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Air Force Pilot Retention:

An Economic Analysis

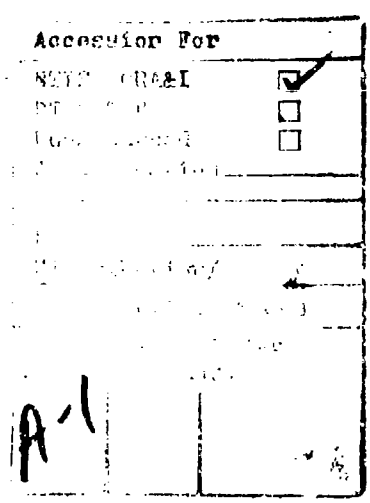
by Stephen P. Barrows, 2LT, USAF

1993

68 Pages

Master of Arts Degree in Economics

The Pennsylvania State University



Abstract

The Air Force has been concerned with increasing the retention rates of its pilots. Three primary economic issues are presented in this paper. First, the economic theory of general and specific training in human capital is discussed. Human capital theory suggests that the type of training pilots receive may impact retention rates. Air Force pilot training will be discussed in light of this theory.

The second issue presented is the theory of compensating wage differentials. It is demonstrated that the lifetime monetary compensation offered to pilots in the Air Force is significantly below that of pilots flying for a major airline. Monetary compensation, as well as non-wage amenities and job attributes, are discussed and compared in the two sectors.

The final subject discussed concerns the institutional issues which may impact pilot retention. It is suggested that the Air Force's institutional structure resembles that of an internal labor market. Internal labor market theory is discussed, as well as alternative institutional structures which might be used to increase pilot retention.

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The Graduate School

Department of Economics

Air Force Pilot Retention:

An Economic Analysis

A Master's Paper

in Economics

by

Stephen P. Barrows

Submitted in Partial Fulfillment

of the Requirements for the

Master of Arts Degree

DATE OF APPROVAL:	**APPROVAL BY:**
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TABLE OF CONTENTS

I. INTRODUCTION

For several decades, the Air Force has been concerned with the poor retention rates of its experienced pilots. While continual changes in force structure, defense spending, and the international security environment cause the Air Force to adjust the number of active pilots in its force, retention of experienced pilots is always a concern. Unfortunately for the Air Force, pilots frequently separate to fly in the civilian airline industry. By reducing pilot turnover, the Air Force would both improve its strength in the skies and realize a greater return on its investment in the training of its pilot force.

The Air Force receives considerable political pressure to retain an experienced pilot force. Indeed, Congress would like to see a higher return on its investment in the training of pilots for combat. As Air Force Lieutenant Colonel Edward Hoffman explains: "The huge costs of training a fully mission ready pilot are considerable, and an adequate pilot retention is necessary to provide continuity of operation, groom future operational leaders and accomplish the mission".[1] The political pressures alone surrounding pilot retention have resulted in numerous studies and proposed remedies for the problem.

Indeed, there are many forces influencing Air Force pilot retention. A Congressional Budget Office study explains:

> The willingness of pilots to remain in the military depends on many factors: military pay levels; pay available in the civilian sector; type of military aircraft flown; availability of pilot jobs in the

> commercial sector; the unemployment rate; and satisfaction with military pilot jobs, which might depend on considerations such as available flying time.[2]

Whatever the cause, the Air Force is always concerned with keeping its pilot retention rates high.

There are many economic issues involved in the discussion of pilot retention. In order to understand the problem, it is essential to address the economic theory concerning general and specific training in human capital. Further, it is necessary to look at the Air Force's employment structure itself. Of course, a discussion of pilot retention would not be complete without comparing and contrasting the wages and non-wage amenities offered by the Air Force to those offered by the civilian airline industry. All three of these topics are critical to an economic interpretation of Air Force pilot turnover.

In this paper I will begin with a discussion of the theory of general and specific training in human capital. Human capital theory suggests that the type of training received by trainees may impact retention rates. The next chapter will address this issue. Further, it will address the training pilots receive and the costs associated with this training. Specifically, this chapter will discuss the types of training pilots receive in terms of skill specificity and analyze pilot retention rates in light of the theory.

In Chapter 3, I will discuss the theory of compensating wage differentials and compare and contrast the Air Force and civilian compensation for pilots. Airline and Air Force wage

data demonstrate that civilian pilots typically have substantially higher lifetime earnings than Air Force pilots. Additionally, despite the generous non-wage amenities given to Air Force personnel, these do not seem to be enough to compensate for the disparity in wages.

In Chapter 4, I will discuss the employment structure used by the Air Force. Specifically, the theory of internal labor markets will be applied to the Air Force. Looking at the Air Force's institutional structure is helpful in understanding the retention issue. In many respects, the Air Force does not resemble the typical firm in traditional economic theory. ILM theory seems to closely describe the institutional structure used by the Air Force. Thus, the institutional structure used by the Air Force will be addressed as well.

Finally, I will summarize the economic issues addressed in the paper and explain why they should all be considered by the Air Force when it develops policies to increase pilot retention. The theory of human capital, compensation issues, and internal labor market theory are all helpful in understanding and interpreting the Air Force's pilot retention problem.

II. THE IMPORTANCE OF PILOT RETENTION: HUMAN CAPITAL EVIDENCE

Air Force pilots receive a substantial amount of training. All of this training is paid by the Air Force, regardless of the degree of specificity of the training. The type of training pilots receive, which varies among different aircraft, can impact their retention rates. This chapter will discuss the theory of general and specific training in human capital as it relates to Air Force pilot retention.

A. INVESTMENT IN HUMAN CAPITAL

The Air Force makes substantial investments in human capital. An Air Force pilot spends a considerable amount of time in training. Much of this training is on-the-job training in the form of combat simulations and exercises. The cost of investing in this human capital should be considered when studying the retention issue. Indeed, the theory of investment in human capital can give keen insight into understanding the retention data.

In his classic book Human Capital, Gary Becker outlines the theory behind the training of workers.[3] Becker distinguishes between general and specific training and clearly explains how the expected turnover of workers is affected by the type of training they receive.

Before discussing a firm's investment decision in human capital, it is necessary to explain the general theory behind a firm's demand for labor. Economic theory explains that a

rational, cost-minimizing firm will hire labor up to the point where the cost of employing another worker equals the revenue generated by that additional employee. In other words, firms hire labor up to the point where the marginal revenue product of labor equals its marginal wage cost.

Becker discusses how training affects the marginal productivity of workers and thus influences a firm's hiring decisions. He explains, "Most on-the-job training presumably increases the future marginal productivity of workers in the firm providing it; general training, however, also increases their marginal product in other firms as well".[4] In essence, general training is training which can be transferred to another firm. Indeed, as Becker states, "Completely general training increases the marginal productivity of trainees by exactly the same amount in the firms providing the training as in other firms".[5]

Becker explains that employees most likely bear the costs of general training.[6] The reasoning behind this is clear. First, because by definition the skills obtained from general training can be transferred completely to other firms, there is little incentive for a firm to pay for it. For example, if Firm A actually paid for general training, the trainee could threaten to leave and work for another firm unless he received a premium above his marginal product to continue working for Firm A. In other words, Firm A has no incentive to provide general training to a worker who would use such an investment to behave opportunistically. A firm would be unable to recoup

the investment it makes in the general training of a worker because the worker would either demand a premium to stay, or leave the firm altogether. Thus, as the training a worker receives becomes more general, the greater the share of the training cost that is borne by the trainee.

On the other hand, specific training is training that does not affect a trainee's productivity in other firms.[7] Because of this, specific training costs may be paid for by the firm.[8] Since workers cannot transfer skills which are specific to other firms, they would have little incentive to invest in the training themselves. Furthermore, because of this skill immobility, a firm recognizes that a trainee cannot use the specific training it receives to behave opportunistically. Since specific training is not transferrable, Becker explains that "no rational employee would pay for training that did not benefit him."[9] For these reasons, the more specific the training is, the greater the share of the cost is borne by the firm.

There are few examples of completely general or completely specific training. Indeed, virtually all training falls in a spectrum between the two extremes.[10] One example of specific training in the Air Force is the training received by a "boom operator" on a KC-135 air refueler. A boom operator is trained to lower the refueling line to refuel other aircraft in mid-air. Such training would have little use in the private sector. This is just one example of

training in the Air Force which leans toward the specific end of the spectrum.

The Air Force provides considerable amounts of general training as well. For example, the leadership skills taught to all officers would be useful in virtually any private sector job. Furthermore, the college education received by Air Force Academy cadets is very general in nature. Thus, like most civilian workers, Air Force officers and airmen receive training that covers the entire spectrum of training specificity.

