NAVAL POSTGRADUATE SCHOOL
Monterey, California

AD-A205 693

DTIC
SELECTED
MAR 2 9 1989
S D
D

THESIS

First-term Retention of Enlisted Selected
Marine Corps (SMCR) Reservists

by

Daniel J. O'Donohue

December 1988

Thesis Advisor	George W. Thomas
Co-Advisor	Kathyrn M. Kocher

Approved for public release: distribution is unlimited.

89 3 28 032

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED		1b RESTRICTIVE MARKINGS			
2a SECURITY CLASSIFICATION AUTHORITY		3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited.			
2b DECLASSIFICATION/DOWNGRADING SCHEDULE					
4 PERFORMING ORGANIZATION REPORT NUMBER(S)		5 MONITORING ORGANIZATION REPORT NUMBER(S)			
6a NAME OF PERFORMING ORGANIZATION Naval Postgraduate School	6b OFFICE SYMBOL (If applicable) Code 54	7a NAME OF MONITORING ORGANIZATION Naval Postgraduate School			
6c ADDRESS (City, State and ZIP Code) Monterey, CA 93943-5000		7b ADDRESS (City, State, and ZIP Code) Monterey, CA 93943-5000			
8a NAME OF FUNDING/SPONSORING ORGANIZATION	8b OFFICE SYMBOL (If applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER			
8c ADDRESS (City, State, and ZIP Code)		10 SOURCE OF FUNDING NUMBERS			

		PROGRAM ELEMENT NO	PROJECT NO	TASK NO	WORK UNIT ACCESSION NO

11 TITLE (Include Security Classification)

FIRST-TERM RETENTION OF ENLISTED SELECTED MARINE CORPS (SMCR) RESERVISTS

12 PERSONAL AUTHOR(S)
O'Donohue, Daniel J.

13a TYPE OF REPORT Master's Thesis	13b TIME COVERED FROM_____ TO_____	14 DATE OF REPORT (Year, Month, Day) December 1988	15 PAGE COUNT 98

16 SUPPLEMENTARY NOTATION The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of

17	COSATI CODES		18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB GROUP	

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

This thesis examines factors that influence a male, first-term enlisted reservist's decision to remain in the Selected Marine Corps Reserve (SMCR). Specifically, the logistic regression model was used to determine the relative impact of biodemographic and both pecuniary and nonpecuniary job factors on retention. Models were developed for both nonprior (NPS) and prior active service (PS) reservists. The data base was a combination of the responses of participants in the 1986 Reserve Components Surveys and their personnel records from the Reserve Components Common Personnel Data System. The thesis concludes with reserve policy implications and recommendations for further research.

Important findings of this thesis were:

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS	21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL Dr. George W. Thomas	22b TELEPHONE (Include Area Code) (408) 646-2536	22c OFFICE SYMBOL Code 54TE

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete

SECURITY CLASSIFICATION OF THIS PAGE

★ U.S. Government Printing Office: 1986—606-24.

16. Continued:

Defense or the U.S. Government.

19. Continued:

1. Reserve income has a statistically significant and positive impact on SMCR retention. Civilian income was not found to be a factor.

2. Educational benefits, civilian job-related training, and retirement benefits were found to be significant factors in retaining prior service reservists.

First-term Retention of Enlisted Selected
Marine Corps (SMCR) Reservists

by

Daniel J. O'Donohue
First Lieutenant, United States Marine Corps
B.A., The College of William and Mary, 1981

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
December 1988
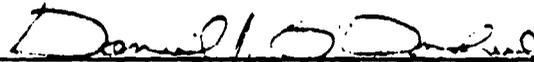
Author: _____
Daniel J. O'Donohue
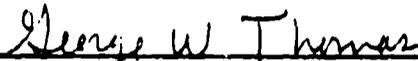
Approved By: _____
George W. Thomas, Thesis Advisor
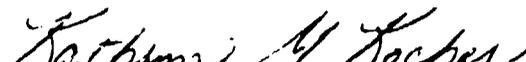
_____
Kathryn M. Kocher, Co-Advisor
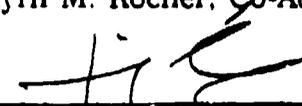
_____
David R. Whipple, Jr., Chairman,
Department of Administrative Sciences

_____
Kneale T. Marshall,
Dean of Information and Policy Sciences

iii

ABSTRACT

This thesis examines factors that influence a male, first-term enlisted reservist's decision to remain in the Selected Marine Corps Reserve (SMCR). Specifically, the logistic regression model was used to determine the relative impact of biodemographic and both pecuniary and nonpecuniary job factors on retention. Models were developed for both nonprior (NPS) and prior active service (PS) reservists. The data base was a combination of the responses of participants in the *1986 Reserve Component Surveys* and their personnel records from the Reserve Components Common Personnel Data System. The thesis concludes with reserve policy implications and recommendations for further research.

Important findings of this thesis were:

- Reserve income has a statistically significant and positive impact on SMCR retention. Civilian income was not found to be a factor.

- Educational benefits, civilian job-related training, and retirement benefits were found to be significant factors in retaining prior service reservists.

TABLE OF CONTENTS

I. INTRODUCTION

A. PURPOSE

This thesis seeks to identify the factors that influence a male, first-term enlisted reservist's decision to remain in the Selected Marine Corps Reserve (SMCR). Specifically, an explanatory model will be developed to determine the relative impact of both pecuniary and nonpecuniary factors on retention. In this study, retention is defined as an SMCR member's decision to reenlist/extend, rather than separate from the SMCR, at the end of his enlistment contract. Through the use of multivariate data analysis, this thesis will examine the relative importance of factors that influence this decision. The thesis concludes with policy implications drawn from this analysis.

B. BACKGROUND

Reserves in general, and reserve retention in particular, are currently of great interest to manpower policy makers and strategists. Reserves offer a potential solution to the problem of fulfilling undiminished mission and force requirements with an increasingly constrained manpower budget. The Marine Corps is presently streamlining its active force by transferring, to the reserves, units and missions most appropriate for high-intensity warfare. This move is part of a Department of Defense (DOD)-wide trend that has increased the number of drilling reservists by 300,000 in the last eight years [Ref. 1:p. 24].

The increasingly heavy reliance on reserves has profound implications for Marine manpower planners. Although the Selected Marine Corps Reserve (SMCR) has achieved its authorized manning levels in recent years, retention rates, and the compensation required to reach them, have emerged as two of the most pressing manpower issues. The focus of reserve manpower management has shifted from recruitment to retention of trained, experienced reservists for two reasons.

First, retention policies affect the SMCR's readiness. Retention of skilled reservists is increasingly important as the SMCR assumes more demanding missions, meets increasingly tight mobilization schedules, and is armed with more technologically complex weapons and equipment. Increased retention would also reduce the alarmingly high percentage of Marine reservists (23 percent) not fully trained for their job because of limited training time and skill-mismatches [Ref. 2;p. 10].

Second, retention policies affect the efficiency with which the Marines field the SMCR. Determining the least-cost compensation policy that ensures given retention rates is an important and unsettled issue. Other efficiency issues concerning retention are:

- The need for an improved first-termer/careerist mix. Many active duty studies have found that in the careerist versus first-termer trade-off, careerists are more cost-effective. The corresponding trade-off in the SMCR is even more heavily weighted in favor of "careerists" because of limited training opportunities.

- Increased retention would decrease the number of recruits required and training costs. Under the present retention rates, reserves account for 21 percent of all recruit training [Ref. 3: III-5]. The Marine Corps estimates for enlisted replacements in 1987 ran as high as $8,500 per person [Ref. 4;p. 46].

- As the reserves modernize with more technologically complex equipment, a greater investment is required in on-the-job training. Retention goals should rise to reflect this investment.

2

A consensus appears to be forming that reserve management in general is due for more intense scrutiny. Congressional hearings on the reserve budget for FY 1989 were marked by a reappraisal of the reserves' growth in the 1980s [Ref. 5:pp. 303-367]. Concerns about reserve readiness, rather than manning shortfalls, dominated the hearings. The DOD has echoed the same concerns about reserve readiness. The Assistant Secretary of Defense for Reserve Affairs has attributed many of the reserve problems to growth too rapid to be managed well. Concerns about reserve compensation resulted in President Reagan's tasking of the Sixth Quadrennial Review of Military Compensation to "undertake a comprehensive evaluation of the benefits and costs of all reserve component programs." [Ref. 6:p. 1]

In summary, reserve retention issues are currently relevant and the policy environment is conducive to change. Reserve management, which has traditionally lagged behind that of the active forces, is now a prominent issue. It is widely suspected that current reserve retention and associated compensation policies are not the most suitable for today's reserve.

C. FORCE STRUCTURE

Changes in force structure under the All Volunteer Force have made it difficult for retention and compensation policies to keep pace. In 1973, the Total Force Policy recognized that "reserve forces would take on an enhanced importance in an all-volunteer environment due to the smaller planned size of the active force and the diminished capability, without an operating draft, to rapidly expand the active forces during mobilization." [Ref. 7:p. 209]

Since 1973, and especially after 1980, the reserves dramatically increased their peacetime role under this policy. No longer do the citizen

3

soldiers of the reserve languish in a military backwater marked by poor training, obsolete equipment, dispirited units, and the improbable prospect of mobilization. In fact, Selected Reserve numbers are at an all time high while their active duty counterparts have declined by 24 percent from pre-Vietnam levels [Ref. 8:p. 303]. Reservists are also being provided with the latest equipment, sometimes before active duty units. Furthermore, reserves are now included as full partners in national defense as they take on more and more significant missions under the Total Force Policy.

Despite its role as a force in readiness, the Marine Corps has not escaped an increasing reliance on reserve forces. Currently, 33 percent of trained manpower and 25 percent of the force structure are reserve. The number of SMCR reservists has increased by almost 17 percent since FY 1981 [Ref. 1: p. 24]. SMCR reservists now number over 42,000. Ceilings on active duty end strengths have forced the Marine Corps to rely on the SMCR to round out the manning of 16 of the 24 infantry battalions [Ref. 9:p. 4]. The SMCR will also receive most of the missions unique to high-intensity warfare. Under this policy, three heavy artillery batteries are to be transferred to the SMCR in FY 1990.

The SMCR is the most important category of the Marine Corps Reserve. The Marine Corps Reserve is divided into three components: the Ready Reserve, the Standby Reserve, and the Retired Reserve. The SMCR, in turn, is one category of the Ready Reserve. It consists of those reserve units that train for the most short-fused and demanding of the reserve missions. SMCR members are subject to involuntary mobilizations for up to 90 days at the President's discretion. They are also expected to be able to deploy within 24 hours [Ref. 10:p. 3-1].

4

Of the different Marine reserve categories, the SMCR has received most of the increases in standards of readiness, appropriations, and demanding missions. The SMCR consists of trained units that drill one weekend a month and for two weeks, usually in the summer. SMCR reservists are paid volunteers, are subject to immediate mobilization, and are the heart of the Marine reserve. Currently, the SMCR's retention rate lags behind all but the Army Reserve (see Table 1).

Given the increasing reliance on the SMCR, the Marine Corps must retain trained reservists if it is to meet its role as a rapidly mobilized force in readiness. Desired retention rates, however, may be harder to achieve as SMCR reservists are called on to train harder and longer than ever before. Of particular concern is the increased strain on families and civilian employers. This thesis examines first-term, male enlisted reservists in the SMCR to identify the relative importance of both pecuniary and nonpecuniary factors on SMCR retention.

TABLE 1

FIRST-TERM ENLISTED RETENTION RATES
(In percentages)

Component	FY 85	FY 86	FY 87
Army National Guard	85	83	80
Army Reserve	50	66	65
Naval Reserve	89	89	82
Marine Corps Reserve	69	71	75
Air National Guard	91	90	82
Air Force Reserve	78	83	81
Coast Guard Reserve	80	74	78

Source: Reserve Component Programs for Fiscal Year 1987. Department of Defense, February 1988, p. 34.

D. METHODOLOGY

Reserve retention is modeled by determining the probability that a reservist will continue in the SMCR following the first reenlistment point, given his individual characteristics.   Because retention is based on the dichotomous choice between reenlisting/extending or separating, the non-linear logit regression model was used to analyze a data set that combined the responses of reservists on the DOD *1986 Reserve Components Survey: Selected Reserve Officer and Personnel* (1986 RC Member Survey) with their personnel records in the Reserve Components Common Personnel Data System (RCCPDS).

The 1986 RC Member Survey provided information about SMCR reservists such as their military background, individual and family characteristics, civilian work, family resources, and their attitudes regarding further service, military training, and benefits.   RCCPDS was used to supplement the survey data by providing such variables as Armed Forces Qualification Test (AFQT) scores, current pay grade, number of dependents, type of unit, and location.   More importantly, the RCCPDS recorded the actual reenlistment/extension actions of the 1986 RC Member Survey.   The RCCPDS was also used in the survey as a source document.   It was used to verify such self-reported variables as reserve income and rank.

The data base was limited only to respondents in the 1986 RC Member Survey who subsequently had an opportunity to leave the SMCR voluntarily. The data were further limited to males because of the small number of females in this set

6

E. ORGANIZATION OF THE STUDY

Chapter II develops the conceptual foundation for the thesis. Civilian turnover, secondary labor market, active duty retention, and reserve retention theory and research are examined. Candidate variables are derived from this literature review for inclusion in the reserve retention model.

Chapter III outlines the research objectives of the thesis, describes the data, and explains the methodology employed. Chapter IV describes the analysis of SMCR reenlistment. The results of bivariate, factor, and multivariate analysis are presented and discussed. Chapter V presents conclusions drawn from the model estimation and recommendations for future research.

II. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

A. INTRODUCTION

This chapter presents the theoretical foundation for the SMCR retention model described in Chapter IV. Candidate variables for the model are derived from a review of four areas of relevant research and theory: secondary labor market, civilian turnover, active duty retention, and reserve retention.

This thesis draws from such a large and diverse body of research for three reasons. First, there is relatively little research devoted specifically to reserve retention. Although in 1970 the Gates' Commission (The President's Commission on an All-Volunteer Force) "recognized from its first meeting the need for special attention to the problems of the reserve forces," the Commission suffered from a lack of relevant research [Ref. 11:p. 97]. Reserve retention research is growing but it still draws on a much greater body of civilian and active duty retention research.

Second, retention research in general is moving from the relatively straightforward study of pecuniary compensation to a multi-disciplinary study of a service member's satisfaction with many aspects of military life. The benefits, or utility, a service member receives in compensation for service include not only pay but also psychic and other nonmonetary rewards. Such factors as training environment, unit cohesion, and the service family's satisfaction with the military are important to retention. Retention modeling has therefore expanded from its traditionally economic basis to incorporate such disciplines as sociology and psychology [Ref. 12.p. 2]. Because pay is

much less important to reservists than for either civilian workers or active duty service members, reserve retention models particularly benefit from this expanded examination of a service member's "taste" for military service.

