Thus, even though financial liberalization arose in 1990s, results indicate that sales-maximization still explains the behavior of the Japan's regional banks.

¹⁰Hereafter, estimates of cost function coefficients are available by contacting the authors.

4.2 Controlling non-performing loans

As described earlier, the lower significant estimates of yearly dummy variables for the late 1990s may result from the depression triggered by the burst of the bubble economy. Most regional banks suffered from massive non-performing loans throughout the 1990s, peaking in March 2002. These non-performing loans could lead to these biased estimates. To address that possibility, we re-estimate our model by excluding the book values of non-performing loans from total loans. However, because the disclosure of non-performing loans has been required since FY 1998, thus the sample period is not consistent with the former analysis¹¹.

Table 3 presents new evidence for the period FY 1998-FY 2009. To account for the effect of each bank's financial health on loan demand, we add the non-performing loans ratio as a control variable, its parameter is indicated by β_2 . Consistent with results in Table 2, the estimate of ϵ is statistically significant with a positive sign; thus, the theoretically consistent loan demand function is obtained. Estimates of the parameter set θ are also generally statistically significant.

Figure 3 displays yearly fluctuations in the degree of managerial objectives. Compared to results in Figure 2, values of parameter μ change marginally. For instance, the value in FY 2000 changes from 0.0006 to 0.0009. Further, a downward trend still is evident: values of parameter μ fall from 0.0010 in FY 1998 to 0.0005 in FY 2009. These results strongly support the sales-maximization hypothesis for Japan's regional banks, even until recently. Also, these results are consistent with the findings by Uchida and Tsutsui (2005) that regional banks are less competitive than city banks in Japanese loan markets by investigating the first-order condition for profit-maximization. These results support Izawa and Tsutsui (1998), who found no evidence of profit-maximization or expense preference behaviors in Japanese banking.

5 Conclusions

Little recent academic literature has empirically examined the managerial objectives of firms, and its prevailing theoretical framework still considers maximizing profits as the firms' proper objective. However, pure profit-maximization seems to be a less obvious goal among modern corporations, where ownership is separated from control. We have analyzed the managerial behavior of Japan's regional banks by estimating a nested objective function consistent following Fershtman and Judd (1987). Using data from FY 1980 through FY 2009, we focused on oligopolistic behavior in Japan's domestic loan market and examined the intensity with which banks sought to maximize sales and profits.

We found empirically that sales-maximization explains the behavior of Japanese regional banks more adequately and appropriately than maximizing profits. Although we

¹¹Although regional banks had begun to disclosing loans to bankrupt borrowers since 1993, financial regulators strengthened disclosure standards for non-performing loans in FY 1997.

compared results by bifurcating the sample into periods pre-and post full-scale liberalization of interest rates, sales-maximizing behavior appears to be even more intense in recent years post-liberalization. Moreover, robustness of results was obtained when book value of non-performing loans from total loans was excluded. Yearly fluctuations in the degree of managerial objectives suggest a stronger recent tendency for sales-maximization. Our results are consistent with previous studies that suggest lower competition among Japanese regional banks in domestic loan markets. Of course, the distinct environment of Japanese banking in recent years for example, severe entry barriers and extremely low interest rates likely influences these results. Our results do not necessarily reject the possibility of price competition in Japan's loan markets.

Therefore, we highlight the findings obtained from the nested objective function of sales- and profit-maximization. While earlier research generally took for granted that competitive firms act to maximize profits, our results suggest that strategic delegation may generate sales-maximizing behavior. Future researchers can use this to enhance the empirical work we have begun. In particular, future research needs to identify other industries with homogeneous products and, apply our analysis to learn further lessons and validate our methodology.