The tendency of trainees to leave a firm is clearly related to the degree of specificity in the training they have received. As Becker explains:

> Employees with specific training have less incentive to quit, and firms have less incentive to fire them, than employees with no training or general training, which implies that quit and layoff rates are inversely related to the amount of specific training.[11]

As will be seen, this relationship is apparent in the retention rates of pilots in different aircraft.

Firms, of course, are hurt by turnover. High rates of turnover can be very costly to any firm. Becker explains that "a firm is hurt by the departure of a trained employee because an equally profitable new employee could not be obtained".[12] One method by which a firm attempts to reduce turnover is by developing an internal labor market. This will be discussed further in Chapter 4. A firm could also establish an explicit contract with a worker, which would essentially convert general training into specific training, since a worker could

not leave the firm without being penalized.[13] Essentially, active duty service commitments used by the military accomplish this.

Becker elaborates on training in light of the military. According to Becker, those persons who have received training for skills useful in the civilian sector tend to leave because the wages outside the military tend to be higher.[14] In fact, studies have shown that reenlistment rates in the Army are significantly higher for soldiers in combat jobs than noncombat positions.[15] With this in mind, one would expect pilot retention rates to vary depending on the degree of skill specificity received by pilots.

B. AIR FORCE PILOT TRAINING

As discussed, the training an Air Force pilot receives ranges from the very general (basic leadership skills) to the highly specific (e.g. flying and operating the complex weapon systems on the F-117A Stealth fighter). Every pilot goes through officer training from one of three sources: the Air Force Academy, Reserve Officers Training Corps, or Officers Training School. After commissioning, a pilot prospective enters Undergraduate Pilot Training (UPT). Both officer training and UPT can be considered general training: the skills learned in both can be easily transferred to the private sector or the civilian airline industry.

After UPT, fighter pilots receive lead-in-training into their particular aircraft, and other pilots receive OJT in the

aircraft assigned to them.[16] Some aircraft training is very general. For example, the KC-135 air refueler is essentially a copy of the Boeing 707.[17] Obviously, the pilot who flies this aircraft could easily transfer those skills to an airline that flies the Boeing 707. Further, the skills learned by any pilot flying for Air Mobility Command (which flies many aircraft similar to the KC-135) could be transferred to the airline industry relatively easily.

On the other hand, those pilots who fly helicopters or fighters such as the F-15 have skills which are somewhat more specific. While there are clearly some flying skills (such as instrument reading and takeoff/landing skills) which are useful and transferrable to any other flying occupation, other skills (such as firing a cruise missile or being a highly skilled dog-fighter) are less useful in the airline industry. As a result, one would expect that those pilots who have the most general and transferable skills would have lower retention rates than those with more specific skills which are unique to the Air Force. The relationship between training and retention will be scrutinized in section E.

C. IMPORTANCE OF RETENTION AND COSTS OF REPLACEMENT

The Air Force would like to increase the retention rate and average experience level of pilots for several reasons. First, the Air Force invests a considerable amount of money in the training of a pilot. In 1987, a GAO report estimated the training costs of a fighter pilot to range from approximately

$5.2 to $7.5 million dollars.[18] These five year costs include the initial costs of officer training and undergraduate pilot training, specific fighter training, mission qualification training, and a three year operational tour.[19] Indeed, the Air Force has a desire to realize a proper return on this investment in human capital.

Another reason why the Air Force desires a high level of experience and retention, and one that is closely related to the issue of investment in human capital, is that the marginal product (in the form of better flying skills and increased air power) of pilots increases as they gain experience. This is typical of most occupations. As Lieutenant General Thomas J. Hickey stated in testimony before Congress: "Flying hours generate combat capability--the more we fly, the better we'll fight".[20] Indeed, other things equal, the more experienced the active flying force is, the more productive the Air Force will be.

It is clear that an Air Force pilot receives a substantial amount of training. An experienced pilot (one that has 6-14 years of service) is particularly valuable to the Air Force. The question that must be asked is exactly how valuable is a pilot to the Air Force?

One way of determining the value of a pilot is to calculate how much it would cost to replace one pilot with another with the same marginal productivity (or experience level). The marginal productivity of a pilot is simply how much additional output an additional pilot produces. One

method to measure the cost of replacing an experienced pilot is called the Full Investment Cost Method. This method, developed by the Air Force Human Resource Laboratory (AFHRL), includes in the replacement cost for a pilot the cost of commissioning and the cost of training a pilot, multiplied by the number of pilots needed to ensure one achieves the same productivity level as the exiting pilot.[21] This model does not consider normal compensation such as salary and benefits because "These costs represent the normal personnel investments made by the Air Force for which it receives equivalent value in return".[22] The cost calculations made by AFHRL (using 1988 cost estimates provided by the Air Force) found that the full cost of replacing the average pilot with six years of service was between $1,429,417 and $2,021,115.[23] For a pilot with 14 years of experience, that cost rises from between $3,539,479 and $4,922,787.[24] It is clear that replacing an experienced pilot is costly to the Air Force. Thus, turnover is costly to the Air Force as it is to any firm.

Such replacement cost models can be very useful for policy evaluation. These models can be used to analyze the cost-effectiveness of various pilot bonus programs. In order to check the cost-effectiveness of a bonus, it is necessary to know how much it would cost to replace an individual receiving a bonus. Clearly not every newly commissioned second lieutenant will still be in the service fifteen years later. Rather, each year a probability exists that an officer will

remain in the service. If each year that probability is .92, after fifteen years the probability that a new lieutenant will still be in the Air Force is $(.92)^{15} = .286$. Thus, the estimated number of new officers required to ensure one will stay for fifteen years is 1/.286 = 3.4929. The FICM model estimated that it takes 3.6415 new officers to ensure one still remains after fifteen years of service.[25]

Using these probability estimates, one can estimate the true replacement cost of a pilot (using the method discussed above). An efficient bonus policy would be one where the marginal cost of the bonus equals the marginal savings in reducing replacement costs. A study by AFHRL evaluated a bonus program which would pay $12,000 annually for pilots between 8 and 14 years of service who would commit at eight years of service to remain in the Air Force through their fourteenth year. The authors of the study found that "FICM values indicate that the Air Force would benefit from the implementation of a . . . pilot bonus".[26]

Specifically, the study explains that the implementation of this bonus program increases the probability that a pilot will remain in the service. This higher probability lowers the estimated replacement cost of an exiting pilot. The report found that this reduction in the estimated replacement cost exceeded the cost of paying the bonuses, making the bonus program cost-effective. Of course, an efficient bonus program would be one where the marginal cost of the bonus equals the marginal benefit in reduced replacement costs.

The Air Force's investment in the training of pilots is substantial. As this training increases a pilot's productivity, it simultaneously increases the cost to the Air Force of replacing lost pilots. The replacement cost of an experienced pilot should be of paramount importance to the Air Force as it develops compensation and bonus policies to reduce pilot turnover. It is to the subject of compensation that we turn next.

D. EFFORTS TO INCREASE RETENTION

The Air Force has implemented various policies over the years in an effort to increase pilot retention. Many proposals have been given, and a few of the proposals have been implemented. Some of the efforts have focused on monetary bonuses, while other policies have emphasized improving non-wage amenities and job attributes. An in-depth discussion of the wages and job characteristics of pilots in the Air Force and civilian airlines will be given in the next chapter.

There are two monetary incentives given to pilots in the Air Force. The first, Aviation Career Incentive Pay (ACIP) or "flight pay" began in 1974.[27] The ACIP rates vary with years of aviation service. The second monetary incentive is known as Aviator Continuation Pay (ACP). This pilot bonus is an annual bonus given to pilots who promise to stay on active duty through their 14th year of service.[28] This bonus began on 1 January 1989.[29] This year, the Air Force offered ACP to

1,236 pilots, and 826 pilots accepted the bonus.[30] Currently, the Air Force is requesting that Congress authorize $54 million to continue this bonus program next year.[31] These two financial incentives, ACIP and ACP, are currently the only two programs used for the specific purpose of increasing the retention of pilots.

Interestingly, many pilots complain about things other than disparities in pay between the Air Force and airlines. Hoffman explains that "An exit survey of pilots in 1979 showed job satisfaction, geographic stability, little say in future assignments, job opportunities, and senior Air Force leadership as the most often cited reasons for separation".[32] As stated above, the Air Force has tried methods other than monetary bonuses to retain pilots. These policies range from adjusting the performance rating system for pilots to increasing the minimum service commitment for graduates of pilot training.[33]

Some of the attempts to retain pilots have been very controversial. For example, on one occasion the Air Force issued leather flying jackets to currently rated pilots in an effort to increase morale.[34] Some have proposed a "dual track" system for pilots which would allow those pilots who want to concentrate on flying to avoid some non-flying duties typically required of pilots desiring promotion and advancement in the Air Force. This will be discussed further in the chapter on institutional issues.