Third, reserve retention research draws on a wide body of literature because of the unique nature of reserve service. Reservists share certain characteristics with multiple job-holders, active duty personnel, civilians, and volunteer workers. Reservists are most often compared to multiple jobholders, or "moonlighters," because of the part-time nature of their job and the fact that 93 percent of reservists hold a second job [Ref 13;p. 4]. Reservists, however, are similar to active duty personnel in that they are subject to immediate mobilizations for national emergencies. Reservists, like the civilian work force, are subject to job changes, geographical moves, and other demands of their civilian primary job. Finally, reservists are also viewed as volunteers or members of an institution rather than merely occupational workers. Reservists often serve to fulfill a sense of duty or social needs rather than just for a paycheck. Reserve retention research must encompass this multi-faceted nature of reserve participation.

B. SECONDARY LABOR MARKET THEORY AND RESEARCH

Reservists may be considered multiple job-holders, or "moonlighters," because an overwhelming number of them hold a civilian, primary job. Labor market theory, and the moonlighting model in particular, are therefore the foundation for this research on reserve retention.

According to labor market theory, the SMCR competes in the labor market with other components of the services and civilian employers to attract and retain scarce skills. In order to man the SMCR in the numbers,

9

and with the quality, required to fulfill its mission, the SMCR must offer a competitive compensation package of pecuniary and nonpecuniary benefits. From the reservist's perspective, the decision to remain in the reserves is based on a comparison of the costs and benefits of reserve participation. The cost of reserve membership can be measured in terms of time, effort, skill, experience, and the opportunity cost of leisure time or working other jobs. The benefits can be measured by pecuniary compensation, fringe benefits, training, and such intangible rewards as status, camaraderie, and service to country. [Ref. 14:p. 233]

Because the hours a reservist can work are severely constrained (reservists average only four hours of work a week), reserve participation is more appealing to those looking for a second job. Within labor market theory, therefore, the moonlighting model is most appropriate. This model was developed by Rostker and Shishko in 1973 [Ref. 15].

According to Rostker and Shishko, moonlighters are workers who seek to adjust the amount of hours and work they receive. Because most jobs offer fixed hours of employment, moonlighting allows a worker to reach an optimum trade-off between leisure time and hours worked [Ref. 16:p. 169]. For instance, a worker constrained to a forty-hour work week at his primary job can moonlight to reach higher income goals. Moonlighting is therefore attractive to those with strong consumption demands or who derive psychic benefits from increased labor hours.

Rostker and Shishko felt the decision to moonlight is driven by whether an individual can work enough hours at his primary wage rate to satisfy his income goals. Rostker and Shishko identified four major factors in determining the number of secondary job hours, if any, an individual will

10

demand: primary job hours, primary job wage rate, secondary job wage rate, and nonlabor income. [Ref. 15:p. 299]

Rostker and Shishko tested this model on civilian data from the University of Michigan Income Dynamics Panel by using the Tobit regression technique. Using weekly hours on the second job, they found that the supply of moonlighting labor increases with the moonlighting wage and falls with primary job earnings. Their most significant finding was that the secondary job pay elasticity was .9. In other words, for every 10 percent increase in the secondary job wage rate, the probability of moonlighting will increase by 9 percent. As will be shown further in the literature review, this pay elasticity was roughly half what was predicted for reserves by the Gates Commission and by active duty studies. Rostker and Shishko's model also included age and family size as proxies for consumption demand. They found that increasing age lessened the moonlighting hours supplied, supporting their hypothesis that consumption needs are increasingly satisfied over a life cycle. Family size had a positive effect as expected because of the increased pressure for consumption.

This rudimentary moonlighting model, based on traditional economic variables, provides the framework for subsequent research in reserve participation. Although there is a debate as to how much the moonlighting model can explain reserve participation, most research builds on Rostker and Shishko's four key variables. The moonlighting model, however, only models the economic aspects of civilian moonlighting. More sophisticated models of reserve participation are required that recognize the difference between reservists and civilian moonlighters.

11

Differences between reservists and civilian moonlighters, as outlined by Grissmer and Kirby [Ref. 13:pp. 3-4], are:

- The hours worked are different. Reservists average four hours a week while the median for civilian moonlighters is 13 hours.

- Although reservists and moonlighters are paid about the same per hour, reservists receive much less income because of their limited work hours.

- Reservists legally commit themselves for up to six years of service during which they can be called to active service at any time.

- Reservists receive fringe benefits, such as retirement, not found in most moonlighting jobs.

- Reserve duty time and primary job time can directly conflict during annual two week active duty training and mobilization drills.

- Reserves receive such nonpecuniary rewards as training, camaraderie, and satisfaction from serving one's country.

Because of these differences, the moonlighting model was supplemented with models drawn from turnover and active duty research and theory.

C. TURNOVER THEORY AND RESEARCH

Civilian turnover theory and research seek to explain voluntary turnover by analyzing the behavioral process an _individual_ goes through before quitting. Researchers in this field have noted that economic variables alone cannot explain the turnover process. In fact, variables such as unemployment income that highly correlate with turnover at the national or regional level are poor correlates at the individual level [Ref. 14:p. 237 and Ref. 17:p. 495]. This is an example of Robinson's (1950) ecological fallacy which states that variables found correlated at one level of aggregation cannot be assumed to correlate at the individual level [Ref. 14:p. 495]. National, or even local, labor markets may be poorly related to the relevant or perceived labor market for an individual possessing a specific mix of skills

12

and experience. Turnover theory, therefore, tries to incorporate an individual's perception and evaluation of available alternatives. It does so by expanding on traditional economic models by including such variables as organizational commitment, job satisfaction, and behavioral intentions.

Turnover theory and research has built on over a 1000 papers and 70 years of study [Ref. 18:p. 263]. This section will, therefore, be highly selective in its review of a few representative studies and models. First, a summary of variables relevant to the turnover process will be presented. Second, three of the most frequently cited and empirically tested conceptual models will be discussed.

1. Turnover Variables

In general, there is widespread agreement on the variables related to turnover. There is, however, disagreement over the relative impact of the variables, especially when dealing with populations with different characteristics. Cotton and Tuttle (1986) statistically summarized over 120 sets of data from turnover research using meta-analysis [Ref. 19]. They divide turnover correlates into three categories: external, work-related, and personal. Examples of external correlates are employment perceptions and unemployment rate. Work-related correlates include pay, satisfaction with work, and performance. Age, tenure, gender, and number of dependents are examples of personal correlates. Table 2 presents all of Cotton and Tuttle's turnover correlates, their relationship to turnover, and the confidence level at which they were statistically significant.

At the individual level, economic and job satisfaction correlates with turnover are well established. Job satisfaction is in fact the most frequently studied correlate with turnover [Ref. 17:p. 497]. Although job satisfaction is

13

TABLE 2

CORRELATES OF TURNOVER

Turnover Correlate	Direction of Relationship	Confidence
External		
Employment perceptions	Positive	Strong
Unemployment rate	Negative	Moderate
Accession rate	Positive	Weak
Union presence	Negative	Strong
Work-Related		
Pay	Negative	Strong
Performance	Negative	Moderate
Role clarity	Negative	Moderate
Task repetitiveness	Positive	Weak
Overall satisfaction	Negative	Strong
Satisfaction with:		
Pay	Negative	Strong
Work itself	Negative	Strong
Supervision	Negative	Strong
Co-workers	Negative	Moderate
Promotion	Negative	Moderate
Organizational		
commitment	Negative	Strong
Personal		
Age	Negative	Strong
Tenure	Negative	Strong
Gender	Women Positive	Strong
Biographical data	Varies With Data	Strong
Education	Positive	Strong
Marital status	Married Negative	Weak to Moderate
Number of dependents	Negative	Strong
Attitude and ability		Weak to Moderate
Intelligence	Positive	No Confidence
Behavioral intentions	Positive	Strong
Met expectations	Negative	Strong

Strong Confidence: p <.0005	Weak Confidence: .01< p <.05
Moderate Confidence: .0005< p <.005	No Confidence: p >.05
Weak to Moderate Confidence: .005< p <.01	

Source: Extracted from Cotton and Tuttle. "Employee Turnover: A Meta-Analysis and Review with Implications for Research." Academy of Management Review. Vol. 11. No.1. 55-70. 1986.

consistently significant, its correlation with turnover is usually less than .40 [Ref. 20:p. 237]. When included in multivariate models, job satisfaction explains even less of the variance in turnover (approximately 16 percent) [Ref. 21:p. 246]. Because of this poor explanatory power, turnover researchers have looked to other affective and cognitive variables such as job motivation, organizational commitment, and behavioral intentions. These variables are more difficult to measure, less extensively tested, and often more ambiguous.

2. Conceptual Models

Because a fairly clear set of turnover correlates has been established, recent research has focused on building conceptual models of the turnover process. This section will review a selection of the more firmly established models. These models do not follow a precise theory, but rather suggest linkages in the turnover process that, in some cases, have uncertain empirical support.

In fact, comprehensive turnover models have explained no more than 6 percent of the variance in employee turnover [Ref. 22:p. 738]. While still low, this figure is somewhat misleading because turnover research focuses on factors that do not have an obvious effect. Tenure, for example, is frequently omitted. Conceptual models are included here, however, because they identify and categorize variables that previous research has found important, they provide direction for future research, and they have been employed in several retention studies upon which this thesis will build.

March and Simon (1958) developed a pathbreaking participation-withdrawal decision model that greatly influenced subsequent research. According to this model, the decision to quit is based on perceptions of the desirability and ease of quitting. The desirability of quitting is negatively

15

related to an employee's satisfaction with the job and the perceived possibility of transfer within the organization. The ease of job withdrawal is positively related to the number of perceived alternative jobs outside the organization. When the perception of both the ease and desirability of movement are high, employees are more likely to quit. [Ref. 14:p. 234]

Mobley (1977) built on March and Simon's model of the turnover process by predicting intermediate linkages between job satisfaction and turnover. Mobley theorized that there were nine interacting factors that preceded the decision to quit or stay [Ref. 20:p. 238]:

- evaluation of existing job
- experience of job satisfaction/dissatisfaction
- thinking of quitting
- evaluation of expected utility of search and cost of quitting
- intention to search for alternatives
- search for alternatives
- evaluation of alternatives
- comparison of alternatives with present job
- intent to quit/stay
- the decision to quit/stay

The premise of Mobley's model is that a number of cognitive and behavioral factors occur between the emotional experience of job satisfaction/dissatisfaction and withdrawal behavior. Furthermore, Mobley hypothesized that the intention to quit is the immediate precursor of turnover. [Ref. 23:p. 408]

The first empirical test of Mobley's model by Mobley, Horner, and Hollingsworth (1978) resulted in its simplification. Mobley's original model lacked structure and was difficult to test empirically. The revised model outlined the following steps to turnover [Ref. 23:pp. 408-414]:

- job satisfaction
- individual characteristics
- the probability of finding alternative employment

16

- thinking of quitting
- intention to search
- turnover

Mobley, et al., found that the "single significant regression coefficient with turnover (among the variables studied) was intent to quit and that the effect of job dissatisfaction was on thinking of quitting and intentions rather than turnover itself" [Ref. 23:p. 413]. They further concluded that any study of the turnover process must consider cognitive and behavioral variables in addition to the affective experience of job satisfaction. [Ref. 23:pp. 413-414]

Steers and Mowday (1981) synthesized several models including Mobley's and March and Simon's. Their sequence of direct influences on turnover was [Ref. 22:pp. 721-743]:

- job expectations and values
- affective responses
- intent to leave
- turnover

Steers and Mowday centered their study on the affective responses to a job or organization. These responses included job satisfaction, job involvement, and organizational commitment. They determined that job expectations and values, organizational characteristics and experiences, and job performance directly influence affective responses. Job expectations and values are in turn influenced by individual characteristics, available information about the job and organization, and alternative job opportunities. Finally, perceived job opportunities are influenced by the labor market, economic conditions, and individual characteristics. Steers and Mowday thought that this turnover process could differ among individuals. For example, for one individual an intention to leave may lead immediately to quitting while for another it may lead first to a job search. [Ref. 22:p. 722]

17

In comparison to Mobley and Mobley, et al., Steers and Mowday present a less detailed linkage between attitude and behavior but more details on the antecedents of job satisfaction. In an analysis of Steer and Mowday's model, Lee and Mowday outlined how this model improved on previous ones [Ref. 22:p. 724]:

- They explicitly recognized the role of available information about a job and an organization.

- They introduced job performance as an influence on affective responses.

- They considered job alternatives other than satisfaction as antecedents to an employee leaving.

- They gave greater emphasis to nonwork influences that affect intent to leave.

- They recognized that disaffected employees may try to change a situation before leaving an organization.

There are several other conceptual models being tested, most notably Bluedorn (1982) and Arnold and Feldman (1982). These models are similar to those presented in that evaluations of an individual's present position that create dissatisfaction can lead to a search for another job. This dissatisfaction and job search result in intentions to quit. Intentions to quit will ultimately lead to a decision to quit for those individuals who also perceive a favorable labor market with alternative jobs providing more benefits than their current job. [Ref. 14:p. 235]

D. ACTIVE DUTY RETENTION

A review of active duty retention is included for several reasons. First, active, like reserve, service differs from civilian employment in that members are legally committed to a fixed term and cannot freely quit before that term requires. Although both active and reserve service members can achieve an

18

early quit through physical, disciplinary, and attitudinal problems (i.e., various types of attrition), this thesis will limit voluntary quits to those occurring at the end of a service contract. Therefore, unlike civilian employment in which quits can occur at any time, both active and reserve retention are marked by periodic reenlistment points. For instance, a reservist with no prior military experience normally serves for six years before reaching the first reenlistment point.

Second, active duty retention is relevant to the reserves because it has received the bulk of retention research. Although active and reserve service differ dramatically in several ways, many of the methodologies developed in active duty research are relevant to the reserves. Third, many of the reserve compensation and retention policies are patterned after the active force's. Finally, a comparison of the characteristics of civilian turnover, active duty retention, and reserve retention gives insight into the unique aspects of reserve service and retention.

This thesis will employ several analytic techniques used in active duty research. Among these are bivariate, factor, and multivariate analysis. The validity of using reenlistment/extension intentions to predict actual SMCR retention will also be tested. Orvis (1982) tested the use of enlistment intentions to predict eventual active duty enlistment [Ref. 24]. He concluded that intention measures are valid. Although intentions are strongest as predictors of enlistment 12 to 18 months following a survey point, Orvis determined that intentions continue to predict actual enlistments for at least three to four years. The following sections will highlight the most significant pecuniary, nonpecuniary, and demographic factors found in active duty research.

1. Pecuniary Factors

Active duty retention is distinguished by the fact that pay is the most important and consistent explanatory variable [Ref. 12:p. 2]. One example of the importance of pecuniary factors is the Annualized Cost of Leaving (ACOL) developed by Warner [Ref. 25:p. 86] and widely used by the military to predict active duty retention. This model is driven by the ratio of military to civilian compensation, both present and expected.

There are, however, many methodological difficulties in measuring pay or other pecuniary benefits [Ref. 12:p. 15]. These difficulties have resulted in a spread of reported first-term pay elasticities ranging from 1.5 to 4 with an average of 2 [Ref. 12:p. 15]. Among the difficulties in determining the relative impact of pecuniary benefits on retention are:

- The complexity of the military compensation system which includes many fringe benefits that are difficult to value.