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Table 1: Descriptive statistics on variables used in the estimation

	Sample period			
	1980-1994		1995-2009	
	Mean	Std. Dev.	Mean	Std. Dev.
Total cost	64,781	64,162	34,223	27,415
Loans	914,094	996,894	1,560,013	1,347,209
Securities	244,089	268,005	506,933	493,580
Price of labor	6.3569	1.2884	8.0309	1.1081
Price of deposit	3.6986	0.8973	0.3773	0.3641
Price of capital	0.4494	0.1126	0.4377	0.2050
Price of loans	6.5362	1.1479	2.4249	0.3449
Loan market share	0.0083	0.0076	0.0088	0.0076
Number of sample	1979		1741	

1. Monetary variables are in millions of Yen.
2. Prices of deposit and loans are expressed in percentage.

Table 2: Estimation results

Parameter	Sample period					
	1980-1994			1995-2009		
	Estimate	Std. Err.		Estimate	Std. Err.	
α	9.5623	0.3391	***	11.3686	0.3127	***
ϵ	1.2384	0.1187	***	0.5272	0.0851	***
β_1	26.1181	3.4555	***	65.5677	2.7162	***
θ_0	150.4380	6.6494	***	833.3000	64.8453	***
θ_{y1981}	-6.3175	8.4824				
θ_{y1982}	65.0790	9.1547	***			
θ_{y1983}	72.4908	9.5221	***			
θ_{y1984}	33.8313	9.2413	***			
θ_{y1985}	22.5682	9.4276	**			
θ_{y1986}	33.4287	10.8407	***			
θ_{y1987}	58.3571	12.6632	***			
θ_{y1988}	57.7959	14.0094	***			
θ_{y1989}	-15.0774	12.8137				
θ_{y1990}	-72.6368	11.8734	***			
θ_{y1991}	-26.9081	13.6328	**			
θ_{y1992}	52.7080	17.5392	***			
θ_{y1993}	156.7510	24.1361	***			
θ_{y1994}	191.3850	26.4302	***			
θ_{y1996}				92.8155	90.5117	
θ_{y1997}				173.5410	93.3668	*
θ_{y1998}				154.6110	93.1118	*
θ_{y1999}				221.4120	95.4846	**
θ_{y2000}				261.3600	96.6345	***
θ_{y2001}				416.1210	102.0140	***
θ_{y2002}				406.7000	103.5400	***
θ_{y2003}				444.8290	107.4130	***
θ_{y2004}				594.5170	115.6300	***
θ_{y2005}				785.7420	127.9520	***
θ_{y2006}				786.1460	128.5690	***
θ_{y2007}				717.7650	130.2190	***
θ_{y2008}				1039.6300	152.8230	***
θ_{y2009}				1101.8500	158.8590	***
Observations	1979			1741		
<i>R</i> -squared						
Eq.(2)	0.0024			0.0022		
Eq.(3)	0.4650			0.7649		

1.***, ** and * stand for significance at the 1%, 5% and 10% levels.