E. RETENTION MEASUREMENTS AND DATA

The Air Force has two primary methods for measuring pilot retention. The first, the simple retention rate (SRR), is merely the number of pilots in a particular service year group (without a service commitment) who choose to remain in the service, divided by the total number of pilots in that year group.[35] Pilots who have a service commitment cannot voluntarily exit the Air Force, but are rather required to serve a specified number of years, and are therefore not included in the calculation. The second and more common method of measuring retention is through the Cumulative Continuation Rate (CCR). The CCR is calculated by multiplying together the SRRs for each year group.[36] Typically, this is done for those with 6 to 14 years of aviation service. Thus, if the SRR for each year group was .9, the CCR would be $.9^9=.387$. This number indicates that only 38.7 percent of those pilots in their sixth year of service will remain (at current retention rates) through their fourteenth year of service.

A variety of factors can cause the CCR to fluctuate. The civilian unemployment rate and the number of airline pilot hires are just two examples of factors which may influence CCR figures. Indeed, as will be seen, there are many causes behind the retention problem.

While the CCR gives a good estimate of retention, it says nothing about how experienced the pilot force is. The Air Force uses a measure called the Total Active Rated Service

(TARS) to calculate the average years of aviation experience actively flying pilots have.[37] Both the CCR and the TARS figures were at a low in 1979 and a high in 1983. It should be emphasized that these figures are for pilots of all aircraft. As will be seen interesting variations occur when the CCR and TARS are observed for various aircraft types.

F. RELATIONSHIP BETWEEN TRAINING AND RETENTION

The USAF Pilot Retention Office has accumulated data on the CCR and TARS of pilots flying various aircraft since 1979. As previously mentioned, other things equal, one would expect to find higher TARS and CCR figures for pilots who have received more specific flying training. The following tables show the CCR and TARS figures for pilots of various aircraft.

Cumulative Continuation Rate: 6-14 Year Group

FY	TOTAL	FTR	BMB	TKR	SAL	TAL	HELO
79(LO)	21.0	28.7	29.8	17.4	14.8	17.7	34.2
1980	42.2	52.5	53.3	33.8	35.4	40.9	74.9
1981	54.2	61.3	64.0	48.0	44.7	57.3	67.2
1982	68.4	77.5	69.8	66.2	64.4	69.6	71.8
1983	77.6	80.2	76.1	75.6	73.2	82.4	82.1
1984	71.9	79.1	78.7	74.0	63.2	71.1	67.8
1985	58.6	68.2	71.9	55.5	41.4	53.2	80.6
1986	55.7	63.3	51.2	50.4	40.9	51.9	81.6
1987	47.9	55.1	58.5	36.3	31.5	46.4	69.4
1988	37.4	42.	44.7	31.1	21.9	38.1	57.7
1989	29.8	33.9	39.3	18.2	20.5	26.4	67.1
1990	28.9	32.3	41.1	23.8	16.5	30.9	64.7
1991	30.4	36.7	39.8	20.9	17.1	32.8	70.7
1992	30.4	32.8	48.8	24.2	18.0	25.4	78.5
93(Q1)	34.7	32.4	52.4	31.0	25.5	41.5	60.7

SOURCE: USAF PILOT RETENTION OFFICE (AFMPC/DPMYAF), 1993

REPRESENTATIVE AIRCRAFT:
Fighter (FTR): F-15s, F-16s. Strategic Airlift (SAL): C-141Bs. Bomber (BMB): B-52s, B-1Bs. Tanker (TKR): KC-135s, KC-10s. Helicopters (HELO): UH-60s. Tactical Airlift (TAL): C-130s.

TOTAL ACTIVE RATED SERVICE (TARS)							
FY	TOTAL	FTR	BMB	TKR	SAL	TAL	HELO
79(LO)	8.86	9.91	9.84	8.21	7.71	7.94	12.24
1980	10.68	11.60	11.66	9.92	9.94	10.97	15.2
1981	12.40	13.28	14.12	11.44	10.98	12.65	14.27
1982	14.00	15.18	13.86	14.38	13.63	14.19	13.18
1983	15.64	15.73	14.47	15.38	15.81	16.38	16.95
1984	14.21	15.22	14.93	14.39	13.51	13.78	13.82
1985	13.02	14.24	14.35	11.93	11.41	12.07	15.64
1986	13.03	13.89	12.83	12.12	11.42	12.19	15.89
1987	11.99	12.87	13.28	10.61	9.78	11.60	13.97
1988	11.70	12.46	12.60	10.87	9.78	11.63	13.95
1989	10.72	11.26	11.81	9.07	9.34	10.46	14.68
1990	10.60	11.12	11.75	9.91	8.74	11.07	15.50
1991	9.67	10.89	11.10	8.85	7.92	10.23	14.64
1992	9.30	10.11	11.92	8.81	7.59	10.21	14.66
93(Q1)	10.20	10.73	12.66	9.64	8.77	11.53	15.83
SOURCE: USAF PILOT RETENTION OFFICE (AFMPC/DPMYAF), 1993							

A simple regression makes the relationship between the specificity of training and the CCR and TARS figures clearer. For example, dummy variables may be assigned to the indeper lent variables characterized by specific training (FTR, BMB, and HELO). When the CCR and TARS figures regressed using such dummy variables, the following results are obtained (standard errors in parentheses):

$$\begin{aligned} CCR &= a_0 + a_1 SPEC \\ &= \underset{(2.35)}{42.82} + \underset{(3.45)}{19.03}\ SPEC \qquad R^2 = .26 \end{aligned}$$

$$\begin{aligned} TARS &= b_0 + b_1 SPEC \\ &= \underset{(0.30)}{11.08} + \underset{(0.43)}{2.25}\ SPEC \qquad R^2 = .24 \end{aligned}$$

The regressions also show a significant t-statistic on the variable SPEC. Here SPEC refers to aircraft with specific training (where SPEC = 1 if FTR, BMB, or HELO and 0 otherwise). Also, the coefficients a_1 and b_1 are positive,

indicating that as the training becomes more specific, the CCR and TARS figures should be higher, as theory predicts. These results indicate that the specificity of training does indeed have an impact on the TARS and CCR data for Air Force pilots.

Of course, there could be a sample selection bias problem here. For example, pilots graduating from UPT have some say in the aircraft to which they will be assigned. While a pilot's desires are superseded by the Air Force's needs and aircraft availability, it could be the case that pilots who are more inclined to make the Air Force a career may choose to fly aircraft which are unique to the Air Force (such as a fighter). Thus, those pilots who desire to remain in the Air Force may select themselves into an aircraft with specific training. Such a bias should be considered when analyzing the regression results.

To test the robustness of these results, additional regressions were run using YEAR, YEAR^2, UNEMP (the civilian unemployment rate), and more detailed aircraft dummy variables as explanatory variables. The coefficient on UNEMP was positive and significant on both CCR and TARS regressions, indicating that as the civilian unemployment rate increases, CCR and TARS figures rise, as one would expect. Complete regression data and results can be found in Appendix A.[38]

A brief explanation of these regressions is helpful. For example, if the dependent variable is the CCR data in 1979 for fighter pilots, then CCR = 16.2 (for the 6 to 11 year group), and five dummies (FTR = 1, all other dummies = 0) are used as

explanatory variables, as well as YEAR = 79, YEARSQ = $(79)^2$, and UNEMP = the civilian unemployment rate in 1979. This would be repeated using the CCR for each aircraft type in each year. Again, the results show that nearly all the explanatory variables have significant t-statistics. These results are shown in Appendix A.

It is clear that the pilots of those aircraft (fighters, bombers, and helicopters) which involve more specific skills typically have higher CCRs and TARS than pilots who fly aircraft whose skills are more general in nature (tankers, tactical airlift, strategic airlift). Thus, as expected, turnover rates are inversely correlated with the degree of specificity in training. While many factors can be expected to impact retention, the data show a clear relationship between the degree of training and retention rates. Of course, there could be a sample selection bias as previously mentioned. However, the results are consistent with human capital theory.

Air Force pilots receive a substantial amount of training. Because the Air Force pays for the training, there is less incentive for the trainee to remain in the Air Force, particularly when that training is general in nature.

The cost of training a pilot is substantial. Indeed, the Air Force would prefer to have pilots choose to stay in the service rather than voluntarily exit. This is because turnover is costly to the Air Force as it is for any firm. In the next chapter, we will see how compensation compares

between Air Force and airline pilots and why discrepancies between the two sectors exacerbate the retention problem.