- Even when detailed measures of real military compensation (RMC) are developed, a service member's perception of what that RMC is worth is often as important as the actual value. Chow and Polich [Ref. 26], for instance included a variable that incorporated these perceptions.

- Income differentials are often found to be insignificant because of the nonrandom nature of pay differences over time. Income differentials can often be accounted for by such variables as promotion, skill, or performance. [Ref. 12:p. 15]

- The impact of bonus payments is particularly hard to measure because of problems with simultaneous equation bias. This downward bias occurs because bonus levels are a function of retention and retention is a function of pay. In this case, it is difficult to distinguish the true impact of different bonus levels on retention rates. [Ref. 27:p. 16]

The major pecuniary factors are: base pay and allowances, bonuses, promotion opportunities, estimated civilian earnings, medical benefits, and retirement. Of these variables, however, retirement has little impact on first-

20

term retention. Retirement becomes increasingly important only after the seventh year of service [Ref. 28:p. 17].

2. Nonpecuniary Factors

Active duty research has focused on pecuniary factors because of their importance, the visibility of their costs, abundant data, and their flexibility as policy tools [Ref. 28:p. 20]. Nonpecuniary influences, however, are important to retention. In calculating the benefits of continued service, a service member includes such factors as constant relocations, family separations, and job security.

Warner and Goldberg (1984) used the annualized cost of leaving (ACOL) model to test the impact of U.S. Navy sea duty on reenlistments [Ref. 29]. Within this model, an individual evaluates the utility associated with staying or leaving based on two factors. First are the present values of the income streams achieved through reenlisting and leaving. The difference between these two streams is the "cost of leaving." Second are the present values of the nonpecuniary aspects of those choices. Warner and Goldberg termed these the "taste factors." An individual will reenlist only if the annual cost of leaving exceeds the net taste for civilian life.

In their empirical test of the model, Warner and Goldberg found that ACOL "explains much of the variation in the probability of reenlisting" [Ref. 29:p. 32]. They also found that increases in sea duty reduce the reenlistment rate associated with any given level of pay. Finally, they discovered that married individuals are more likely to reenlist than unmarried. They hypothesize that this is due to the greater value to married personnel of such nonpecuniary benefits as health care.

21

Fredland and Little (1983) found that job satisfaction is lower in the military than the civilian labor force [Ref. 30]. An individual is therefore more likely to have a greater taste for civilian than for military life. Fredland and Little determined that lower military job satisfaction was due to: an initial relocation from home, the danger involved, misinformation on the nature of the job and placement, a perception that military pay is low, long and irregular work hours with no overtime, isolated bases, frequent rotation, and the difficulty of quitting. For these reasons, an individual is more likely to have a higher taste for civilian life. Factors that do lead to military job satisfaction, however, included: job security, relatively stable promotions and pay, the fulfillment of a "calling" for military service, nonpecuniary benefits, and less racism. [Ref. 30]

In summary, nonpecuniary factors include: training opportunities, health care, job satisfaction, educational benefits, relocations, family separations, work schedules, and a host of other quality-of-life variables. Although pecuniary factors dominate the active duty reenlistment decision, Doering and Grissmer point out the importance of nonpecuniary factors in the following areas [Ref. 12:p. 15]:

- Determining the cost-effectiveness of additional pay in comparison to nonpecuniary benefits.

- Achieving the best mix of pecuniary and nonpecuniary benefits (e.g., increases in pay or educational benefits) that retains high-quality personnel.

- Preserving such characteristics as institutional loyalty and cohesion that are not based in pay increases.

3. Demographic Factors

Demographic factors are used to identify the reenlistment probabilities of different groups such as high school graduates or minorities.

22

Some of these variables serve as proxies for performance or ability to function in the military, others as proxies for attitudes toward, or taste for, military service.

Education levels and test scores serve as proxies for job performance. People with higher education and test scores are assumed to have more to offer an employer and therefore have better civilian employment opportunities. Chow and Polich's (1980) [Ref. 26] and Goldberg and Warner's (1982) [Ref.29] research support the expectation that higher education levels and Armed Forces Qualification Test (AFQT) scores lessen the probability of reenlistment.

Chow and Polich (1980) found that women are more likely to reenlist than men because there is less sex-based discrimination in the military than the private sector. Boesel and Johnson, however, feel that there is not enough research to conclude that women are definitely more likely to reenlist than men. [Ref. 29:p. 30]

Nonwhites are theorized to have higher retention rates than whites because there is less discrimination in the military. There is, however, some disagreement on this point in the literature. Chow and Polich (1980) found that nonwhites were more likely to reenlist than whites. Goldberg and Warner (1982), however, found that black sailors are less likely to reenlist [Ref 29:p. 30]. Fredland and Little (1983) also found no significant differences in job satisfaction between blacks and whites [Ref. 30:p. 280].

Marital status has proven to be one of the strongest biodemographic variables associated with retention. Married service members are theorized to seek more job stability because of their family responsibilities. Moreover, many of the military's nonpecuniary benefits such as health care and family

23

services are more highly valued by married service members. For these reasons it is hypothesized that being married increases the probability that a service member will remain in the military. A competing hypothesis, however, is that married individuals reenlist at lower rates because of the stress caused by constant moves, separations, and job hazards. In an empirical test, Warner and Goldberg (1984) found that married individuals had a greater probability of first-term reenlistment [Ref. 29:p. 30]. In a review of retention research, however, Boesel and Johnson (1984) found no such relationship [Ref. 28]. Because reserve families are subject to fewer of the stresses associated with active service, marital status is expected to be a positive variable in reserve retention models.

E. RESERVE RETENTION

Although reserve retention draws from active duty research, reserve service differs from active in many respects. Doering and Grissmer outlined the following differences [Ref. 12:p. 19]:

- Active duty service is full-time while reserve service is a part-time, second job.

- Except for initial and annual training, reservists are not forced to relocate as are active duty personnel.

- The responsibility the military assumes for a member's family differs between the active and reserve forces. While the reservist's family has traditionally been ignored, active duty families receive a wide range of benefits and support.

- While pecuniary compensation has the greatest impact on active duty retention, the two biggest reasons for reservists leaving at their first-term reenlistment point are conflicts with spouses or employers.

In summary, reserve participation requires substantially less commitment from the reservist. Doering and Grissmer observe that reserve retention is highly sensitive to factors outside the reserve job. Marriage, moves, and job

24

changes are all threats to continued reserve participation. Census data show that the typical reservist, who is 25 to 26 at the end of the first term, is particularly susceptible to these threats. For instance, 50 percent of the people between age 19 and 25 will marry. Approximately 40 percent of 23-year olds move annually. Full-time job turnover rates are 36.4 percent for 18 to 24-year olds. [Ref. 12;pp. 19-20]

One of the first empirical studies of reserve retention was the 1978 Selected Reserve Reenlistment Bonus Test and a follow-up study by Grissmer and Kirby (1985) [Ref. 13]. During this test, Army reservists and National Guard members were offered a bonus at the end of their first or second term. This bonus varied in size according to whether a reservist reenlisted for either three or six years. The effect of the bonus was to increase reserve pay by 30 to 40 percent. According to Rostker and Shishko's moonlighting theory, this increase in income should have increased reenlistments by almost the same 30 to 40 percent. In fact, there was only a 5 percent increase in reenlistments.

Survey data that were collected during the experiment showed reservists were also less influenced by civilian job wages and working hours than civilian moonlighters. Although the explanatory variables suggested by the moonlighting model (net reserve pay, net reserve hours, civilian wage rate, and civilian hours) were all statistically significant, their weakened impact clearly proved that reservists were motivated for different reasons than Rostker and Shishko's civilian moonlighters. Although predicted to have elasticities around 1, the moonlighting variables had elasticities of only .1 to .3. Doering and Grissmer (1985) concluded from these data that reservists were "less motivated by monetary concerns than the average moonlighter,

25

and seemed to have a strong taste for the reserve job itself" [Ref. 12:p. 23].
They further determined that reserve participation is largely based on leisure,
not monetary needs. Reserve reenlistments are therefore particularly subject
to conflicts with family or civilian work life. [Ref.10:p.22-23]

In a follow-up study of the bonus test, Grissmer and Kirby (1985)
recognized the fundamental differences between reserve and moonlighting
jobs [Ref. 13]. Although Grissmer and Kirby analyzed reserve retention
within the traditional moonlighting framework, they expanded the model to
include variables that described in more detail the reserve experience,
individual characteristics, the civilian work environment, and regional
characteristics. In short, Grissmer and Kirby built on Rostker and Shishko's
traditional moonlighting theory to construct a more sophisticated and
convincing model of reserve reenlistment behavior. Although many of their
variables were not significant, they pointed the w y for future research. For
instance, regional characteristics, spouse's annual earnings, and type of
employer were all found to be insignificant. These variables, however, were
refined in subsequent studies. Their most important finding, however, was
that "nonmonetary considerations may dominate the reenlistment decision."
[Ref. 13:p. 8] Table 3 summarizes their results.

Although Mehay (1988) examined reserve enlistment decisions, his
research is important for its test of both the moonlighting theory and the
impact of the local labor market [Ref. 31]. Mehay confirmed Grissmer and
Kirby's finding that nonpecuniary and indirect economic benefits are critical
to reserve participation. He also found traditional economic variables to be
weaker, though statistically significant. Mehay was similar to Grissmer and
Kirby in his prediction that reservists were sensitive to such local factors as

26

TABLE 3

SUMMARY OF GRISSMER AND KIRBY'S STUDY

Independent Variables	Sign	Significant (at 5% level)
Reserve Pay and Time		
Annual net drill and camp pay	Positive	No
Net reserve time	Negative	Yes
Reserve Experience		
E3 or below	Negative	Yes
E5	Positive	Yes
E6	Positive	Yes
E7 or above	Positive	Yes
Combat job	Negative	Yes
Years of service	Negative	Yes
Draft motivation	Negative	Yes
Prior enlistment	Positive	Yes
Civilian Work Environment		
Free time	Positive	Yes
Civilian hourly wage	Negative	Yes
Availability of paid overtime	Negative	Yes
Must use vacation to drill	Negative	No
Employer's attitude	Negative	Yes
Federal government employment	Negative	No
State/local government employment	Positive	No
Middle-sized firm employment	Positive	No
Small-firm employment	Positive	No
Self-employed	Negative	No
Spouse's annual earnings	Negative	No
Individual Characteristics		
Female	Positive	Yes
Black	Positive	Yes
Age	Positive	Yes
Married	Negative	No
Not high school graduate	Positive	No
College graduate	Negative	Yes
Regional characteristics		
Middle-sized urban area	Negative	No
Small urban area	Negative	No
Rural area	Negative	No
Suburban area	Positive	No
1978/1977 local inflation factor	Positive	No

Source: Grissmer and Kirby. Attrition and Retention in the Army Reserve and Army National Guard: An Empirical Analysis. Report No. R-7077. Rand Corporation. Santa Monica. California. 1985.

the second job market, fixed costs of working, and reserve demand. Unlike Grissmer and Kirby however, Mehay successfully modeled these local factors by using data on population density, rent, population change, and unemployment based on Standard Metropolitan Statistical Areas (SMSAs).

Mehay also included an estimated civilian second job wage that was absent in Grissmer and Kirby's model. Although this variable had a negative influence on reserve participation, it was not statistically significant. Mehay theorized that this was due to multicollinearity problems between the second job wage variable and such demographic variables as education and intelligence. These variables, in effect, are proxy measures of earnings potential. This finding suggests that Grissmer and Kirby's omission of a second job rate variable caused little bias in their model. Finally, Mehay found primary job employment at the federal, state, and local government level to be positive and significant due to work hours and employer attitudes conducive to reserve participation.

Fithian (1989) used the *1986 Reserve Components Surveys* and the logit estimation technique to examine the retention of Army Selected Reservists and National Guard members [Ref. 32]. Fithian's research is significant for several reasons. First, the *1986 Reserve Component Surveys* provided a wealth of information on a reservist's taste for many aspects of reserve participation. Fithian exploited this detail by using the factor analysis technique for variable reduction. Second, Fithian was therefore able to model many of the cognitive/perceptual variables missing from previous research. These variables included a reservist's perceptions of reserve quality of life, pay and benefits, opportunities for promotion, condition of equipment, a unit's resources, and such intrinsic values as patriotism and camaraderie.

Due to data limitations, however, Fithian was unable to include traditional economic variables such as civilian and reserve income. Fithian did employ a composite variable of a reservist's feelings towards pay and benefits. This variable was found to be insignificant, further confirming the importance of nonpecuniary factors in reserve retention. Additional findings of Fithian's study were:

- Marital status had a positive effect on the likelihood of reenlisting. No other biodemographic variable was found statistically significant.

- Fithian divided his data between nonprior service (NPS) ar 1 prior service (PS) reservists and noted distinct differences between the two populations.

- Spouse's and employer's attitude towards reserve participation were not statistically significant. Perhaps this finding was due to the data being reported by the reservist and not the spouse or employer.

F. CONCLUSIONS

Two general conclusions can be drawn from this literature review. First, although moonlighting, civilian turnover, active retention, and reserve retention research are related, reserve retention is distinguished by the importance of nonmonetary considerations. Conflicts with civilian jobs or families are a great threat to continued reserve participation. The impact of reserve pay is relatively insignificant as it makes up only 7 percent of total after-tax income for the typical reservist [Ref. 13:p. 22].

Second, developing a model that incorporates direct economic, indirect economic, and cognitive/perceptual influences on reserve retention is a difficult task. None of the research reviewed has provided a complete reserve retention model.

29

III. RESEARCH OBJECTIVES AND METHODOLOGY

A. RESEARCH OBJECTIVES

The overall objective of this thesis is to develop an explanatory model of the first-term retention of enlisted, male Selected Marine Corps reservists. Retention is defined as an SMCR member's decision to either reenlist or extend upon reaching his first reenlistment point. Losses before this reenlistment point (attrition) are not considered. Subsidiary objectives are to determine:

- the relative impact on retention of traditional economic variables such as those embodied in the moonlighting model;

- the relative impact on retention of a reservist's taste for national service, training, camaraderie, and other nonmonetary aspects of reserve service;

- the differences in the retention patterns between prior and nonprior service reservists and military occupational groups;

- the predictive validity of intentions to remain or separate from the SMCR.

B. DESCRIPTION OF DATA

The data set used in this thesis was built around the Department of Defense's *1986 Reserve Components Survey: Selected Reserve Officer and Enlisted Personnel* (1986 RC Member Survey). From this survey, the responses of enlisted SMCR members were extracted and matched with the following data:

- their most current personnel records from the Reserve Component Common Personnel Data System (RCCPDS) as of 30 June 1988,

- their records in the "New GI Bill (NGIB) Data Base" as of 30 June 1988,

30

- county-level unemployment data from the Bureau of Labor and Statistics.

This combined data base benefits from the currentness of the RCCPDS and the NGB and the depth and wide scope of the 1986 RC Member Survey. The data set was further refined by the following modifications.

First, the sample studied was narrowed to only those survey respondents who faced a reenlistment opportunity between June 1986, the survey's closing date, and June 1988, the date the RCCPDS files were matched to the survey responses. Survey respondents who separated before the end of their enlistment contract, and those whose contracts did not expire during this two-year period, were not included.