2. White's heteroskedasticity consistent covariance estimates are used.

Figure.1 Yearly fluctuation in the managerial objective from FY 1980 to FY 1994

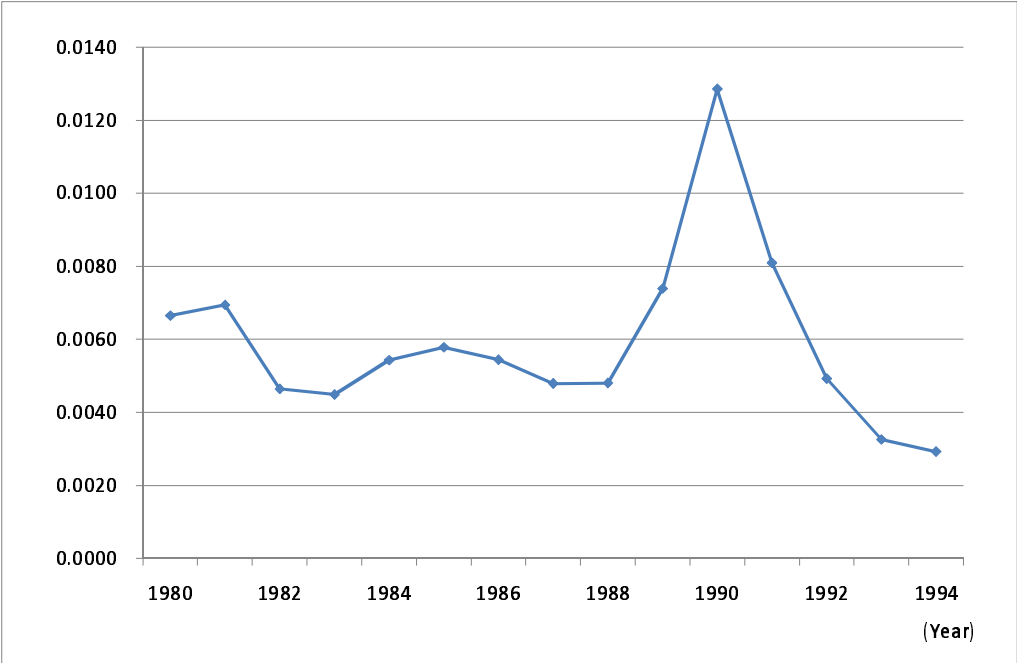


Figure.2 Yearly fluctuation in the managerial objective from FY 1995 to FY 2009

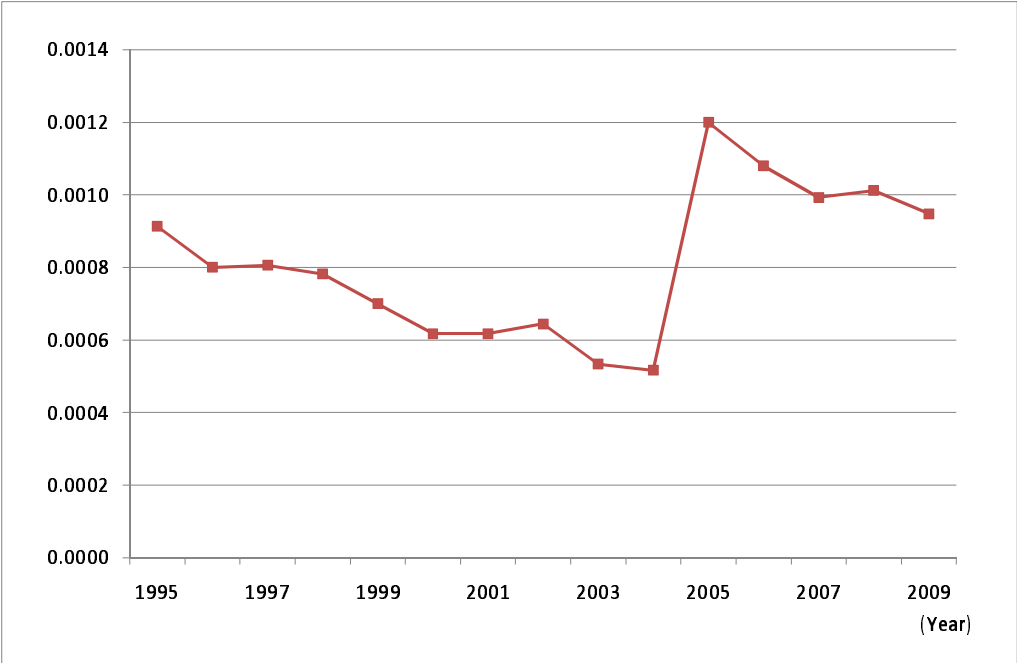


Table 3: Estimation results

Parameter	(Excluding non-performing loans)		
	Sample period		
	1998-2009		
	Estimate	Std. Err.	
α	11.0588	0.4935	***
ϵ	0.6426	0.1296	***
β_1	60.5303	3.0051	***
β_2	-2.3366	0.3263	***
θ_0	968.7520	74.2714	***
θ_{y1999}	77.3415	97.5645	***
θ_{y2000}	98.7338	98.8833	
θ_{y2001}	231.6720	106.4500	**
θ_{y2002}	258.2250	107.8360	**
θ_{y2003}	334.3550	111.8940	***
θ_{y2004}	499.4450	119.4280	***
θ_{y2005}	684.7360	132.1580	***
θ_{y2006}	630.0690	130.1530	***
θ_{y2007}	564.5090	130.8290	***
θ_{y2008}	844.3880	153.3090	***
θ_{y2009}	992.3160	162.6730	***
Observations	1358		
R -squared			
Eq.(2)	0.0010		
Eq.(3)	0.7702		

1. *** and ** stand for significance at the 1% and 5% levels.
2. White's heteroskedasticity consistent covariance estimates are used.

Figure.3 Yearly fluctuation in the managerial objective from FY 1998 to FY 2009