III. COMPENSATION ISSUES IN PILOT RETENTION

A discussion of the issue of pilot retention would not be complete without an examination of the wages paid to pilots in both sectors. A look at these wages shows that pilots flying for a major airline have a significantly greater expected lifetime income than Air Force pilots. In addition to examining the monetary compensation paid, it is necessary to discuss the non-wage amenities provided to the pilots, as well as the job attributes pilots in both sectors face.

It is clear that differentials in salary alone are not the sole cause of pilots leaving the Air Force. Indeed, as will be shown, many exiting pilots have complained about the occupational attributes of flying in the Air Force. This chapter will present the economic theory surrounding the issue, compare the lifetime earnings of an Air Force and major airline pilot, and discuss the non-wage aspects of each sector.

A. THE THEORY OF COMPENSATING WAGE DIFFERENTIALS

An individual's supply of labor varies with changes in the wage rate. Yet economists have long realized that wages are not the only factor which impacts an individual's decision to supply labor to a particular firm. Rather, additional variables, such as job characteristics and the non-wage amenities offered by an employer, impact an individual's decision to supply labor.

In essence, the wage a worker receives encompasses not only compensation for the work provided by that individual,

but also the job conditions and environment in which the employee works.[1] Consider two jobs which pay the same wage and are identical in every respect but one: Job A has a lower risk of injury to the worker than Job B. Under such circumstances, Job A is clearly preferable to Job B. To make both jobs equally attractive to a prospective employee, Firm B would need to compensate for the higher risk, perhaps by offering a higher wage. Such a compensation is referred to in the economic literature as a compensating wage differential. Adam Smith highlighted th theory of compensating wage differentials when he stated: "The whole of the advantages and disadvantages of the different employments of labor and stock must, in the same neighborhood, be either perfectly equal or continually tending toward equality. . .the wages of labour vary with the ease or hardship, the cleanliness or dirtiness, the honourableness or dishonourableness of the employment".[2] Indeed, a wage relays as much information about a job as a price does about a product.

The theory of compensating wage differentials posits that workers have preferences for particular job characteristics.[3] Of cour e, preferences will differ from individual to individual, which makes the empirical testing of the theory difficult and the results often inconclusive.[4] However, despite this taste heterogeneity among workers, some job characteristics are undoubtedly economic goods while others are clearly economic bads. For example, greater chance of death on the job is an ec omic bad while more days of paid

vacation per year is an economic good. Ultimately, the important thing to remember is that workers (and firms) attach an economic value to non-wage amenities and job characteristics.

These job characteristics and non-wage amenities effectively have implicit prices attached to them.[5] Robert Smith states: "Therefore, the wage rate embodies a series of implicit prices at which each of these job characteristics is bought and sold--prices we shall call compensating wage differentials".[6] These implicit prices, sometimes referred to as hedonic prices, are attached to the various attributes of a job and are observed by the worker and impact his labor supply decision.[7] Two similar occupations may offer different wages because of the implicit price attached to differing job characteristics. As an example, economist Sherwin Rosen explains that wages offered for work on the Alaskan Pipeline "substantially exceeded the pay available for comparable work elsewhere".[8] Indeed, it is essential to consider the job attributes and non-wage amenities in addition to the wage rate when comparing Air Force pilot compensation with that offered by the airlines.

B. THE AIR FORCE PAY SYSTEM

The Air For e has a somewhat unique method for compensating pilots. Pilots receive basic pay, a basic allowance for quarters and subsistence (BAQ and BAS), a variable housing allowance (VHA), Aviation Career Incentive

Pay (ACIP), and a pilot bonus (ACP). Occasionally, pilots also receive hazardous duty pay, although this is usually not the case in peacetime. The amount paid in each category depends on a variety of factors, including the officer's rank, years of service, years of aviation service, duty location, and marital/family status.

The VHA and hazardous duty pay given to some Air Force personnel are excellent examples of compensating wage differentials. VHA compensates the worker for the undesirable job attribute of working in a high cost of living area. Obviously, hazardous duty pay compensates the worker for the additional risk of injury or death during wartime or for a hazardous assignment in peacetime.

Two of the pay categories, ACIP and ACP, are used for the explicit purpose of reducing pilot turnover. The ACIP program began in 1974 in response to the retention problem.[9] This pay, commonly known as flight pay, is paid monthly to most pilots actively flying. The ACP program began in 1989 and "provides annual cash bonuses up to $12,000 to certain pilots who choose to remain on active duty beyond the minimum years of service (YOS) required after receiving flight training".[10] These pay schedules, along with other pay schedules, can be found in Appendix B.

As one would expect, the pay and compensation for civilian pilots varies from one airline to another. Further, a civilian pilot's salary also depends on whether or not he is flying for a major airline, regional airline, or other

airline; it also depends on whether he flies a corporate jet or helicopter, and so forth.[11] Unlike the Air Force, the type of aircraft the pilot flies may impact his salary[12]. For example, in 1992 a first officer with seven years of experience flying a Boeing 727 for American Airlines received $4,781 per month whereas the same first officer in a DC-10 received $5,572 per month.[13] Like the Air Force, the major airlines have a ranking system (first officer, captain, etc.) and base their salaries according to rank and tenure.[14] Unless otherwise stated, comparisons will be made between the Air Force and the major airlines.

C. A COMPARISON OF LIFETIME EARNINGS

In their booklet Career Pilot Salary Survey, the Future Aviation Professionals of America (FAPA) developed a 1992-1993 Pilot Career Earnings Model to estimate the Total Lifetime Earnings of the average pilot flying for one of the major airlines.[15] I have calculated an estimate of the total lifetime earnings of a civilian pilot using three critical assumptions made by FAPA: 1) the pilot is hired on his 30th birthday and works for the carrier until his 60th birthday, 2) the pilot lives to be 75 years of age and draws 15 years of retirement income and benefits, and 3) the pilot's pre-retirement benefits are equivalent to 15 percent of the pilot's salary and post-retirement benefits are equivalent to 7.5 percent of defined retirement income.[16] I also used

FAPA's calculations for retirement benefits of a typical pilot.

My calculations yield interesting results. In current (1992) dollars, and with a four percent annual discount factor considered, the estimated total lifetime earnings for the average pilot in this scenario is $2,734,457.[17] This figure includes salary, pre and post-retirement benefits (as defined in the assumptions), and typical retirement plans offered by the major airlines. Indeed, this figure is quite interesting when compared to the lifetime earnings of an Air Force Pilot.

In calculating the lifetime earnings of the typical Air Force pilot, I have made the following assumptions:

-The pilot is 30 years of age.
-The pilot has 8 years of service (YOS) and 7 years of aviation service.
-The pilot's current rank is captain.
-The pilot will be promoted to major at 10 YOS, lieutenant colonel at 15 YOS, and colonel at 22 YOS.
-The pilot has dependents.
-The pilot receives VHA of $50.00 per month.
-The pilot ceases flying at 26 YOS (for ACIP purposes).
-The pilot retires at 30 YOS.
-Once retired from the Air Force, the pilot will receive wages from another occupation which are 10 percent higher than his wages he received when he left the service, plus he receives monthly retirement pay.
-The pilot "permanently retires" at age 60 and lives until age 75.
-Like the model above, there is a four percent annual discount factor.
-Allowances are adjusted to account for tax exemption.
-All wages are based on 1993 Air Force pay schedules.

The actual pay schedule calculated in this model can be found in Appendix D. Indeed, the pilot characteristics given above for this model appear to be typical of the pilot who is making a decision between leaving or staying in the Air Force.

From this model, an Air Force pilot's total lifetime earnings is $2,000,490. While several important assumptions have been made here, it is clear that a typical Air Force pilot would earn far less than he would if he decided to fly for a major airline. In this case, the Air Force pilot could earn an average of 36.7 percent more over his lifetime if he flew for the airlines. These calculations include an estimated dollar value of the benefits (including morale, welfare, recreation, medical, travel, and miscellaneous benefits) received by a typical Air Force officer. Clearly a civilian airline pilot receives more than a typical Air Force pilot over the course of his lifetime.

Of course, these figures can and will change from year to year. Changing economic conditions, political circumstances, and other factors could cause this earnings disparity to fluctuate. However, it appears that there is a colossal difference between the salaries offered by the Air Force and the airlines for its pilots.

D. NON-WAGE AMENITIES AND JOB ATTRIBUTES

There have been many studies and surveys of Air Force pilots to determine what factors are to blame for high pilot turnover. In A Study of USAF Pilot Retention, Judith M. Hupp states, "A survey of exiting pilots conducted by the Air Force Military Personnel Center (AFMPC) in 1978-9 identified five principal irritants that contributed to their decision to separate, none of which was compensation".[18] Survey after

survey indicates that pilots are frequently frustrated with the Officer Evaluation System, frequent moves, the quantity of nonflying duties, geographic instability and little control over assignments.[19] The instability of future benefits (such as medical or retirement benefits) is also a commonly cited as a reason why pilots exit the Air Force.[20] Indeed, the retirement benefits have become less generous over the years. Clearly, a pilot's decision to separate is not only based on the discrepancy in wages between the Air Force and airline industry.