Second, the sample was further reduced by checking the data base against the June 1988 active duty and non-SMCR reserve rolls and eliminating those on active duty. There were no survey respondents who subsequently transferred to another reserve component.

Third, the sample only included those records that could be identified as voluntary losses, or presumed losses, by the RCCPDS Interservice Separation Code or Separation Program Designator. Excluded from the sample were separations in the following categories: retirement, death, medical discharge or retirement, misconduct, drugs, civil convictions, unsatisfactory performance, homosexuality, fraudulent entry, erroneous enlistment, entry-level performance, hardship, and pregnancy.

Fourth, the sample was further limited by considering only those reservists above the E-2 pay grade. Reservists unable to reach the E-3 pay grade by their first reenlistment point are only reenlisted as an exception. Because of this demand constraint, the behavior of reservists below the E-3

31

pay grade are not representative of the first-term population and therefore are excluded.

Fifth, there were not enough observations of female reservists in the sample data (they account for only 1 percent of the data) to make valid statistical inferences. They too were omitted from this study.

Sixth, no distinction was made between the decision to extend or reenlist because of the limited number of extenders in the data set. Finally, records with missing data important to this thesis were eliminated.

1. The 1986 RC Member Survey

The 1986 RC Member Survey is one of three surveys that make up the *1986 Reserve Component Surveys* and one of the many surveys sponsored by the Department of Defense (DOD) to gather information on the military life cycle.[1] This survey was the first comprehensive survey of the Selected Reserve Components and the first to target increasingly important family issues. The 1986 RC Member Survey was tasked by the Deputy Assistant Secretary of Defense for Guard/Reserve Manpower and Personnel to collect data on [Ref. 10:p. 2-3]:

- the response of military personnel to changes in military compensation and benefits;

- the factors affecting the retention of reserve personnel;

- the projected behavior of military personnel in response to possible changes in personnel management;

- the differences in intentions, attitudes, and experiences between members of different subgroups such as occupational specialties and minorities;

---

[1]Besides the 1986 RC Member Survey, the *1986 Reserve Component Surveys* include a survey of full-time support officer and personnel (1986 RC AGR Survey) and a survey of Selected Reserve spouses (1986 RC Spouse Survey).

- the demographic, household, familial and other characteristics of military personnel;

- the impact of military policies on military and family life.

In short, the 1986 RC Member Survey provides a wealth of data that include "social characteristics, descriptive, economic, demographic, behavioral information, tastes, preferences, experiences and projected behaviors." [Ref. 10:p. 2-3]

The 1986 RC Member Survey was conducted from February through June of 1986. It was administered by sending survey packets and instructions to the over 15,000 reserve units of the individuals selected in the survey sample. The survey sample was limited to officer and enlisted members of the Selected Reserve who were not in the training pipeline and who were present in the RCCPDS as of 30 October 1985. Of the 30,255 trained, male members of the enlisted SMCR at that time, 6,040 were randomly selected for the survey. Of those, 4,980 were still with the SMCR when the survey was actually administered. The response rate from this population was 62.9 percent (3,086 returned surveys). [Ref. 10:p. 2-17]

The survey contained 127 questions divided into seven sections: "Military Background," "Military Plans," "Military Training, Benefits and Programs," "Individual and Family Characteristics," "Civilian Work," "Family Resources," and "Military Life."

The Defense Manpower Data Center (DMDC), the technical monitor for the survey, edited the data for consistency, out-of-range values, and skip patterns. DMDC also validated the military and civilian income variables through checks with external sources such as the IRS W-2 Form and the RCCPDS. Variables were also appended that translated, or "cross walked,"

33

both civilian and military occupations into codes used by the U.S. Bureau of the Census. These variables linked military and civilian occupations and reduced thousands of occupations into manageable "job clusters." [Ref. 33:pp. E-2 - F-8]

2. The Reserve Component Common Personnel Data System

The RCCPDS is a computerized data base maintained by DMDC that contains monthly information on all categories of reservists from all the services. The RCCPDS includes two types of files: a master file and a transaction file. The master file is submitted monthly for all Selected, Standby, and Retired reservists. Its format is under revision, but it presently contains 95 data fields containing demographic, financial, unit, terms of contract, and other personnel-related data. The transaction file reports Selected Reserve gains, losses, and reenlistments/extensions. A current copy of the master file is also included in the transaction file. [Ref. 34:pp. 1-3]

It is important to note that the Marine Corps transfers reservists into a holding category prior to separation. During this interim, little information is retained on either the master or transaction file. To get the most complete and latest service information on a separated SMCR member, Marine personnel records must be used rather than the RCCPDS. A close approximation of this data can be obtained by using the last master file prior to a reservist's transfer to the holding category. This technique was used in this thesis.

The RCCPDS supplements the 1986 RC Member Survey by providing such variables as a respondent's Armed Forces Qualification Test (AFQT) scores, geographical location, years toward retirement, and unit. More importantly, the RCCPDS records the respondents' <u>actual</u>

34

reenlistment/retention or separation action rather than their intentions. The RCCPDS is also useful in verifying and updating the responses given in the survey. The dates of the RCCPDS files used are current as of June 1988 for those reservists who reenlisted/extended. For those who separated, the dates of the files range from June 1986 to June 1988 depending on when their first reenlistment point was reached.

3. The New GI Bill (NGIB) Data Base

The NGIB Data Base is maintained by DMDC and contains information derived from the RCCPDS, the Veteran's Administration (VA), and inputs unique to the NGIB. It includes records on all individuals who are or who have been on active or reserve duty during the period starting 1 July 1985. Of the 69 data fields in the NGIB, two are used in this thesis: eligibility status for the Selective Reserve Educational Assistance Program (SREAP) and SREAP benefits paid. The NGIB Data Base used in this study was Version 175 with an effective date of 30 September 1988. [Ref. 4:p. 24]

C. DATA LIMITATIONS

There are three major limitations to the data used in this thesis. First, except for the few variables that can be updated by the RCCPDS files, the survey data are not concurrent with the first reenlistment decision point. This lag can be as long as two years. This drawback limits the applicability of the survey data but does allow a test of Orvis's [Ref. 24] contention that intentions are a useful predictor of future behavior for up to four years. The only way to escape this limitation is to accept the expense of more surveys or to use the much less scientifically designed, controlled, and administered end-of-service exit surveys. [Ref. 12:p. 35]

35

A second limitation is the reliance on self-reported data. While considerable effort by DMDC went into checking survey responses for internal consistency and against outside sources, much of the data reflect a respondent's unvalidated perceptions. Although these perceptions provided valuable information, in some cases they weakened a variable's potential strength. The most important example of this was the reliance on a SMCR member's report of his wife's and employer's attitude toward various aspects of his participation in the SMCR. This thesis attempted to use the *1986 Reserve Components Survey of Selected Reserve Spouses* to get a stronger measure of a spouse's relevant opinions and attitudes. Due to the large number of nonrespondents, however, the survey was not appropriate for detailed analysis.

The third data limitation is sample size. Of the 3,086 male, enlisted survey respondents, only 1,421 had reached a reenlistment point by June 1988 and only 1,042 met the criteria for sample selection outlined in Section C of this chapter. Small sizes of subpopulations within this sample prevented the detailed examination of differences between MOSs, males and females, and the reenlistment and extension decisions. Future research will benefit from an enlarged sample as more SMCR members reach the first reenlistment point. There will be a trade-off, however, in the currentness and relevance of the 1986 survey data.

D. RETENTION MODEL SPECIFICATION

Retention depends on a reservist's binary choice between remaining in (reenlisting or extending) or separating from the SMCR. A model used to predict the probability that an individual will remain in the SMCR will

36

therefore have a dichotomous dependent variable. In this study, the dependent variable was coded 1 if a survey respondent reached his first reenlistment point by 30 June 1988 and was retained. If the respondent separated, the dependent variable was coded 0.

Of the 752 NPS reservists in the sample, 530 (70.5 percent) were coded as stayers and 222 (29.5 percent) were coded as leavers. Of the 294 PS reservists, 246 (83.7 percent) were coded as stayers and 48 (16.3 percent) were coded as leavers.

In a binary choice model, the logistic regression model is appropriate because it asymptotically approaches 0 and 1; the same range associated with the probabilities of an individual remaining in the SMCR. The logistic regression model is based on the cumulative logistic probability function. This function assumes a logistic distribution of tastes for SMCR participation in the research sample. This logistic distribution approximates the normal distribution and allows independent variables to vary in impact depending on the probability that a reservist will remain in the SMCR [Ref. 35:pp. 287-300]. The logistic regression model is specified as:

$$P \text{ (Retention)} = \frac{1}{1 + e^{-z}}$$

Where

P = the probability that an individual will remain in the SMCR
e = the base of the natural logarithm
Z = a linear combination of the parameters of the model to be estimated $(\beta_0, \beta_1, \ldots, \beta_k)$

The Logist Procedure, Statistical Analysis System's (SAS) version of the logistic regression model, was used in this thesis [Ref. 36].

E. SPECIFICATION OF VARIABLES

The candidate independent, or explanatory, variables were selected based on the literature review and within the constraints of the combined 1986 RC Member Survey and RCCPDS data set. Independent variables derived from the 127 survey questions and the 95 RCCPDS data fields were divided into six categories: demographic, income, reserve occupational, civilian occupational, regional, and perceptual variables.

1. Demographic Variables

Candidate demographic variables included: *Age, Family, Wife's Attitude, Race, Education, AFQT,* and *Military Experience in Childhood Family* (see Table 4).

Age is expected to have a positive effect on the likelihood of reenlisting. Turnover theory predicts that younger workers are more likely to change jobs for a variety of reasons. First, younger workers have less tenure on average so they have developed less firm specific human capital. They are therefore more willing to leave a job, and employers are more willing to let them go [Ref. 37:p. 5]. Second, according to job matching theory, younger workers will have had less time and skill in collecting information about reserve participation. They are therefore less likely to have made a good job match and are less likely to reenlist or extend [Ref. 37:p. 8]. Finally, younger workers are in a more turbulent period of their life. They are more likely to move or get married than older reservists. Geographical moves and marriage are thought to be among the greatest threats to reserve retention.

Age serves also as a proxy for pay grade, experience, and length of service. Each of these factors has a positive relationship with retention. For

38

the reasons mentioned above. *Age* is hypothesized to have a positive effect on the likelihood of retention.

TABLE 4

CANDIDATE DEMOGRAPHIC VARIABLES

Variable	Value Coding	Hypothesized Sign	Source
Age	Continuous	Positive	RCCPDS
Family	Continuous	Positive	RCCPDS
Wife's Attitude	Dummy Variables		Survey
	No Strong Feeling	Reference Group	
	Favorable	Positive	
	Unfavorable	Negative	
Race	0 = White	Reference Group	Survey
	1 = Nonwhite	Positive	
Education	Dummy Variables		RCCPDS
	High School Degree	Reference Group	
	College Degree	Negative	
	GED/Other	Negative	
	No degree	Negative	
AFQT	Dummy Variables		RCCPDS
	Category I	Reference Group	
	Category II	Negative	
	Category III	Negative	
	Category IV	Negative	
Military Experience in Childhood Family	0 = No	Reference Group	Survey
	1 = Yes	Positive	

Family is a continuous variable that measures the impact of having a spouse and dependents. Preliminary analysis showed multicollinearity problems when spouse and dependents were specified as separate variables. *Family*'s value increases with the total number of dependents and/or a spouse. For instance, an unmarried reservist was coded as 0 and a reservist with a wife or a dependent was coded as 1.

Family is expected to have a positive sign because of greater income needs and greater job and life style stability due to family responsibilities. A

related variable is *Wife's Attitude*. This variable is a reservist's opinion of his wife's attitude towards his reserve participation.

Race is hypothesized to have a positive relationship with retention for nonwhites. Unemployment rates for nonwhites are much higher than for whites. For instance, average unemployment was 5.3 percent for October 1988. The rate for whites was 4.6 percent, for Hispanics it was 7.7 percent, and for blacks it was 11 percent [Ref. 38:p. 14E]. Because unemployment statistics used in this thesis are not differentiated by race, the *Race* variable is expected to pick up this difference in civilian job opportunities.

Education differentiates between those with a high school degree, GED or other certificate, college degree, or no degree at all. Compared to high school graduates, those with a GED or no degree are expected to be retained at a lower rate. Their inability to graduate has been linked by many studies to poor job performance and low tenure. College graduates have greater potential civilian earnings and are therefore also expected to be retained at lower rates.

AFQT is a categorical variable divided into the five major categories of the Armed Forces Qualification Test. Categories of this intelligence and aptitude test range from Category I, very high trainability, to Category V, very low trainability. Presently, the SMCR does not enlist men with scores lower than Category III. Increased trainability is expected to be positively related to retention.

Military Experience in Childhood Family is expected to have a positive relationship with retention because such a reservist is more familiar with a military lifestyle.

40

2. Income Variables

Candidate income variables are *Reserve Income, Civilian Income, Debt, Commute Time, SREAP, Bonus Eligibility,* and *Years Toward Retirement* (see Table 5). *Reserve Income* is a reservist's total before-tax reserve income as verified by the RCCPDS and the IRS W-2 Form. *Civilian Income* includes wages, spouse's income, and investment income. *Debt* is included in this category because it indicates an increased demand for income. *Commute Time* is included because it represents both an opportunity and real cost of reserve participation which lessens net reserve income.

TABLE 5

CANDIDATE INCOME VARIABLES

Variable	Value Coding	Hypothesized Sign	Source
Reserve Income	Continuous	Positive	Survey
Civilian Income	Continuous	Negative	Survey
Debt	Continuous	Positive	Survey
Commute Time	Dummy Variables 0 - 39 minutes 40 - 59 minutes 0 - 2 hours Over 2 hours	 Reference Group Negative Negative Negative	Survey
SREAP	Dummy Variables Nonparticipant Participant	 Reference Group Positive	NGIB
Bonus Eligibility	0 = Ineligible 1 = Eligible	Reference Group Positive	Survey
Years Toward Retirement	Continuous	Positive	RCCPDS

SREAP identifies whether a reservist is eligible for, and/or a participant in SREAP. A reservist is eligible for SREAP if he:

- enlisted/reenlisted/extended for a total SMCR obligation of six years on or after 1 July 1985;

41

- possessed a high school diploma or GED prior to completion of Initial Active Duty for Training (IADT);

- had completed at least the first increment of IADT and had 180 days in the SMCR;

- did not possess a baccalaureate or equivalent degree;

- was not receiving VA educational benefits. [Ref. 4:p. 22]

Participation in SREAP is expected to lessen the probability of retention. Despite the fact that SREAP participants are not forced to leave the SMCR to receive their benefits, their increased earning potential and the exhaustion of their benefits by the first reenlistment point are threats to continued service.

Eligibility differentiates between those who considered themselves either eligible or ineligible for reenlistment bonuses. *Years Toward Retirement* represents the increased value of retirement benefits to a reservist as more years of service are accumulated.

3. Reserve Occupational Variables

Candidate reserve occupational variables include *Pay Grade, Occupation Group, Prior Active Service,* and *Current Bonus* (see Table 6). *Pay Grade* represents increased tenure and is expected to be positively related to retention. *Occupation Group* categorizes reserve MOSs into four groups: Combat Arms, Technical, Administrative, and Service. The Combat Arms category includes infantry, gun crew, and non-occupational MOSs. The Technical category contains electronic specialists, electrical/mechanical equipment repairmen, craftsmen, communications specialists, and intelligence specialists. The Administrative category includes administrative and functional support MOSs. The Service category contains service and supply handler MOSs.

42

TABLE 6

CANDIDATE RESERVE OCCUPATIONAL VARIABLES

Variable	Value Coding	Hypothesized Sign	Source
Pay Grade	Continuous	Positive	RCCPDS
Occupation Group	Dummy Variables		Survey
	Combat Arms	Reference Group	
	Technical	Negative	
	Administrative	Negative	
	Service	Negative	
Prior Active Service	0 = Nonprior Service (NPS)	Reference Group	Survey
	1 = Prior Service (PS)		
Current Bonus	0 = No Bonus in First Enlistment	Reference Group	Survey
	1 = Receiving Bonus in First Enlistment	Positive	

The *Prior Active Service* variable distinguishes between prior service (PS) and nonprior service (NPS) reservists. PS reservists are expected to be retained at higher rates because their original decision to enlist in the SMCR was based on prior knowledge of military life. *Current Bonus* identifies those reservists receiving a bonus during their first enlistment. Those who have received a bonus are expected to reenlist at a lower rate than those who have not. The reason for this is that their participation is theorized to be based more on pecuniary benefits than an innate satisfaction with reserve service.

4. Civilian Occupational Variables

Candidate civilian occupational variables are: *Level of Employment, Civilian Employer, Weekly Hours, Lost Overtime, Lost Vacation Time,* and *Supervisor's Attitude* (see Table 7).

Level of Employment is broken down into four categories: Full-time, Part-time, Unemployed, and in School. Reservists who are unemployed or in school are hypothesized to have a lower probability of retention because their

43

TABLE 7

CANDIDATE CIVILIAN OCCUPATIONAL VARIABLES

Variable	Value Coding	Hypothesized Sign	Source
Level of Employment	Dummy Variables		Survey
	Full-time	Reference Group	
	Part-time	None	
	Unemployed	Negative	
	In School	Negative	
Civilian Employer	0 = Private Firm	Reference Group	Survey
	1 = Government	Positive	
Weekly Hours	Dummy Variables		Survey
	36 to 42 Hours	Reference Group	
	Less Than 36 Hours	Positive	
	More Than 42 Hours	Negative	
Lost Overtime	0 = No	Reference Group	Survey
	1 = Yes	Negative	
Lost Vacation Time	0 = No	Reference Group	Survey
	1 = Yes	Negative	
Supervisor's Attitude	Dummy Variables		Survey
	Neutral/Satisfied	Reference Group	
	Dissatisfied	Negative	

status is relatively unstable. They are more likely to move or change their employment level. The *Civilian Employer* variable distinguishes between those employed by the government or the private sector. Previous studies have theorized that the government sector is more conducive to reserve participation than the private. *Weekly Hours* measures the hours a reservist spends on his primary job. As weekly hours increase there is less time available for leisure or reserve duty and a greater probability that a reservist will separate. *Lost Overtime* and *Lost Vacation Time* identify those reservists who are forced to forgo overtime and/or vacation time to participate in the SMCR. *Supervisor's Attitude* measures an employer's attitude toward an employee's participation in the SMCR as reported by the reservist.

44

5. Regional Variable

Unemployment Rate is the only candidate regional variable (see Table 8). Each reservist's home zip code, taken from the RCCPDS, was matched to county codes and associated Bureau of Labor and Statistics monthly unemployment rates. For survey respondents still in the SMCR, the lowest county unemployment rate faced for the period between June 1986 and June 1988 was used. For survey respondents who left the SMCR, a quarterly average for the period prior to their reenlistment point was used.

TABLE 8

CANDIDATE REGIONAL VARIABLE

Variable	Value Coding	Hypothesized Sign	Source
Unemployment Rate*	Continuous	Negative	Bureau of Labor and Statistics

*The quarterly average of county-level unemployment rates prior to the first reenlistment point.

---

6. Perceptual Variables

The 1986 RC Member Survey contains a host of potential cognitive, affective, and perceptual variables. Questions are asked about everything from how satisfied a reservist is with the morale in his unit to his opinion on the condition of his unit's weapons and equipment. A list of all these questions is presented in Table 19 in the Appendix. In Chapter IV, bivariate and factor analysis will be used to reduce this large pool of potential variables into a manageable and meaningful number of variables and factors. Potential factors are a reservist's feelings about: pecuniary benefits, the

45

retirement benefit, commitments required in terms of time and difficulty of training, and the quality of training and leadership.

IV. DATA ANALYSIS

This chapter develops and tests a model of SMCR retention. The chapter is divided into six main sections. The first two sections, *Sample Characteristics* and *Bivariate Analysis*, use descriptive statistics and bivariate analysis to describe the sample and test for subpopulation differences. Of particular interest are differences between prior and nonprior service reservists. Differences between reenlistment intentions and actual behavior are also examined. The third section, *Test of Intentions as Predictors of Retention*, uses bivariate analysis to test the validity of using intentions as measures of actual behavior. The fourth section, *Factor Analysis*, trims the large number of candidate variables presented in Chapter III. Bivariate and factor analysis are used to either eliminate redundant variables or create a common factor that represents a large number of interrelated questions. The final sections, *Final Model Specification and Reference Individual, Nonprior Service Retention Model*, and *Prior Service Retention Model*, present the SMCR retention models and their results.

A. SAMPLE CHARACTERISTICS

This section describes the nonprior service (NPS), prior service (PS), and total sample populations through frequency tables. The Chi-Square test of independence was used to test for statistically significant differences of categorical variables between NPS and PS reservists. The sample contained 752 NPS reservists (71.9 percent) and 294 PS reservists (28.1 percent) for a total sample size of 1046 SMCR reservists. Tables 9 and 10 present the

47

relative frequencies, percentages, and results of the Chi-Square tests for selected population characteristics. The rest of this section will discuss those differences and similarities between subpopulations of the sample.

TABLE 9

**DEMOGRAPHIC AND RETENTION STATUS CHARACTERISTICS
BY NONPRIOR AND PRIOR ACTIVE SERVICE RESERVISTS**

Characteristic	Nonprior Service (n = 752)	Prior Service (n = 294)
Age		
19-22*	26.6	2.4
23-26*	57.8	30.3
27 or older*	15.6	67.3
Married	30.3	54.4
Number of Dependents		
None*	74.9	44.2
One*	14.5	17.7
Two*	6.8	19.0
Three or more*	3.8	19.0
Race		
Black*	13.8	22.1
Hispanic	11.2	13.9
White*	72.3	61.2
Other	2.7	2.7
Education		
No Degree	16.8	16.7
High School Graduate	76.9	67.0
College*	6.3	16.3
Retention Status		
Stayers*	70.5	83.7
Leavers*	29.5	16.3

* Significant at the 1 percent level
** Significant at the 5 percent level
*** Significant at the 10 percent level

48

The sample's NPS and PS reservists differed significantly in terms of demographic and retention characteristics. In relation to the sample's PS reservists, NPS reservists were younger, more of them were single, they had fewer dependents, and a smaller percentage were black and a larger percentage white. Fewer NPS reservists had attended college than PS reservists. NPS and PS reservists also differed dramatically in terms of retention. In comparison to the 83.7 percent of the PS reservists who were retained, only 70.5 percent of the NPS reservists remained after their first reenlistment point.

NPS and PS reservists also differed in terms of occupational and income characteristics. Compared to the sample's PS reservists, NPS reservists are lower ranking, more often thought they were eligible for a reenlistment bonus, and less likely to have received a bonus during their current enlistment. More NPS reservists served in the Combat Arms and fewer in the Administrative and Non-occupational MOS categories. Fewer NPS than PS reservists worked full-time and more part-time. Finally, NPS and PS reservists differed in terms of income. Mean reserve income was $1,812 and $2,018 for NPS reservists and PS reservists, respectively. Mean civilian income was $19,499 for NPS and $27,404 for PS reservists. (Civilian income measures income from all sources including spouse's earnings, interest, and child support payments.)

The NPS and PS reservists populations were similar in the proportion of high school graduates, Technical and Service MOS categories, members not in the labor force, wife's dissatisfaction, and supervisor's dissatisfaction.

A surprising finding in these frequency tables was how few of either category judged their wife's attitude towards reserve participation to range

49

from slightly dissatisfied to very dissatisfied. Only 4.3 percent of the NPS and 2.7 percent of the PS reservists fell into this category.

TABLE 10

OCCUPATIONAL AND INCOME CHARACTERISTICS
FOR NONPRIOR AND PRIOR ACTIVE SERVICE RESERVISTS

Characteristic	Nonprior Service (n = 752)	Prior Service (n = 294)
Pay Grade		
E-3*	14.1	3.7
E-4*	42.9	12.9
E-5*	37.8	51.4
E-6*	5.2	32.0
*Eligible for Bonus***	23.8	17.7
*Received Bonus**	10.5	17.3
MOS Category		
Combat Arms*	33.8	23.8
Technical	32.6	29.9
Administrative***	6.9	10.5
Service	22.2	20.4
Non-Occupational	4.5	15.3
Labor Force Status		
Full-time***	78.4	83.3
Part-time**	14.8	9.9
Unemployed	3.1	1.7
Not in Labor Force	3.7	5.1
Supervisor Dissatisfied	13.0	14.3
Wife Dissatisfied	4.3	2.7

*   Significant at the 1 percent level
**   Significant at the 5 percent level
***   Significant at the 10 percent level

B. BIVARIATE ANALYSIS

Bivariate analysis was used to test for different retention patterns between NPS and PS reservists and to identify subpopulations within those

two categories. Overall, 70.5 percent of the NPS and 83.7 percent of the PS reservists were retained. Cross-tabulations were created showing retention rates for selected subpopulations such as high school graduates and the Combat Arms MOS category (see Tables 11 and 12). The Chi-Square test was used to determine the statistical significance of retention rates that differ by each independent variable.

Married NPS reservists, with a retention rate of .781, were more likely to stay in the reserves than single reservists. Black NPS reservists reenlisted at a higher rate (.779) and white at a lower (.686). Both NPS and PS high school graduates reenlisted at a lower rate (.684 and .812, respectively) than either nongraduates/certificate holders (.738 for NPS and .898 for PS) and those who had attended some college (.872 for NPS and .872 for PS). Pay grade had a much stronger effect in the NPS population than the PS. Retention increased with each increase in pay grade with a dramatic jump between the E-4 and E-5 pay grade (from .598 to .843). There was a much smaller spread between PS retention rates for different pay grades (rates only ranged from .79 for E-4s to .872 for E-6s). Furthermore, none of these PS retention rates were statistically significant at the 10 percent level.

Neither the NPS nor PS reservists who were eligible for a reenlistment bonus were retained at a statistically different rate (.732 for NPS, .769 for PS). This surprising finding is probably due to two factors. First, bonus eligibility was self-reported by the reservist. Second, the variable came from the 1986 RC Member Survey and may not reflect the bonus eligibility at the time of reenlistment.

Of the MOS categories, NPS reservists in the combat arms reenlisted at a lower rate (.661) and those in administrative MOSs at a higher rate (.807).

51

TABLE 11

CROSS-TABULATIONS OF RETENTION BY SELECTED
INDEPENDENT VARIABLES CONTROLLING FOR PRIOR SERVICE, PART I

Independent Variable	Nonprior Service (n = 752)	Prior Service (n = 294)
	Percent Stayers	*Percent Stayers*
Married	78.1*	84.4
Race		
Black	77.9***	87.7
Hispanic	75.0	80.5
White	68.6**	82.7
Other	65.0	87.5
Education		
No Degree	73.8	89.8
High School Degree	68.4**	81.2*
College	87.2*	87.5
Pay Grade		
E-3	59.4*	81.5
E-4	59.8*	79.0
E-5	84.3*	82.8
E-6	89.7*	87.2
Eligible for Bonus	73.2	76.9
Received Bonus	91.1*	84.3
MOS Category		
Combat Arms	66.1***	82.9
Technical	73.0	80.7
Administrative	80.7***	90.3
Service	68.3	83.3
Non-Occupational	79.4	86.7

* Significant at the 1 percent level
** Significant at the 5 percent level
*** Significant at the 10 percent level

The last statistically significant finding was that NPS reservists with part-time civilian jobs only reenlisted at a lower rate (.622) than those reservists working full-time jobs or not in the labor force (i.e., unemployed or student reservists).

Remarkable in this bivariate analysis is the relatively uniform retention rates across candidate independent variables. With the exception of high school graduates, none of the various PS subpopulations were retained at a rate that was statistically different from the PS population as a whole.

TABLE 13

**CROSS-TABULATIONS OF RETENTION BY SELECTED
INDEPENDENT VARIABLES CONTROLLING FOR PRIOR SERVICE, PART II**

Independent Variables	Nonprior Service (n = 752)	Prior Service (n = 294)
	Frequency	*Frequency*
Labor Force Status		
Full-time	71.5	83.7
Part-time	62.2**	75.9
Unemployment	73.9	100.0
Not in Labor Force	71.4	93.0
Supervisor Dissatisfied	64.3	85.7
Wife Dissatisfied	68.8	87.5

** Significant at the 5 percent level

C. TEST OF INTENTIONS AS PREDICTORS OF RETENTION

Bivariate analysis was used to test whether reenlistment intentions are valid predictors of actual reenlistment/extension behavior in this sample. For both the NPS and PS populations, cross-tabulations were created

between the likelihood of reenlistment or extension as reported on the 1986 RC Member Survey and observed behavior.

The survey question on the likelihood of reenlistment/extension was coded on a ten-point scale from no chance to certain. Reservists who considered their likelihood of reenlistment to be very probable, almost sure, or certain were coded as intending to reenlist/extend. Those responding with no chance, very slight possibility, or slight possibility of reenlistment or extension were coded as intending to leave. Reservists who responded in the five intermediate categories (ranging from some possibility to probable) were considered not to have made a reenlistment decision and were thus excluded from this test.

Using the Chi-Square test, predictions were found to be significantly different from actual NPS behavior at the 10 percent level of significance. Unlike the NPS population, intentions seem to be a valid predictor of reenlistment/extension behavior for PS reservists. Differences between intentions and actual actions were not significant at the 10 percent level of significance. Table 13 presents a two-way cross-tabulation between reenlistment intentions and observed behavior for the NPS and PS populations.