The Air Force has implemented several policies, in addition to monetary bonuses, to compensate pilots and increase their retention. These policies range from reducing the number of additional duties and non-flying assignments for pilots, to improving the Officer Evaluation System. Whether the changes are significant or minor, they all attempt to compensate pilots by improving job characteristics and non-wage amenities and thus implicitly raise wages.

The Air Force provides many favorable amenities to its employees to compensate for the disparity in wages. For example, Air Force employees and their dependents are provided with inexpensive commissary and base exchange services, inexpensive temporary living quarters, free legal services, comprehensive medical and dental services, counseling services, and many other morale, welfare, and recreation (MWR) activities. Further, the Air Force compensates its personnel for expenses incurred from temporary duty away from the

employee's home base and provides each service member with 30 days of paid leave per year. Theory suggests that each of these attributes are also implicitly priced and are accounted for in a pilot's decision to remain or separate from the Air Force.

The airlines also offer pilots many non-wage amenities and favorable job characteristics. For example, every major airline offers a guaranteed minimum number of flying hours per month for each pilot.[21] Similarly, they also offer a minimum number of days off per month.[22] They also provide extra pay for travel expenses and frequently provide free or inexpensive airline passes to pilots and their families.[23] Indeed, such benefits are important when comparing Air Force and airline compensation.

E. ALTERNATIVE COMPENSATION PLANS

While there are two primary monetary compensations for pilots, ACP and ACIP, there have been alternative proposals for distributing these bonuses. As indicated earlier, retention rates differ from one type of aircraft to another. Because of this, it has been suggested that bonuses be targeted by aircraft.[24] Economically, this makes perfect sense. However, the Air Force has vehemently opposed this suggestion. A report by the Congressional Budget Office explains that "The service believes that [aircraft] targeting would adversely affect morale, eventually harm retention, and ultimately increase pilot shortages".[25] Interestingly, the

Navy has used such targeting methods and has not reported the adverse affects expected by the Air Force.[26] Further, the Air Force already does some targeting: helicopter pilots are not given the ACP bonus.[27] Indeed, it appears that targeting bonuses by aircraft would be a wise policy, and that there is little ground for opposing such a policy.

Other alternative compensation plans have suggested other means of providing bonuses to pilots. These plans provide alternatives in the size and scope of the bonuses. Five plans were analyzed in a pilot retention study by the Congressional Budget Office.[28] As expected, the study found that targeting bonuses by the type of aircraft was the most efficient way to reduce the pilot shortage.[29]

It is clear that there is a wide monetary gap between the compensation offered to pilots in the Air Force and those in the civilian airline industry. While it is difficult to empirically test and evaluate job characteristics and non-wage amenities, these factors are implicitly weighed along with wages when pilots make career decisions. Indeed, the Air Force can use three main incentive avenues to keep pilot turnover low: increase monetary incentives, improve job attributes, and increase non-wage amenities.

IV. INSTITUTIONAL ISSUES IN PILOT RETENTION

While external market forces clearly have an influence on pilot turnover, it would be wise to see how the employment structure the Air Force uses impacts retention. Indeed, the Air Force is in many respects unique, and may not always behave as a typical firm would in a competitive market. Further, laws and regulations restrict the freedom typically possessed by a worker in the civilian marketplace. Thus, it is necessary to see how the institutional structure of the Air Force impacts retention.

Within the field of labor economics, an alternative labor market theory has developed which contrasts with typical competitive-based labor market models. This theory suggests that there are internal labor markets (ILMs) which have developed within the economy-wide external labor market. This theory seems to accurately describe the employment structure used by the Air Force. This chapter is concerned with internal labor market theory. It will discuss how the Air Force resembles an internal labor market, why it uses such a structure, and how this structure might impact the retention of pilots.

A. GENERAL ILM THEORY

The literature on internal labor markets is quite diverse. The early literature, which is generally traced back to the 1950s and 1960s, tended to emphasize ILMs from an industrial relations perspective.[1] Perhaps the most important

and comprehensive early contribution to this field is Peter Doeringer and Michael Piore's book entitled Internal Labor Markets and Manpower Analysis. These two economists give an excellent and thorough description of ILMs. Since then, extensive work has been done on ILMs from primarily neoclassical or institutional perspectives.

Doeringer and Piore define an ILM as "an administrative unit, such as a manufacturing plant, within which the pricing and allocation of labor is governed by a set of administrative rules and procedures".[2] This, of course, is in contrast with an external labor market where competitive economic forces dictate the price and allocation of labor. While there are "ports of entry and exit" between these two markets, most jobs in an ILM are protected to a certain extent from competitive economic forces.[3]

Doeringer and Piore cite several factors which create internal labor markets. First, there is skill specificity, which increases the training costs borne by the employer since workers cannot generally be taught job-specific skills outside the firm.[4] As we shall see, skill specificity can create the threat of inefficient opportunistic behavior. ILMs may be able to reduce this inefficiency. Second, there is on-the-job training (OJT). OJT is training which is frequently informal and is often characterized by "learning by doing".[5] Finally, there is custom which is unique to the workplace.[6] According to Doeringer and Piore, custom will create stability in the workplace and is beneficial to both the firm and workers.[7] In

fact, they state that "Stability is the most salient feature of the internal labor market".[8] These three factors are common to internal labor markets.

This concept that the firm, as an institution, significantly impacts the price and allocation of labor is in stark contrast with a strict neoclassical theory of labor markets. In essence, neoclassical theory posits that the price and allocation of labor are dictated though an auction market where workers compete against each other for jobs and firms compete against themselves to attract workers.[9]

Additionally, traditional neoclassical theory tends to dismiss the concept that the mobility of labor is restricted by ports of entry and exit. Rather, workers who are qualified would have access to all jobs which require their skills.[10] This being the case, workers with identical general skills across firms in the same industry should have identical wage structures.[11] The important difference to remember is that, unlike internal labor market theory, traditional neoclassical theory deemphasizes the concept that the price and allocation of labor are dictated by the administrative unit within a firm and are largely insulated from typical market forces.

B. NEOCLASSICAL PERSPECTIVE

While ILM theory is in contrast with traditional labor market theory, over the years, many economists have attempted to explain the existence of ILMs from a neoclassical perspective. In essence, the neoclassical perspective

explains the existence ILMs using an efficiency rationale. Consider the ways a firm can employ workers. The methods range from a "spot market" method (where workers offer their services for as long or as brief as they like, and are paid according to their marginal productivity), to incomplete contracts, to long and detailed explicit contracts (like those which may be found in a unionized industry). An internal labor market is merely another method used by firms to employ labor and may be superior to other alternative contracting systems.

The neoclassical literature emphasizes two general inefficiencies frequently encountered in the firm-employee relationship which may lead to the development of an ILM: opportunistic behavior and transaction costs. ILMs may alleviate these two problems. Indeed, both the firm and the worker may benefit from an internal labor market.

The first problem, opportunistic behavior, describes a situation where one party seeks to exploit an advantage it has for its own gain at the expense of another party. An example of such an advantage is one party having information which is unavailable to the other party. Indeed, asymmetric information is perhaps the biggest cause of opportunistic behavior. Economists Michael Wachter and Randall Wright state:

> Asymmetric information exists when it is relatively more costly for one of the parties to observe or monitor the quantity and quality of either inputs or outputs or the state of technology and demand.[12]

For example, if it is difficult or infeasible for a firm to monitor the work effort of an employee, that employee may claim to be diligent when he is really shiftless and lazy. If the employer knew the worker was lazy, it would either reduce his compensation or fire him. Without this knowledge, however, a worker can take advantage of the asymmetric information and engage in opportunistic behavior (reduce work effort while enjoying the same wage rate).

Some economists have discussed asymmetric information in terms of task idiosyncrasies. In essence, because occupations frequently have idiosyncratic tasks (characteristics which are unique to that particular occupation), experienced workers have a significant information advantage over outsiders. This advantage allows incumbent employees to "hoard information to their personal advantage and engage in a series of bilateral monopolistic exchanges with the management--to the detriment of both the firm and other employees as well".[13]

Opportunistic behavior can also arise when specific investments in human capital are made. One type of specific investment, termed match-specific capital, is discussed by Wachter and Wright. According to these economists, match-specific capital is similar to firm-specific capital and "refers to firm-specific investments in human capital via on-the-job training, learning-by-doing, etc.; to worker-specific investments; and generally to the case in which a firm and a worker may simply have formed a 'good match'".[14] According to

the authors, what is important to notice about match-specific capital

> is that although the ILM is disciplined ex ante by the usual market forces, ex post there is a lock-in effect due to the investments that have been sunk into the relationship. . .In this context, inefficient rent seeking is possible.[15]

For example, the hiring and screening costs associated with placing workers in positions where they are most productive are match-specific investments made by the firm.[16] A worker could use this investment to his advantage by threatening to quit unless he receives a premium above his current wage. Again, with the threat of such opportunistic behavior, the question arises: How does an ILM reduce this inefficiency? This question will be addressed in section D.

The second inefficiency, transaction costs, also encourages the development of an ILM. Wachter and Wright explain that "The puzzle concerning the absence of detailed contracts is solved by one of the factors which explains why the relationship is brought inside the firm in the first place--transaction costs".[17] Indeed, since the costs of constructing detailed contracts are often prohibitive, firms frequently develop incomplete or implicit contracts with their employees.[18] An implicit contract is an agreement between a firm and its workers which is not legally binding, but rather is an "understood" agreement between the two parties. An ILM is in many respects a form of implicit contract between a firm and its workers.

It is easy to explain why writing explicit contracts can be prohibitively costly. First, the cost of writing a contract is, to a certain degree, a function of the length of the contract. The length of a contract is, in turn, a function of how many contingencies must be covered. Clearly, as the number of potential contingencies increases, the cost of writing the contract increases. In order to keep the turnover of its workers low, firms writing explicit contracts might have to write lengthy ones. Indeed, a firm may determine that an internal labor market is a superior alternative to writing lengthy explicit contracts between the firm and its workers.

An ILM is essentially a type of implicit contract between the firm and all its workers. Because the customs, rules, and promotion systems of an ILM apply to all workers, it is much less costly to implement than a system where rules vary from one worker to another. Thus, from a cost perspective, it appears that ILMs can be preferable to explicit, long term contracts in discouraging turnover, primarily because of the high costs associated with developing such lengthy contracts. Yet, while ILMs may reduce opportunistic behavior and transaction costs we shall see that there may be inefficiencies associated with internal labor markets as well.

C. INSTITUTIONAL/SOCIAL PERSPECTIVE

Another perspective on internal labor markets, the institutional or social perspective, is also useful to

discuss. When discussing the institutional approach to internal labor markets, economist Bernard Elbaum explains:

> . . . at heart internal labor markets reflect a quasi-legal legitimacy attached to workers' desire for security and advancement, backed up by the ability of work groups to inflict damage upon the enterprise if customary norms are violated.[19]

The customary norms referred to here are important to understanding internal labor markets, and will be discussed shortly.

Peter Doeringer has pointed out several institutional aspects of IIMs. He suggests that ILMs may create "costless asset formation".[20] Examples of this costless asset formation are employee friendships and loyalty which enhance productivity in a firm.[21] Similarly, ILMs create social relations and group cohesion.[22] Doeringer explains that ILMs create more stable work groups by fostering group cohesion, and that these work groups can have more control over productivity through the "quality" of on-the-job training they give to new workers.[23] Another potential benefit created by IIMs is an improved feedback process.[24] The cohesive groups in an ILM tend to develop more consistent, collective sanctions than other groups. Further, as Doeringer explains, "Where there is legitimacy, morale, job satisfaction, and productivity are likely to be enhanced".[25] These institutional and social aspects of internal labor markets are very important in explaining the employment structure used by the Air Force.

D. EFFICIENCIES AND INEFFICIENCIES OF ILMs

Internal labor markets are efficient in many respects. First, ILMs may eliminate some opportunistic behavior "by shifting to a system where wage rates attach mainly to jobs rather than to workers".[26] By attaching these wages to jobs, workers are presumably less able to negotiate their wage. This eliminates some opportunistic behavior. Furthermore, the promotion system created by ILMs is one where top level positions in the firm are primarily filled by workers in lower level positions. Thus, this system "ties the interests of the worker to the firm in a continuing way".[27] As Williamson et al. explains:

> Reliance on internal promotion has affirmative incentive properties in that workers can anticipate that differential talent and degrees of cooperativeness will be rewarded. Consequently, although the attachment of wages to jobs rather than to individuals may result in an imperfect correspondence between wages and marginal productivity at ports of entry, productivity differentials will be recognized over time and a more perfect correspondence can be expected for higher level assignments in the internal labor market job hierarchy.[28]

Further, Wachter and Wright explain that it is the repeated nature of ILMs which significantly reduces opportunistic behavior.[29] While explicit long-term contracts could also reduce such behavior, they can be prohibitively costly. By attaching wages to jobs and having a systematic internal promotion system which creates a repeated bargaining situation, ILMs are able to reduce some of the opportunistic behavior frequently encountered between a firm and its workers. Workers benefit from this system because they are

insulated from competition for jobs by both less experienced workers within the firm, as well as worker outside the firm.

ILMs may provide many benefits to both employers and workers. One of the potential benefits the employer receives from an ILM is a reduction in worker turnover which can lower a firm's training and hiring costs. Turnover is reduced primarily because of the match-specific capital and skills (discussed by Wachter et al.) which accrue to workers in a particular firm. These skills cannot be transferred completely to another firm and therefore discourage worker turnover. For example, an Air Force pilot may develop skills in a particular aircraft and become so comfortable with that cockpit and his crew that he is discouraged from leaving to fly for the airlines in a new aircraft with a strange crew.

There are other efficiencies associated with ILMs. Specifically, there are technical efficiencies from reduced turnover which make ILMs superior to other systems. Peter Doeringer and Michael Piore explain that:

> existing employees constitute a readily accessible and knowledgeable source of supply whose skill and behavioral characteristics are well known to management. . .Management also has a record of attendance, punctuality, and willingness to operate within established work norms.[30]

Indeed, this is another way that a firm benefits from developing an ILM.

From the worker's perspective, ILMs provide many non-wage amenities. Specifically, there is an added degree of employment security for the worker in an ILM. Internal labor markets shield workers from typical external market forces in

several ways. First, the internal labor force is guaranteed first priority over outsiders for promotions to higher level jobs.[31] Further, the seniority rules established in ILMs shield tenured workers from competition with those who have just begun working for the firm. Added job security (from shielding) is perhaps the biggest benefit workers receive from ILMs.

Despite the efficiencies which may be associated with ILMs, they are far from flawless. Indeed, there are some negative aspects of ILMs. First, the shielding of workers from external (and occasionally internal) competition may be inefficient. By establishing rules and procedures which restrict the "pool of workers" from which a firm may hire, a firm may indeed prevent itself from hiring the most productive worker available for a particular job. The firm, by establishing an internal labor market, is implicitly discriminating against potential employees outside the ILM. This is clearly one negative aspect of an ILM.

Additionally, a system where a worker is paid according to the position she holds rather than her productivity may be inefficient. While some economists propose that in the long run, such a structure will ultimately result in workers being paid their marginal product, the reasoning behind this assertion is unclear. Rather, it seems that an ILM would not allocate the wages paid to labor (through a set of administrative guidelines) as efficiently as the invisible hand of the external market would. Indeed, it may be as

difficult for a firm to "establish" a wage structure which pays each worker his marginal product as it would be for a government social planner to "establish" equilibrium prices on consumer goods in the economy. It is apparent that there may be inefficiencies associated with ILMs as well.

E. THE AIR FORCE AND INTERNAL LABOR MARKETS

The Air Force has a promotion and wage structure which in many aspects reflects that of a typical internal labor market. While discussion of this structure focuses primarily on the officer corps, the structure surrounding airmen and non-commissioned officers is similar. First, every officer enters the Air Force through one of three commissioning sources: the Air Force Academy, ROTC, or Officer's Training School. Further, with a few exceptions, most officers are commissioned with the rank of second lieutenant. These are the "ports of entry" discussed in internal labor market theory.32

Officers frequently incur an active duty service commitment. The length of commitment varies, and is affected by many variables. Currently, officers completing undergraduate pilot training incur an eight year commitment upon completion of their training. Clearly, officers are not free to quit the Air Force any time they desire. Thus, the Air Force has "ports of exit."

In addition to having ports of entry and exit, the Air Force has a compensation system which attaches wages to jobs. All officers are paid basic pay which is a function of the

officer's rank and years of service. The implication here is that as an officer increases in seniority with the firm and gains experience, she becomes more productive and thus is paid more. Furthermore, officers are paid more when they engage in hazardous duty, and when they are pilots. Again, it is clear that wages are attached to jobs (in the form of rank and position) and are essentially fixed and non-negotiable.