D. FACTOR ANALYSIS

1. Procedure

Factor analysis was used in this study to reduce the large number of survey questions (see Table 19 in the Appendix) dealing with a reservist's cognitive/perceptual reactions to various aspects of SMCR service. Using the principle components method, correlation coefficients for this set of variables

54

TABLE 13

CROSS-TABULATIONS OF RETENTION BY INTENTIONS

NPS RESERVISTS

Observed	Intended		
	Leavers	Stayers	Total
Leavers	76.0%	24.0%	150
Stayers	67.4%	32.6%	344
Total	346	148	494

Actual Percentage Staying: 69.6%
Percentage of Total Correctly Classified: 45.7%
Chi-Square Probability Value: .056

PS RESERVISTS

Observed	Intended		
	Leavers	Stayers	Total
Leavers	25.0%	75.0%	32
Stayers	15.4%	84.6%	169
Total	34	167	201

Actual Percentage Staying: 84%
Percentage of Total Correctly Classified: 75.1%
Chi-Square Probability Value: .183

are examined for underlying patterns of relationships. For instance, a reservist's satisfaction with promotion opportunities, as measured by two survey questions, and a third question concerning leadership opportunities may be closely related. These three survey questions can be reduced to one

factor or *component* that may be used as a source variable in the final SMCR retention model. [Ref. 39:p. 469]

Three approaches to factor analysis were attempted. First, all the survey questions dealing with cognitive/perceptual issues were separated into six categories. The categories consisted of questions concerning pecuniary benefits, intrinsic values, civilian education and training, military training, personnel, and time commitment to the reserves. From each of these categories, factors were extracted to be used as source variables in a logistic regression model. This approach was unsuccessful because too many factors (12) were required to capture a significant amount of the variation in the data, factor loadings were difficult to interpret, and factors drawn from each of these six categories suffered from severe multicollinearity.

The second approach attempted was that used by Fithian [Ref. 32] in a similar study. Ten factors were derived from four categories based on how cognitive/questions were asked in the 1986 RC Member Survey. Questions were grouped according to participation reasons, identification of unit training problems, satisfaction with aspects of unit drills, and affective aspects of reserve membership. Again there were a high number of factors, they were difficult to interpret, and multicollinearity was a problem.

The final approach was to take the 33 questions dealing with a reservist's satisfaction and create factors from within this single category. The principal components method of factor analysis and the varimax orthogonal rotation were used to derive eight factors. The varimax rotation maximized the variance of the squared loadings in each factor. The result was factors that were more distinctly associated with input variables and thus more easily interpretable. Factors were derived independently for both

56

the NPS and PS populations. The problem of deriving a few meaningful factors was not solved in this study, if in fact those types of factors existed in the data. The survey questions that loaded most heavily into each of the factors for both the PS and NPS populations can be found in Tables 20 and 21 in the Appendix.

2. NPS Factors

Eight factors were retained for use as source variables in the NPS retention model. Kaiser's measure of sampling adequacy was used to test whether the original 33 survey questions dealing with satisfaction were appropriate for factor analysis (these questions are marked with an asterisk in Table 19 in the Appendix). The overall score was .84. Samples with scores above .5 are suitable for factor analysis. The eight factors explained 63 percent of the variation in the original 33 questions for both populations.

Within the first factor, *Training*, three questions loaded heavily: satisfaction towards training during unit drills, supervision/direction during those drills, and morale of military personnel in unit. Questions concerning a reservist's satisfaction with educational opportunities, retirement benefits, and unit social activities loaded heavily into the second factor, *Extrinsic Values*. Of all the factors, this one was the most difficult to interpret. The third factor, *Income Demand*, represents the demand for pecuniary benefits. Questions relating to a reservist's participation because of his demand for extra money to use now, his need to pay for basic family expenses, and his need for savings loaded into this factor.

The fourth factor, *Taste for SMCR*, relates to a reservist's satisfaction with unique aspects of SMCR service. Questions concerning a reservist's satisfaction with the opportunity to use military equipment, the challenge of

57

military training, and travel/"get away" opportunities loaded into this factor. Questions concerning a reservist's evaluation of the mechanical condition and up-to-dateness of weapons and equipment used during training loaded predominately into the fifth factor, *Weapons and Equipment*.

Within the sixth factor, *Commissary/PX*, questions concerning a reservist's satisfaction with the commissary and PX benefits loaded heavily. Questions concerning satisfaction with promotion and leadership opportunities loaded heavily into the seventh factor, *Future Benefits*. Finally, within the eighth factor, *Civilian Education/Training*, questions that loaded heavily were those measuring the degree a reservist chose to participate in the reserves on the basis of using educational benefits and getting civilian job-related training.

3. PS Factors

Eight factors were also retained in the PS sample. These factors accounted for 57 percent of the total variation in the original 33 questions. The overall Kaiser measure of sampling adequacy was .69. Many of the PS factors were similar in composition to those derived from the NPS population. These factors did vary, however, in the weight with which factors loaded, the order in which they loaded, and the amount of relative variation they represented.

Within the first factor, *Training*, questions that loaded heavily were those concerning a reservist's satisfaction with unit morale, supervision/direction during unit drills, and training received during unit drills. The second factor, *Income Demand*, represented survey questions on the reasons for a reservist's participation based on desire for extra money now, need money for basic family expenses, and saving income for the

58

future. Questions concerning the condition of a unit's weapons and equipment loaded into the third factor, *Weapons and Equipment.* The fourth factor, *Promotion,* represented questions concerning a reservist's satisfaction with promotion and leadership opportunities in a unit.

The fifth factor, *Retirement,* represented a reservist's satisfaction with retirement benefits. The sixth factor, *Future Benefits,* represented questions on how much retirement benefits contributed to a reservist's participation in the SMCR. The seventh factor, *Taste for SMCR,* loaded with questions concerning a reservist's participation based on serving the country and the challenge of military training. Finally, questions concerning a reservist's participation based on using educational benefits and obtaining civilian job skills loaded heavily into the eighth factor, *Civilian Education/Training.*

E. FINAL MODEL SPECIFICATION AND REFERENCE INDIVIDUAL

1. Model Specification

Twenty-one independent variables were selected for inclusion in both the NPS and PS retention models. Because of the PS sample size of 294 observations, 21 variables may be more than the data can support even though eight of the variables are orthogonal. Future work should reduce the number of variables. Although the NPS sample was much larger (752 observations), the models for both populations were kept as similar as possible for comparison. Table 14 presents these variables.

Candidate independent variables were eliminated by the following criteria. First, variables with excessive missing values were omitted. *AFQT* and *Unemployment Rates* fell into this category. Approximately 40 percent of the AFQT scores were missing. County-level unemployment rates could not

59

be used because 38 percent of both the home and unit zips given in the RCCPDS did not match existing zip codes. Not enough reservists in the sample had participated in *SREAP* for that variable to be included.

Second, candidate independent variables were eliminated if frequency tables indicated a variable had limited dispersion. This was the case for *Wife's Attitude*. A reservist's self-report of his wife's attitude towards his reserve participation showed little variance within the population.

Third, candidate independent variables were eliminated on the basis of poor performance in preliminary retention models if they lacked strong theoretical justification, or if the validity of the measure was suspect. Variables that fell into this category were: *Military Experience in Childhood Family, Debt, Commute Time. Bonus Eligibility, Occupation Groups. Civilian Employer, Supervisor's Attitude, Weekly Hours, Lost Overtime,* and *Lost Vacation Time.*

Finally, candidate independent variables were omitted if they displayed severe multicollinearity (i.e., caused a sign change among correlated variables in preliminary regression models). *Years Toward Retirement* was highly correlated with *Age* and *Pay Grade* and therefore dropped from the model. For the same reason, the *Race* and *Pay Grade* variables were collapsed into broad categories. Table 24 in the Appendix presents correlation tables of all variables included in the NPS and PS models that were correlated above the .25 level.

2. Reference Individual

A reference individual was created based on the frequency distribution of NPS and PS population characteristics. By changing one characteristic of the reference individual at a time, while holding all other

60

TABLE 14

INDEPENDENT VARIABLES

Variable	NPS Model Coding	PS Model Coding
Age	Continuous	Same
Family	Continuous	Same
Race	White = 0; else = 1 Nonwhite = 1; else = 0	Same Same
Education	No Degree/GED = 1; else = 0 College	Same Same
Reserve Income	Continuous	Same
Civilian Income	Continuous	Same
Pay Grade	E-3 = 1; else = 0 E-5 and above = 1; else = 0	E-5 = 1; else = 0 E-6 = 1; else = 0
Received Bonus	Received Bonus = 1; else = 0	Same
Labor Force Status	Part-time = 1; else = 0 Not in Labor Force = 1; else = 0	Same

Factors

(All factors are continuous)

Factor 1	Training	Training
Factor 2	Income Demand	Income Demand
Factor 3	Weapons and Equipment	Weapons and Equipment
Factor 4	Taste for SMCR	Taste for SMCR
Factor 5	Commissary/PX	Retirement
Factor 6	Future Benefits	Future Benefits
Factor 7	Extrinsic Values	Promotion
Factor 8	Civilian Education/Training	Civilian Education/Training

variables constant, the relative impact of changes in that characteristic on retention can be measured. This reference individual therefore allows the comparison between subpopulations within the data. For instance, retention behavior of reservists without a degree and those with high school degrees, holding all other variables constant, can be distinguished. The reference individual for the NPS sample was a reservist who:

- was white
- was single
- had no dependents
- was a high school graduate
- was an E-4
- did not receive a bonus in his first enlistment
- worked full-time

The reference individual for the PS population differed only in that the reference pay grade included both E-3 and E-4s.

F. NONPRIOR SERVICE RETENTION MODEL

Table 15 presents the retention probabilities for the NPS sample. A full description of the model is included in Table 23 in the Appendix. Probability changes were measured by increasing a variable while holding all other variables constant. Specifically, the retention probabilities were calculated in the following way:

- the base probability for *Age* was calculated at the mean and increased by one year to get the probability change.

- the probability change presented for *Family*, a continuous variable, measured the difference between a single reservist and one with either a wife or dependent.

- dummy variables, all with a reference individual or base case value of 0, were increased by 1 to measure probability changes among subpopulations.

- *Reserve Income* and *Civilian Income* were calculated at the mean for a base probability. These income variables were then increased by 5, 10, and 20 percent to measure the impact of the change on probability.

- the base probability for factor variables was calculated at the mean. Factor variables were then increased by 1 standard deviation to measure the resulting probability change.

1. Demographic Variables

With the exception of *Age*, none of the demographic variables were significant. *Age* was significant at the 1 percent level. An increase of one year in the mean age of the NPS population would increase the probability of retention by 4 percent. *Family* was hypothesized to have a positive sign because of an increased demand for income and the greater job and life-style stability a married or dependent-supporting reservist may have. *Family*, however, was negative. There are two possible reasons for this unexpected sign. First, the negative sign may indicate competing demands on leisure time and the limited impact of income demands in reserve participation. Multicollinearity, however, may be causing the unexpected sign. *Family* has a correlation of .4 with *Age* and a correlation of .29 with *Reserve Income*. *Nonwhite* had a positive sign as was theorized, but was insignificant. As expected, non-high school graduates and certificate holders were retained at a lower rate than high school graduates. Those who had attended some college, however, were retained at an ever higher rate.

2. Income Variables

Reserve Income was significant at the 1 percent level. A 5 percent increase in mean reserve income ($90) resulted in almost a 2 percent

TABLE 15

NONPRIOR SERVICE
RETENTION PROBABILITIES

Reference Individual Probability of Retention = .663
(Base Probability)

Independent Variable	Change from Base Probability		
Age*	.040		
Family	-.016		
Race			
Nonwhite	.070		
Education			
No High School Degree	-.010		
College	.083		
	5% Change	**10% Change**	**20% Change**
Reserve Income*	.018	.035	.067
Civilian Income	.001	.002	.003
Paygrade			
E-3	.033		
E-5 and above*	.140		
Received Bonus***	.152		
Labor Force Status			
Part-time	-.021		
Not in Labor Force	.080		
Factors			
Training	-.031		
Extrinsic Values	.004		
Income Demand	.007		
Taste for SMCR	-.004		
Weapons and Equipment	-.001		
Commissary/PX	-.018		
Future Benefits	-.002		
Civilian Education/Training	.0:7		

* Significant at the 1 percent level   *** Significant at the 10 percent level

64

increase in the probability of retention. Ten and 20 percent increases ($181 and $362) resulted in increasing retention probabilities of 3.5 and 6.7. Increases in *Civilian Income* did not have the expected negative relationship with retention. This variable was not significant, however, and its impact on the probability of retention was negligible.

3. Reserve Occupational Variables

E-5 and Above and *Received Bonus* were significant at the 1 and 5 percent levels of significance, respectively. An E-5, or above, had a 14 percent greater probability of being retained than an E-4. A reservist who had received a bonus in his current enlistment was found to have a 15.2 percent greater likelihood of reenlisting than those who did not.

4. Civilian Occupational Variables

None of these variables were significant at the 10 percent level. Part-time workers were retained at lower rates than full-time workers and those with supervisors who were not dissatisfied. *Not in the Labor Force* has a positive sign, but was not significant. This variable includes both students and the unemployed. It is suspected that the positive sign is due to a predominance of students in the sample.

5. Perceptual Variables

None of the factors representing perceptual variables was significant at the 10 percent level. *Extrinsic Values, Income Demand,* and *Civilian Education/Training* all had the expected positive sign. As satisfaction with these aspects of reserve life increased, so did retention. *Training, Taste for SMCR, Weapons and Equipment, Commissary/PX,* and *Future Benefits* all had negative signs. This unexpected relation·hip with the dependent variable might be due to changes in levels of satisfaction in the interim between the

survey and reenlistment points or factors that poorly represent variables important for retention.

6. Model Validity

To test the validity of the NPS retention model, the model was used to predict reenlistment/extension behavior of the study's sample. Table 16 presents the results of this test in the form of contingency tables. The model categorized 76.2 percent of the PS sample correctly as either stayers or leavers. This is an improvement on the 70.5 percent who would be correctly categorized if no model was used.

<table>
<tr><td colspan="4" align="center">TABLE 16
NPS RETENTION MODEL VALIDATION</td></tr>
<tr><td>Observed</td><td colspan="3" align="center">Predicted</td></tr>
<tr><td></td><td>Leavers</td><td>Stayers</td><td>Total</td></tr>
<tr><td>Leavers</td><td>33.8%</td><td>66.2%</td><td>222</td></tr>
<tr><td>Stayers</td><td>6.0%</td><td>94.0%</td><td>530</td></tr>
<tr><td>Total</td><td>107</td><td>645</td><td>752</td></tr>
<tr><td colspan="4" align="center">Actual Percentage Staying: 70.5%
Percentage of Total Correctly Classified: 76.2%</td></tr>
</table>

G. PRIOR SERVICE RETENTION MODEL

Table 17 presents the retention probabilities for the PS sample. Probability changes are calculated in the same way as in the NPS model.