The Air Force also has an explicit and detailed promotion system. Numerous regulations, such as Air Force Regulation (AFR) 36-10: Officer Evaluation System, set the guidelines for assessing an officer's performance and potential for promotion.[33] Further, there is an extensive number of regulations and pamphlets which discuss professional military education, civilian education, and other "boxes" which must be checked for an officer to be competitive for promotion.

Like many ILMs, the Air Force's pay and promotion procedures place much emphasis on seniority. As previously discussed, the wages paid to an officer are, in part, a function of seniority. Further, officers compete for promotions only with other officers of the same rank. For example, colonels do not have to worry about competing with captains for promotion to brigadier general. The ranking system used by the Air Force is like a job and promotion ladder which may be found in a typical ILM. Additionally, officers do not have to be concerned with competing against civilians for a promotion to a higher rank. Thus, it is clear that officers in the Air Force are shielded from competition

for military positions (or rank) from civilian workers, and from less-experience workers within the Air Force.

Finally, like most internal labor markets, the Air Force has many customs. These customs range from where and when to salute to how an officer earns a promotion. The existence of these customs makes it infeasible and unrealistic for the Air Force to allow people to enter the force as officers by a method other than one of the typical ports of entry. For example, while an airplane captain from American Airlines may be perfectly capable of flying a KC-135 for the Air Force, his unfamiliarity with officer-enlisted relationships, Air Force rules and regulations, and other customs make him unfit to be "hired" to fly the KC-135 for the Air Force as a major with the position of flight commander.

Undoubtedly, the Air Force has an employment structure which resembles an internal labor market. The Air Force feels that an employment structure similar to an ILM is the optimal structure to use. Yet, it may not be clear why the Air Force has chosen this structure in lieu of a more market-based employment system. It is to this discussion I will turn next.

The Air Force is a unique "firm" in many respects. First, the product which this firm produces is ultimately national defense. The ability of missileers to fire a nuclear missile or the ability of F-15 pilots to achieve air supremacy ultimately contributes to national defense. While the quantity and quality of this output may difficult to measure,

national defense is the product which the military and the Air Force produce.

It could be argued that the Air Force attempts to maximize its output (national defense or control of the skies) subject to a budget constraint. It seems the Air Force has chosen a structure which is similar to an internal labor market because it feels that this is the best structure to maximize its output. Many of the social and institutional aspects of an internal labor market explain why this structure is superior to alternative market-based employment methods the Air Force could use.

First, this structure does promote the "costless" asset formation discussed by Doeringer. The unique organizational culture found in the Air Force promotes loyalty, group cohesion, and stable work groups which, in turn, increases the quality of national defense. It promotes cohesion and loyalty through stressful training to all members going through a port of entry. It promotes stable work groups by using the job ladders and promotion structure previously discussed. Further, the explicit internal promotion system promotes a clear system of command and control which is necessary for control of the skies. Additionally, through the Uniform Code of Military Justice, there is a clear and consistent method of sanctions for the employees, which further promotes stability. All of these are social and institutional examples of why an ILM structure may be superior to other methods for producing the highest level of national defense.

In addition to these elements, the Air Force possesses the three characteristics (skill specificity, on-the-job training, and custom) which often lead to the creation of an ILM.[34] As we have already seen, some skills learned in the Air Force are specific, such as learning how to fire a ground-based nuclear missile or dropping a smart bomb on an enemy target with precision.

A significant amount of on-the-job training (OJT) occurs in the Air Force as well. Virtually all pilot training is OJT because it is done in a hands-on, one-on-one environment.[35] It would obviously be difficult in a classroom environment to train a pilot how to drop a bomb! Indeed, the existence of OJT encourages the ILM structure used by the Air Force.

In addition to the social and institutional examples, there are clear economic reasons why the Air Force is structured like an internal labor market. The Air Force could feasibly just hire "mercenaries" to perform certain duties during wartime, such as hiring aircraft pilots to fly fighters and bombers. Yet these mercenaries would not have developed the same cohesion and other forms of costless asset formation active duty pilots develop.

Furthermore, hiring mercenaries would require some sort of contract between the Air Force (or government) and the mercenaries. As mentioned before, such contracts are often prohibitively costly. As the number of potential contingencies which must be covered in the contract increases

the cost of the contract increases. Imagine how many contingencies would occur in wartime!

The Air Force does "hire" some pilots during wartime through the Civilian Reserve Air Fleet (CRAF). The CRAF consists of a fleet of over 500 planes from over 30 airlines prepared to provide airlift in emergency situations.[36] Air Mobility Command (AMC) monitors and coordinates the contracts with the CRAF.[37] Small portions of the CRAF may be activated by the commander of AMC, but activation of approximately 50 aircraft or greater must be done by the Secretary of Defense.[38]

The CRAF provides additional airlift both domestically and internationally. A special aeromedical airlift mission was added in 1986.[39] While the CRAF was initiated by President Truman and established in 1952, the first use of the reserve fleet occurred on August 18, 1990 to provide airlift to the Persian Gulf.[40] It proved to be highly successful.

While the Air Force does "hire" people on occasion during wartime (thru the CRAF), this hiring is generally complimentary and noncombat in nature and it cannot be feasibly applied to the entire force. Key combat roles (such as flying a stealth fighter or launching a nuclear missile) could not be contracted out in such a fashion. Such combat roles require thousands of hours of training. Thus, the more combat oriented the mission, the more difficult and infeasible it would be to contract out these tasks.

For the same reason, the Air Force does not draft people for bombing or similar combat roles. As Gary Becker explains, "draftees have less incentive than professional soldiers to invest in purely military skills".[41] Indeed, while a draftee may be able to perform noncombat jobs proficiently with little training, this is not the case for most combat roles.

Alternatively, the Air Force could behave like a spot market and hire people for as long as they desire to work for the Air Force. Yet clearly the lack of continuity and potentially high turnover in this scenario would result in less output in the form of a weaker national defense. Indeed, an internal labor market, for both practical economic reasons and the social and institutional reasons, is the best structure the Air Force can use to maximize its output of national defense subject to a government-imposed budget constraint.

F. ALTERNATIVE INSTITUTIONAL ARRANGEMENTS: A DUAL TRACK SYSTEM

As previously stated, one of the frequent complaints of Air Force pilots is that they do not get to fly enough. Rather, they feel bogged down with additional duties or dislike being put in nonflying assignments. One survey conducted by Judith Marie Hupp found that "95% of this group feel a 'fly-only' career option would have a positive effect on their" decision to remain in the Air Force.[42] Because of

this, some feel that the current institutional structure is not conducive to keeping pilot turnover low.

In an effort to improve the retention of experienced, senior pilots, there have been proposals to develop a two track system for pilots. This system, often referred to as the Dual Track system, would allow pilots to remain in a career track similar to the one they are in currently, or alternatively enter a track where they would be a pilot "specialist." Air Force Major David Evans explains that a pilot in the specialist track ". . .would no longer be considered for promotion, PME, or other non-flying related programs and would retain his current rank for the remainder of his service".[43]

Thus, the Dual Track system is essentially an internal labor market structure with an additional job ladder. The pilots in the second track would not be under the same promotion rules and procedures as they are today. The pilot specialists would have their own job ladder.

While the recommended details of the Dual Track system may vary, essentially its purpose is to allow those pilots in the critical 6-14 year group the opportunity to focus on what they prefer most: flying full-time. One popular proposal is to create a second track made up of 30% of the pilot force.[44] These pilots would be devoted to flying for their entire career and would retain their current rank. Currently, the Air Force views pilots as officers first, and pilots second. Promotions and assignments are based not only on flying

skills, but also on the many other "whole officer" characteristics mentioned above (professional military education, civilian education, etc.). Unfortunately, many pilots who desire to fly only view these other promotion requirements as "economic bads" and as a result are encouraged to move to a job which allows them to concentrate on flying. This often leads them to leave for the civilian airlines.

Those who propose a Dual Track system believe it will improve the retention of pilots by developing a specialty status for those pilots interested in flying and not advancing in the current internal labor market structure. Indeed, the British Royal Air Force, Canadian Air Force, and German Luftwaffe use a similar structure successfully.[45] A Dual Track system would essentially provide pilots in the specialty track a "non-wage amenity" and improve the job attributes of the Air Force from the perspective of some pilots. Evans states:

> One of the strongest points of the proposed track, and one from which many of its other benefits flow, is the reduction of "up or out" pressure it affords . . .Consequently career pilots, not "bogged down" in accumulating promotion-driven requirements, will have more time to spend concentrating on the "art" of flying.[46]

Indeed, not only might this reduce pilot turnover, but allowing more concentration on flying skills could also increase the Air Force's output of national defense!