66

TABLE 17

PRIOR SERVICE RETENTION PROBABILITIES

Reference Individual's Probability of Retention = .839

Independent Variable	Change from Base Probability		
Age	-.001		
Family	-.001		
Race			
Nonwhite	.031		
Education			
No High School Degree	.078		
College	.067		
	5% Change	**10% Change**	**20% Change**
Reserve Income*	.001	.018	.034
Civilian Income	-.001	-.001	-.002
Paygrade			
E-5	-.017		
E-6	-.004		
Received Bonus	-.010		
Labor Force Status			
Part-time	-.041		
Not in the Labor Force	.124		
Factors			
Training	.000		
Income Demand	.003		
Weapons and Equipment	-.011		
Promotion	-.018		
Retirement***	.030		
Future Benefits	.020		
Taste for SMCR	.015		
Civilian Education/Training**	.047		

* Significant at the 1 percent level   ** Significant at the 5 percent level

*** Significant at the 10 percent level

67

1. Demographic Variables

None of the demographic variables was significant at the 10 percent level. *Age* and *Family* had a negative relationship with retention. The negative sign for *Age* is most likely due to multicollinearity. *Age* is significantly correlated with *College*, *Family*, *Reserve Income*, and the pay grade *E-6*. *Nonwhite* has the expected positive sign. *No Degree* and *College* both had an unexpected positive sign. Again, multicollinearity problems are suspected (see Table 24 in the Appendix for the table of highly-correlated variables).

2. Income Variables

As was the case with the NPS model, *Reserve Income* was significant (at the 1 percent level). A 5 percent increase in reserve income ($100) resulted in a 1 percent increase in the likelihood of retention, everything else held constant. Income increases of 10 and 20 percent ($202 and $403) resulted in increased probabilities of retention of 1.8 and 3.4 percent. *Civilian Income* was not significant and had the expected negative sign.

3. Reserve Occupational Variables

Neither *E-5* nor *E-6* were significant and both had an unexpected negative sign. Again multicollinearity problems among tenure-related variables are suspected of producing this effect. The *Received Bonus* sign was negative as hypothesized, but insignificant.

4. Civilian Occupational Variables

None of the *Labor Force Status* variables was significant. *Part-time* was negative as theorized. *Not in the Labor Force* was hard to interpret because the category included both students and the unemployed.

5. Perceptual Variables

Two of the perceptual variables, *Retirement/Satisfaction* and *Civilian Education/Training*, were significant (at the 10 and 5 percent levels, respectively). A 1 standard deviation in satisfaction with retirement benefits resulted in a 3.0 percent increase in the probability of retention. Increasing satisfaction with educational benefits and civilian job-related training resulted in a 4.7 percent increase in the likelihood of retention. *Training, Income Demand, Future Benefits,* and *Taste for SMCR* were all positive as expected. *Weapons and Equipment* and *Promotion* had negative signs and either were not important to reserve retention, or were poorly constructed factors.

6. Model Validity

To test the validity of the PS retention model, the model was used to predict reenlistment/extension behavior of the study's sample. Table 18 presents the results of this test in the form of contingency tables. The model categorized 84.4 percent of the PS sample correctly as either stayers or leavers. This is a slight improvement on the 83.7 percent who would be correctly categorized if no model was used.

69

TABLE 16

P6 RETENTION MODEL VALIDATION

Observed	Predicted		
	Leavers	Stayers	Total
Leavers	12.5%	87.5%	46
Stayers	0.0%	99.6%	246
Total	7	287	294

Actual Percentage Staying: 83.7%
Percentage of Total Correctly Classified: 85.4%

70

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis sought to identify the factors that influenced a male, first-term enlisted reservist's decision to reenlist/extend in the Selected Marine Corps Reserve (SMCR). The nonprior service (NPS) and prior service (PS) retention models that were developed were partially successful in modeling the relative impact of pecuniary and nonpecuniary aspects of reserve retention. This section will review the strengths and weaknesses of this thesis in terms of the data, methodology, and the NPS and PS retention models. This section will end with a summary of the conclusions that can be drawn from this study.

1. Data

The data base constructed for this research was not as strong as it initially seemed. The combination of survey data from the *1986 Reserve Components Surveys*, personnel records from the RCCPDS, and the NGIB data base was flawed in several ways:

- The data from the 1986 RC Member Survey were not concurrent with the reenlistment points examined. There was a potential lag of up to two years between the survey's administration and a reservist's first reenlistment point. During this period, the perceptions recorded in the survey were subject to change.

- Variables such as wife's dissatisfaction, supervisor's dissatisfaction, and bonus eligibility were self-reported by the reservist and therefore suspect.

- This study attempted to use the *1986 Reserve Components Survey of Selected Reserve Spouses*, but it was found to be inappropriate for analysis because of a low response rate.

- The RCCPDS was ridden with missing values for such key variables as AFQT scores and accurate unit and home of record zip codes.

71

- This data could not capture the effects of the Selected Reserve Educational Program (SPEAP) because so few of the included reservists were participants.

Although the quality of reserve-related data has improved immensely in the last ten years, there is still room for improvement. The study's data base did, however, allow for good measures of reserve and civilian income, a reservist's actual intentions, bonus received, and perceptions about aspects of reserve life.

2. Methodology

Factor analysis, using the principal components method and a varimax orthogonal rotation, allowed the derivation of factors that reflected meaningful patterns in the data. That each of these factors was uncorrelated with the other by definition was useful in trying to disentangle the effects of various satisfaction variables on retention. A reservist's perceptions of training, supervision during drills, and promotion opportunities were highly correlated variables when examined separately. By using a factor loaded heavily with these variables in multivariate analysis, multicollinearity problems were avoided. On the other hand, a large number of factors (eight) had to be retained to capture a majority of the variation in the original data. Few of these factors proved to be statistically significant in logistic regression models of reserve reenlistments.

3. NPS Retention Model

Four variables were found to be statistically significant in explaining retention in this model: *Age* (at the 1 percent level), *Pay Grade* (at the 1 percent level), *Reserve Income* (at the 1 percent level), and *Received Bonus* (at the 5 percent level). *Age* and *Pay Grade* had a positive impact on retention. Increases in *Reserve Income* had a relatively large impact on retention. An

72

increase of 10 percent ($181) in the mean reserve income resulted in an increase of almost 4 percent in the probability of retention. All three of these variables (*Age, Pay Grade, and Reserve Income*) are proxies for length of service. Even though the NPS population had no one who had served over six years, the effect of tenure was significant. In this sample, reservists who received a bonus in their first enlistment were found to be more likely to reenlist.

The eight factors measuring various perceptions about reserve participation were consistently insignificant in the final, and all preliminary retention models. A possible reason for this is an NPS reservist's satisfaction is more readily changed in comparison to PS reservists because of his more limited experience with reserve life. At their first reserve reenlistment point, PS reservists have reached at least their second military reenlistment point. They are therefore a much more self-selected group than NPS reservists. Although NPS reservists have higher attrition rates, PS reservists appear much more uniform at the first reenlistment point. Bivariate analysis highlighted the almost indistinguishable rates at which different PS subpopulations were retained. Substantiating the hypothesis that NPS reservist's reenlistment behavior is much more unpredictable is the fact that an NPS reservist's reenlistment intentions were found to be statistically different from his actual behavior.

4. PS Retention Model

Three variables were found to be statistically significant in the PS retention model: *Reserve Income* (at the 1 percent level), satisfaction with *Retirement* (at the 10 percent level), and *Civilian Job-related Training and Educational Benefits* (at the 5 percent level). A 10 percent increase in reserve

73

income ($202) resulted in an increase in the likelihood of reenlistment/retention of almost 2 percent. Satisfaction with retirement benefits, educational benefits, and civilian job-related training all had a positive impact on PS retention.

5. Summary

The following conclusions were drawn based on the analysis in this thesis:

- Reserve research would benefit from an improvement in the quality of reserve data. If the SMCR is to continue to increase in importance, accurate record keeping should be targeted to assist in SMCR management.

- This thesis had limited success in deriving a small number of significant factors that reflected meaningful aspects of a reservist's satisfaction with reserve participation. Several factor analysis techniques were employed, but by no means were all options exhausted.

- Based on the results from this sample, reserve income has a statistically significant and positive impact on SMCR retention. While the impact of civilian income is negligible, the moonlighting model does have validity in explaining reserve retention.

- Educational benefits, civilian job-related training, and retirement benefits were also found to be relatively important in increasing the retention of first-term PS reservists.

B. POLICY IMPLICATIONS

The increasing reliance on the reserve forces since the inception of the Total Force Policy has extensive implications for reserve management. Trained reservists are now more valuable as the reserves are assigned more demanding missions. Presently, however, skill-mismatches and a lack of trained reservists are endemic to the Selected Reserves in all the services. Achieving higher retention rates is one way to husband the reserve's pool of trained reservists. Implications for retention policies derived from this thesis follow.

74

First, retention in the SMCR could be increased by relying more heavily on PS reservists. In this study, PS reservists were retained at a rate significantly higher than that for NPS reservists (.837 versus .705). PS reservists appeared to be more certain in both their career goals and degree of satisfaction with reserve service. Not only were their reenlistment/extension intentions valid predictors of their actual behavior, but two satisfaction variables (satisfaction with retirement benefits and satisfaction with the opportunities for education and civilian job-related training) were statistically significant in explaining retention.

NPS reservists, on the other hand, were retained at a lower rate and their reenlistment/extension intentions were significantly different from their observed behavior. Furthermore, it was a consistent finding in this study that satisfaction variables were statistically insignificant in the preliminary and final NPS retention model. This is not to say that satisfaction measures were not important, but that they were much more difficult to capture and possibly more fickle in the NPS model than the PS model.

The proper mix of NPS/PS reservists should be determined by more than just retention rates. Other important considerations are the SMCR's rank structure, required experience level, career progression, desired youth of the force, and payroll expense. In short, a thorough analysis must be made to determine the most effective mix of NPS and PS reservists that can be achieved at the least cost. Taking into account this qualification, increasing the NPS/PS mix in favor of PS reservists warrants more attention. PS reservists have greater experience levels and this study found them to have higher retention rates.

A second policy implication derived from this thesis concerns retirement. Reserve retirement has been attacked for being too lucrative. Few, if any, part-time jobs offer retirement benefits. The Sixth Quadrennial Review of Military Compensation is, in fact, examining reserve retirement as an area for reform. This thesis, however, has identified reserve retirement as a significant factor in the retention of PS reservists. PS reservists react more strongly to the pull of retirement benefits than NPS reservists. Holding all other factors constant, a reduction or elimination of reserve retirement benefits would reduce the PS retention rate more than that for NPS reservists.

Finally, reserve management would benefit from better quality data. More effective management and compensation policies could be designed based on accurate SMCR personnel records. There is also a need for survey data that are collected on a regular basis and thus allow changes in perceptions to be tracked. The *1986 Reserve Components Surveys* are a valuable source for this type of information but are limited to one collection point. These data seem to be especially perishable when dealing with NPS reservists.

A possible solution to this problem is a closer relationship with the Defense Manpower Data Center (DMDC) in the form of a research liaison. DMDC is the custodian for most of the relevant data and is staffed by experts in survey and data administration. A Marine liaison would provide relatively low-cost access to this talent and be a focal point for policy-related research conducted at Headquarters Marine Corps and the Naval Postgraduate School.

C. RECOMMENDATIONS FOR FURTHER STUDY

This thesis took an aggregate approach in studying SMCR reserve retention. The study focused on only two groups, NPS and PS reservists. SMCR management would benefit, however, from more detailed studies that focus on women, married reservists, reservists categorized by age, and full-time workers. Determining the relative impact of variables that affect retention in each of these populations would allow for more closely tailored force management.

SMCR research would also benefit from a distinction between the various choices a reservist has at his first reenlistment point. While this thesis modeled retention as choice between staying or leaving the reserves, a more accurate model would include a reservist's choice of reenlisting, extending, joining the active force, or leaving military service altogether.

A third possible area for study is an examination of differences in retention rates by military occupational categories (MOSs). This thesis attempted to investigate these differences by categorizing MOSs into five major categories (Combat Arms, Administrative, Support, Technical, and Non-Occupational). Due to data limitations, these categories were too broadly defined. There were also a large percentage of reservists who had to be classified in the grab-bag category of Non-Occupational MOSs. Non-Occupational MOSs represented reservists who had not yet received an MOS, or their MOS was missing in the data. For PS reservists, however, satisfaction with civilian job-related training and educational benefits were significant factors in retention. MOSs that permit civilian job-related training might be significant factors in retention.

77

As mentioned previously, a fourth possible area for further research is the determination of the most efficient and effective mix of NPS and PS reservists. A fifth area is retention by geographical region.

Finally, all of these recommendations for further research must be qualified by the need for better data. Perhaps the most immediate need for further research is an analysis of reserve data requirements that best meets the need for both personnel record keeping and poli_y-related research. Integrating periodic surveys with high-quality personnel records would be an invaluable resource in the management of the SMCR.

APPENDIX

TABLES

TABLE 19

CANDIDATE PERCEPTUAL VARIABLES

Survey Question	Scale
How much did the following factors contribute to your most recent decision to stay in the Reserve?	4 point: from major to no contribution

- Serving the country*
- Using educational benefits*
- Obtaining training in a skill that would help get a civilian job*
- Serving with the people in a unit*
- Getting credit toward Reserve retirement*
- Promotion opportunities*
- Opportunity to use military equipment*
- Challenge of military training*
- Needed the money for basic family expenses*
- Wanted extra money to use now*
- Saving income for the future*
- Travel/"get away" opportunities*
- Just enjoyed the Reserve*
- Pride in my accomplishments in the Reserve*

How much of a problem is each of the following for meeting your unit's training objectives?	7 point: from serious to no problem

- Out-of-date equipment/weapons
- Poor mechanical condition of equipment/weapons
- Being below strength in Grades E1 - E4
- Being below strength in Grades E5 - E9
- Not enough staff resources to plan effective training
- Low attendance of unit personnel at Unit Drills
- Low attendance of unit personnel at Annual Training/ACDUTRA
- Ineffective training during Annual Training/ACDUTRA
- Shortage of MOS-qualified people
- Low quality of personnel in low-grade unit drill positions
- Not enough drill time to practice skills
- Not enough time to plan training objectives and get all administrative paper work done
- Lack of access to good training facilities and grounds
- Lack of good instruction manuals and materials
- Lack of supplies, such as ammunition, gasoline, etc.

TABLE 19

(CONTINUED)

Survey Questions	Scale
How satisfied are you with:	7 point: from very satisfied to very dissatisfied

- The training received during your drills?*
- The opportunities you have to use your MOS skills during unit drills?*
- The opportunities you have for your promotion in your unit?*
- Your opportunities for leadership in your unit?*
- Your unit's activities at 1985 Annual Training/ ACDUTRA?*
- The supervision and direction you received during unit drills?*

In general, how would you describe:	7 point scales:

- The weapons or equipment your unit uses during your unit drills?* — from Out-of-date to Up-to-date;
- The mechanical condition of the weapons and equipment your unit uses during training?* — from poor to excellent;
- The morale of military personnel in your unit?* — from very low to very high

How much of a problem for your family are each of the following:	4 point scale: from no to serious problem

- Absence for weekend drills
- Absence for Annual Training/ACDUTRA
- Absence for extra time spent at Reserve

What is your spouse's overall attitude toward your participation in the Reserve?	5 point: from very favorable to very unfavorable

What is your immediate (main) civilian supervisor's overall attitude toward your participation in the Reserve?

How much of a problem for your main employer are each of the following:	6 point: from no to serious problem

- Absence for weekend drills
- Absence for Annual Training/ACDUTRA
- Absence for extra time spent at Reserve
- Time spent at work on Reserve business

All things considered, please indicate your level of satisfaction with each feature of the Reserve listed below:	5 point: from very satisfied to very dissatisfied

- Military pay and allowances*
- Commissary privileges*

TABLE 19

(CONTINUED)

Survey Question	Scale
All things considered, please indicate your level of satisfaction with each feature of the Reserve listed below:	5 point scale: from very satisfied to very dissatisfied

- Time required at Reserve activities*
- Military retirement benefits*
- Unit social activities*
- Opportunities for education/training*
- Opportunity to serve one's country*
- Acquaintances/friendships*

Overall, how satisfied are you with the pay and benefits you receive for the amount of time you spend on Reserve activities?	7 point: from very satisfied to very dissatisfied
Overall, how satisfied are you with your participation in the Reserve?	
How likely are you to reenlist or extend?	10 point: from no chance
Would you reenlist or extend if:	10 point: from no chance to certain

- drills were increased by an additional two four-hour drills per month?
- annual training were increased by an additional 5 days?

to certain

*Questions used in factor analysis.

TABLE 20

NONPRIOR SERVICE FACTOR LOADINGS

Factor	Survey Question
Training	How satisfied are you with training received during unit drills? How satisfied are you with opportunities to use MOS during drills? How satisfied are you with supervision/direction during drills? How would you describe the morale of personnel in your unit?
Extrinsic Values	How satisfied are you with opportunities for education/training? How satisfied are you with military retirement benefits? How satisfied are you with military pay and allowances? How satisfied are you with unit social activities?
Income Demand	Importance of wanting extra money to use now for reserve participation? Importance of needed money for basic family expenses for reserve participation?
Taste for SMCR	Importance of opportunities to use military equipment for reserve participation? Importance of challenge of military training for reserve participation? Importance of travel/"get away" opportunities for reserve participation?
Weapons and Equipment	How would you describe weapons/equipment used during unit drills? How would you describe mechanical condition of weapons/equipment used during training?
Commissary/PX	How satisfied are you with commissary privileges? How satisfied are you with other military privileges (e.g., exchange, space available travel)?
Future Benefits	Importance of getting credit for reserve retirement for reserve participation? Importance of promotion opportunities for reserve participation? Importance of serving with people in unit for reserve participation?
Civilian Education/Training	Importance of using educational benefits for reserve participation? Importance of obtaining training in a skill that would help get a civilian job?

TABLE 21

PRIOR SERVICE FACTOR LOADINGS

Factor	Survey Question
Training	How would you describe the morale of personnel in your unit? How satisfied are you with the supervision/direction during unit drills? How satisfied are you with the training received during unit drills?
Income Demand	How important is the need for extra money to use now for reserve participation? How important is the need for money to pay basic family expenses? How important is saving income for the future for reserve participation?
Weapons and Equipment	How would you describe the weapons/equipment used in unit drills? How would you describe the mechanical condition of weapons/equipment used during training?
Promotion	How satisfied are you with promotion opportunities in your unit? How satisfied are you with leadership opportunities in your unit? How satisfied are you with unit social activities?
Retirement	How satisfied are you with retirement benefits? How satisfied are you with social benefits? How satisfied are you with military pay and allowances?
Future Benefits	How important is getting credit toward reserve retirement for reserve participation? How important are promotion opportunities for reserve participation? How important are travel/"get away" opportunities for reserve participation?
Taste for SMCR	How important is serving the country for reserve participation? How important is the challenge of military training for reserve participation? How important is the opportunity to use military equipment for reserve participation?
Civilian Education/ Training	How important is using educational benefits for reserve participation? How important is obtaining training in a skill that would help get a civilian job?

TABLE 22

NPS MODEL DESCRIPTIVE STATISTICS

Variable	Beta Value	Mean	Chi-Square	P-Value
Intercept	-5.456	--	23.62	.000
Age	0.185	24.17	15.18	.000
Family	-0.070	1.73	0.65	.421
Race				
Nonwhite	0.334	--	2.29	.130
Education				
No Degree	-0.046	--	0.03	.852
College	0.402	--	0.70	.402
Reserve Income	0.001	1812.28	13.91	.000
Civilian Income	0.000	19499.40	0.59	.441
Pay Grade				
E-3	0.249	--	1.01	.314
E-5	0.730	--	11.21	.001
Received Bonus	0.811	--	3.59	.058
Labor Force Status				
Part-Time	-0.091	--	0.14	.710
Not in Labor Force	0.383	--	1.15	.284
Factors				
Training	-0.136	0.00	2.38	.123
Extrinsic Values	0.016	0.00	0.03	.855
Income Demand	0.030	0.00	0.12	.731
Taste for SMCR	-0.019	0.00	0.05	.832
Weapons and Equipment	-0.028	0.00	0.10	.747
Commissary/PX	-0.081	0.00	0.76	.385
Future Benefits	-0.009	0.00	0.01	.916
Civilian Education/ Training	0.079	0.00	0.81	.367

TABLE 23

P8 MODEL'S DESCRIPTIVE STATISTICS

Variable	Beta Values	Mean	Chi-Square	P-Value
Intercept	0.514	--	0.21	.645
Age	-0.005	31.02	0.01	.903
Family	-0.005	2.78	0.00	.967
Race				
Nonwhite	0.253	--	0.42	.516
Education				
No Degree	0.752	--	1.91	.167
College	0.613	--	1.11	.293
Reserve Income	0.001	2018.95	9.80	.002
Civilian Income	-0.000	27404.90	0.11	.741
Pay Grade				
E-5	-0.119	--	0.06	.811
E-6	-0.029	--	0.00	.964
Received Bonus	-0.074	--	0.02	.878
Labor Force Status				
Part-Time	-0.274	--	0.24	.624
Not in Labor Force	1.610	--	2.06	.151
Factors				
Training	0.001	0.00	0.00	.994
Income Demand	0.018	0.00	0.01	.917
Weapons and Equipment	-0.077	0.00	0.20	.653
Promotion	-0.132	0.00	0.55	.459
Retirement	0.241	0.00	2.78	.096
Future Benefits	0.159	0.00	0.96	.326
Taste for SMCR	0.114	0.00	0.54	.461
Civilian Education/ Training	0.402	0.00	5.03	.025

TABLE 24

CORRELATION TABLES OF DEPENDENT AND INDEPENDENT VARIABLES

NPS MODEL*

	Age	Reserve Income	Status	Civilian Income	Received Bonus
Age	1.00	.36	.26	.24	--
Reserve Income	.36	1.00	.27	--	.26
E-5 and above	.42	.42	.27	--	--
Retention Status	.26	.27	1.00	--	--
Family	.40	.29	--	--	--
Civilian Income	.24	--	--	--	--

PS MODEL*

	Age	Reserve Income	E-6	Family	College
Age	1.00	.35	.47	.55	.40
Reserve Income	.35	1.00	.28	.28	.35
E-6	.47	.28	1.00	.29	.24
Civilian Income	.50	--	.30	.44	.30
Commissary/PX	.25	--	--	--	--

* All variables with correlations over .25 were included in this table.

LIST OF REFERENCES

1. U.S. Department of Defense, *Reserve Componen: Programs for Fiscal Year 1988*, p. 24, Government Printing Office, Washington, D.C., 1988.

2. Burlage, J. and Maze R., "Concern Mounting on Reserves 'Mismatch'," *Navy Times*, v. 37, p. 10, 28 March 1988.

3. U.S. Department of Defense, *Military Manpower Training Report for FY 1988*, Office of the Assistant Secretary of Defense (Force Management and Personnel), February 1987.

4. Gumbel, John D., *An Evaluation of the Selected Reserve Educational Assistance Program (SREP) as it Relates to the Selected Marine Corps Reserve (SMCR)*, Master's Thesis, Naval Postgraduate School, Monterey, California, September 1987.

5. U.S. Congress, House, Committee on Appropriations, *Department of Defense Appropriations for 1989: Hearings Before the Subcommittee on the Department of Defense*, 100th Congress, 2nd Session, 14 April 1988.

6. Memorandum for the Honorable Casper Weinberger, The Secretary of Defense, Subject: The Sixth Quadrennial Review of Military Compensation (QRMC), The White House, Washington, D.C., 25 September 1986.

7. Brinkerhoff, J. R. and Grissmer, D.W., "The Reserve Forces in an All-Volunteer Environment," in *The All-Volunteer Force After a Decade*, eds. Bowman, W., Little, R., and Sicilia, G.T., pp. 206-229, Pergamon-Brassey, 1986.

8. Lacy, James L., *Naval Reserve Forces: The Historical Experience with Involuntary Recalls*, Center for Naval Analyses, Report No. CRM 86-76, Arlington, Virginia, April 1986.

9. Jones, Mel, "Marines Regrouping to do More with Less," *Navy Times*, v. 37, p. 10, 18 July 1988.

10. Defense Manpower Data Center, *Description of Officers and Enlisted Personnel in the U.S. Selected Reserve: 1986, a Report Based on the 1986 Reserve Component Surveys*, Defense Manpower Data Center, Arlington, Virginia, Undated.

11. *The Report of the President's Commission on an All-Volunteer Armed Force*, Government Printing Office, Washington, D.C., February 1970.

12. Doering, Z. D. and Grissiner D. W., *Active and Reserve Force Attrition and Retention: A Selected Review of Research and Methods*, The Rand Corporation, Report No. P-7007, Santa Monica, California, 1985.

13. Grissmer, D. W. and Kirby, S. N., *Attrition and Retention in the Army Reserve and Army National Guard*, The Rand Corporation, Report No. P-7077, Santa Monica, California, 1985.

14. Hulin, C. L., Roznowski, M. and Hachiya, D., "Alternative Opportunities and Withdrawal Decisions: Empirical and Theoretical Discrepancies and an Integration," *Psychological Bulletin*, v. 97, No. 2, pp. 233-250, 1985.

15. Rostker, B. and Shishko, R., "The Economics of Multiple Job Holding," *The American Economic Review*, v. 66, No. 3, pp. 298-308, June 1976.

16. Ehrenburg, R. G. and Smith, R. S., *Modern Labor Economics*, 3rd ed., Scott, Foresman and Company, 1988.

17. Mobley, W. H., Griffeth, R. W., Hand, H. H. and Meglino, B. M., "Review and Conceptual Analysis of the Employee Turnover Process," *Psychological Bulletin*, v. 86, no. 3, pp. 493-522, 1979.

18. Muchinsky, P. and Morrow, P., "A Multidisciplinary Model of Voluntary Employee Turnover," *Journal of Vocational Behavior*, v. 17, pp. 263-290, 1980.

19. Cotton, J. L. and Tuttle, J. M., "Employee Turnover: A Meta-Analysis and Review with Implications for Research," *Academy of Management Review*, v. 11, pp. 55-70, 1986.

20. Mobley, W. H., "Intermediate Linkages in the Relationship Between Job Satisfaction and Employee Turnover," *Journal of Applied Psychology*, v. 62, No. 2, pp. 237-240, 1977.

21. Dalessio, A., Silverman, W. H. and Schuck, J. R., "Paths to Turnover: A Re-analysis and Review of Existing Data on the Mobley, Horner, and Hollingsworth Turnover Model," *Human Relations*, v. 39, No. 3, pp. 245-263, 1986.

22. Lee, T. W. and Mowday, R. T., "Voluntarily Leaving an Organization: An Empirical Investigation of Steers and Mowday's Model of Turnover," *Academy of Management Journal*, v. 30, No. 4, pp. 721-743, 1987.

23. Mobley, W. H., Horner, S. O. and Hollingsworth, A. T., "An Evaluation of Precursors of Hospital Employee Turnover," *Journal of Applied Psychology*, v. 63, No. 4, pp. 408-414, 1978.

24. Orvis, Bruce R., *Forecasting Enlistment Actions From Intention Information: Validity and Improvement*, The Rand Corporation, Report No. N-1954-MRAL, Santa Monica, California, December 1982.

25. Quester, A. O. and Thomason, J. S., "Keeping the Force: Retaining Military Careerists," *Armed Forces and Society*, v. 11, No. 1, pp. 85-95, 1984.

26. Chow, W. and Polich, J., *Models of the First-Term Reenlistment Decision*, The Rand Corporation, Report No. R-2468-MRAL, Santa Monica, California, 1983.

27. Warner, J. T., *Issues in Navy Manpower Research and Policy: An Economist's Perspective*, Center for Naval Analyses, Professional Paper 322, Alexandria, Virginia, 1981.

28. Boesel, D. and Johnson, K., *Why Service Members Leave the Military: Review of the Literature and Analysis*, Defense Manpower Data Center, Personnel Survey Branch, Arlington, Virginia, April, 1984.

29. Warner, J. T. and Goldberg, M. S., "The Influence of Non-Pecuniary Factors on Labor Supply: The Case of Navy Enlisted Personnel," *Review of Economics and Statistics*, v. 66, pp. 26-34, 1984.

30. Fredland, J. E. and Little, R. D., "Job Satisfaction Determinants: Differences Between Servicemen and Civilians," *Journal of Political and Military Sociology*, v. 11, pp. 265-280, 1983.

31. Mehay, S., *Moonlighting and Reserve Participation: Are They the Same?*, Naval Postgraduate School, Monterey, California, February 1988.

32. Fithian, D., *An Analysis of Retention of First-Term Enlisted Personnel in the Selected Reserves*, Master's Thesis, Naval Postgraduate School, Monterey, California, June 1988.

33. Research Triangle Institute, *User's Manual and Codebook, 1986 Reserve Components Survey, Selected Reserve Officers and Enlisted Personnel*, Research Triangle Park, North Carolina, Undated.

34. Department of Defense Instruction 7730.54, "Reserve Components Common Personnel Data System (RCCPDS)," 7 May 1986.

35. Pindyck, R. and Rubinfeld, D., *Econometric Models and Economic Forecasts*, 2d ed., New York, McGraw-Hill Book Company, 1981.

36. SAS Institute Inc., *SUGI Supplemental Library User's Guide*, Version 5, pp. 181-202, 1986.

37. Buddin, R., "Analysis of Early Military Attrition Behavior," The Rand Corporation, Report No. R-3069-ML, Santa Monica, California, July 1984.

38. "5.3% Jobless Rate Raises Inflation Fears," *San Jose Mercury News*, p. 14 (E), 21 November 1988.

39. Nie, Norman H., et. al., *Statistical Package for the Social Sciences (SPSS)*, 2nd ed, McGraw-Hill Book Company, pp. 468-514, 1975.

INITIAL DISTRIBUTION LIST

1.	Defense Technical Information Center Cameron Station Alexandria, Virginia 22304-6145	2
2.	Library, Code 0142 Naval Postgraduate School Monterey, California 93943-5002	2
3.	Commandant of the Marine Corps Code TE 06 Headquarters, U.S. Marine Corps Washington, D.C. 20380-0001	1
4.	Professor George W. Thomas Code 54TE Naval Postgraduate School Monterey, California 93943-5000	1
5.	Kathyrn M. Kocher Code 54TE Naval Postgraduate School Monterey, California 93943-5000	1
6	Professor Stephen L. Mehay Code 54MP Naval Postgraduate School Monterey, California 93943-5000	1
7.	1stLt Daniel J. O'Donohue 6109 Fairfield Place Alexandria, Virginia 22310	1