Air Force leadership has resisted developing a dual track system for several reasons. First, they fear that pilots in the second track may develop a mercenary image.[47] Second,

some fear that pay disparities between the two tracks would hurt morale.[48] Finally, some fear that the pilots in the fly-only track would be viewed as second-class citizens by their contemporaries.[49] These are the primary potential drawbacks of a dual track system.

While the Air Force has not adopted such a system, it is clear that "restructuring" the internal labor market as it pertains to pilots is one of the options which have been considered to increase pilot retention. This implies that there could be ways to improve the current structure of the Air Force's internal labor market in order to reduce the turnover of pilots.

The institutional structure of the Air Force is helpful in analyzing the pilot retention issue. It should be noted that other institutional issues (such as the role of the Air Force Reserves and Air National Guard) may impact the pilot retention issue and should also be considered when formulating policy. Furthermore, as the Air Force goes through significant changes during the current reduction in force, some institutional issues and Air Force policies (such as the Pilot Early Release Program) will impact pilot retention as well. While these issues have not been addressed, it is clear that the institutional structure used by the Air Force can impact pilot retention.

V. CONCLUSIONS

The policies and issues surrounding Air Force pilot retention have been discussed in this paper. The Air Force has a desire to reduce turnover among its experienced pilot force. Over the years, the Air Force has implemented many policies in an effort to increase retention, yet the retention rates of pilots continues to fluctuate wildly. Such fluctuations can make defense planning difficult.

The Air Force provides a significant amount of general and specific training to its pilots. The degree of specificity of training is correlated with the retention rates of pilots. Furthermore, the Air Force desires to realize an adequate return on its investment in training pilots. This is another reason why the Air Force would like to reduce its pilot turnover.

Without doubt, it has been demonstrated that the lifetime monetary compensation offered to pilots in the Air Force is far below that of pilots flying for a major airline. Additionally, there are many non-wage amenities and job attributes which are considered by Air Force pilots when they make career decisions.

Finally, the Air Force's labor market has many characteristics common to an internal labor market. Custom, on-the-job training, and skill specificity are common to the Air Force. Ports of entry and exit are present, as is a system where wages are attached to jobs. There is a strict promotion system which ensures members of the Air Force they

will be somewhat sh elded from external and internal competition. Yet, despite this structure, the Air Force clearly feels the effects of external labor market forces; the airline industry is a serious drain on Air Force pilot resources. Because of this, proposals have been made to restructure the ILM into a Dual Track system, but the implementation of this is not foreseeable.

Indeed, the Air Force should consider all the economic issues addressed above when developing policies to increase pilot retention. While it is unlikely that the Air Force will be able to compete monetarily with the airline industry in purchasing the services of pilots, it is clear that other policies, such as adjusting the structure of its internal labor market, or improving the job attributes for its pilots, may be alternative methods for improving retention.

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APPENDIX A

DEPENDENT VARIABLES: CCR and TARS statistics

INDEPENDENT VARIABLES:

C: INTERCEPT

SPEC: DUMMY VARIABLE FOR SPECIFIC TRAINING

FTR, BMB, HELO, TAL, TKR: DUMMY VARIABLES FOR TRAINING SPECIFICITY FOR EACH AIRCRAFT TYPE

YEAR: YEAR OF DATA

YEARSQ: YEAR SQUARED

UNEMP: CIVILIAN UNEMPLOYMENT RATE

D79 thru D92: INDIVIDUAL YEAR DUMMIES

APPENDIX A

DEP. VARIABLE: CCR

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	39.884	3.444	11.581
FTR	18.699	2.668	7.01
BMB	20.427	2.668	7.657
HELO	34.767	2.668	13.033
TAL	11.26	2.668	4.221
TKR	5.539	2.668	2.077
D79	-27.07	4.218	-6.413
D80	-6.533	4.218	-1.549
D81	2.083	4.218	0.494
D82	14.883	4.218	3.529
D83	23.267	4.218	5.516
D84	17.317	4.218	4.105
D85	6.799	4.218	1.612
D86	1.549	4.218	0.367
D87	-5.067	4.218	-1.296
D88	-9.599	4.218	-2.276
D89	-15.66	4.218	-3.714
D90	-15.55	4.218	-3.687
D91	-16.01	4.218	-3.821
D92	-9.883	4.218	-2.343
	R-SQUARED: .8820		

DEP. VARIABLE: TARS

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	9.739	0.47	20.703
FTR	2.144	0.364	5.884
BMB	2.323	0.364	6.376
HELO	4.277	0.364	11.726
TAL	1.371	0.364	3.763
TKR	0.613	0.364	1.683
D79	-2.218	0.576	-3.85
D80	0.022	0.576	0.038
D81	1.263	0.576	2.193
D82	2.543	0.576	4.414
D83	4.26	0.576	7.394
D84	2.748	0.576	4.77
D85	1.757	0.576	3.032
D86	1.53	0.576	2.656
D87	0.492	0.576	0.853
D88	0.355	0.576	0.616
D89	-0.423	0.576	-0.735
D90	-0.178	0.576	-0.309
D91	-0.922	0.576	-1.599
D92	-0.977	0.576	-1.695
	R-SQUARED: .8537		

APPENDIX A

DEP. VARIABLE: CCR

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	42.82	2.347	17.569
SPEC	19.031	3.447	5.521
	R-SQUARED: .2573		

DEP. VARIABLE: TARS

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	11.084	0.303	36.634
SPEC	2.252	0.428	5.263
	R-SQUARED: .2394		

DEP. VARIABLE: CCR

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	-2397.4	419.523	-5.741
FTR	18.699	3.263	5.73
BMB	20.427	3.263	6.259
HELO	34.767	3.263	10.654
TAL	11.26	3.263	3.45
TKR	5.539	3.263	1.698
YEAR	55.251	9.778	5.65
YEARSQ	-0.321	0.057	-5.64
UNEMP	8.689	0.789	11.015
	R-SQUARED: .7957		

DEP. VARIABLE: TARS

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT
C	-400.85	52.434	-7.645
FTR	2.144	0.408	5.257
BMB	2.323	0.408	5.696
HELO	4.273	0.408	10.476
TAL	1.371	0.408	3.362
TKR	0.613	0.408	1.501
YEAR	9.469	1.222	7.747
YEARSQ	-0.055	0.007	-7.747
UNEMP	0.883	0.099	8.959
	R-SQUARED: .7879		

APPENDIX B

BASIC PAY

YEARS OF SERVICE

PAY GRADE	8	10	12	14	16
O-10	$7,154	$7,550	$7,550	$7,550	$8,090
O-9	$6,339	$6,602	$6,602	$6,602	$7,154
O-8	$6,053	$6,339	$6,339	$6,339	$6,602
O-7	$4,953	$5,240	$5,502	$5,502	$6,053
O-6	$3,852	$3,852	$3,983	$3,983	$4,612
O-5	$3,303	$3,403	$3,827	$3,827	$4,113
O-4	$3,064	$3,273	$3,615	$3,615	$3,773
O-3	$2,959	$3,119	$3,353	$3,353	$3,353
O-2	$2,488	$2,488	$2,488	$2,488	$2,488
O-1	$1,963	$1,963	$1,963	$1,963	$1,963

	18	20	22	24	26
O-10	$8,090	$8,632	$8,632	$8,632	$9,170
O-9	$7,154	$7,550	$7,550	$7,550	$8,090
O-8	$6,889	$7,154	$7,330	$7,330	$7,330
O-7	$6,469	$6,469	$6,469	$6,469	$6,469
O-6	$4,848	$4,953	$5,240	$5,418	$5,684
O-5	$4,349	$4,841	$4,637	$4,637	$4,637
O-4	$3,878	$3,878	$3,878	$3,878	$3,878
O-3	$3,353	$3,353	$3,353	$3,353	$3,353
O-2	$2,488	$2,488	$2,488	$2,488	$2,488
O-1	$1,963	$1,963	$1,963	$1,963	$1,963

AVIATION CAREER INCENTIVE PAY

PHASE 1		PHASE 2	
MONTHLY RATE	YEARS OF AV SERVICE	MONTHLY RATE	YEARS OF AV SERVICE
$125	2 OR LESS	$585	>18
$156	>2	$495	>20
$188	>3	$385	>22
$206	>4	$250	>25
$650	>6		

BASIC ALLOWANCE FOR SUBSISTENCE: $139.39 per month

BASIC ALLOWANCE FOR QUARTERS
(WITH DEPENDENTS)

PAY GRADE	MONTHLY RATE
O-6	$792.30
O-5	$763.50
O-4	$673.20
O-3	$557.10
O-2	$475.80
O-1	$425.10