I Want You! (but not you): Selection in Military Retention

Christina Patterson, Research Proposal for NBER Pre-Doctoral Fellowship Program for the Economics of an Aging Workforce.

Project joint with Jonathan Petkun (MIT) and William Skimmyhorn (USMA)

Introduction: In recent years, policymakers and pundits have expressed concern that the U.S. military is failing to retain its best and brightest commissioned and non-commissioned officers. Explanations for this phenomenon vary. Some observers place the blame on the military's compensation and benefits structures, including a pension that vests steeply after twenty years, when workers in most areas of the economy are in their mid-careers. Others blame a personnel management system that inadequately rewards talent. Despite the proliferation of opinions, there is little concrete evidence on the magnitude, causes, and consequences of selection in military retention.

More broadly, we know relatively little about how to retain high quality public servants, especially as they reach mid-career. Many public employees, including members of the military, have pension plans that encourage them to leave their careers at relatively young ages and to transition either out of the labor force or into other sectors for the rest of their careers. These mid-career transitions are likely costly to public agencies that are losing some of their most experienced workers. In addition, these transitions may be costly to the workers themselves – they may be better off leaving the public workforce, but still face a penalty relative to workers who started in the private sector. Understanding costs on both sides is important for both designing the right policies to maximize productivity in the public sector and for understanding the changing costs of worker transitions over the age gradient.

The military, in particular, has many policies at its disposal that it uses to recruit and retain workers, from lump sum bonuses to promises of future benefits such as pensions. Indeed, several studies have leveraged such policies to study retention elasticities. However, this literature focuses solely on how many people are retained, with no mention of who. We propose to fill this gap, which is a fertile ground in which to understand not only the military, which is independently important, but also, more broadly, to understand public sector retention and the costs of mid-career transitions by workers of different skill levels.

Specifically, we believe that this project will make three main contributions. First, we will provide estimates of the elasticity of personnel quality with respect to a wide array of retirement benefits in the military. From a public finance point of view, this is important, as the military accounts for 3 percent of GDP and military compensation alone accounts for 0.8 percent of GDP. Since studies have shown that personnel ability is important for military production (e.g. Wigdor and Green 1991), understanding the effect of changes in military benefits is extremely policy relevant. Indeed, just 3 weeks ago, President Obama signed the 2016 National Defense Authorization Act, which will greatly change the nature of military retirement in 2018. This research will both help inform the potential effects of that policy, and can be extended to evaluate its actual effects once implemented.

Second, and more broadly, this research will provide estimates of how retirement packages, among other benefits, affect worker quality. While these estimates come from the military, we believe the empirical strategy and our resulting estimates can be applied to other public sectors where future compensation promises loom large, such as education or law enforcement. While it is well understood by the private sector that higher wages attract

better talent, it is less well understood how worker quality responds to future compensation, especially in sectors where current wages are often less than one's outside options and individuals may have "tastes for service" that complicate the relationship between retention and compensation. Since military retirement (as with other careers where pensions vest early) often occurs in middle age, the military is at high risk of losing its best and most productive workers to retirement.[1] Therefore, these quality retention elasticities will be valuable for understanding how to retain skilled workers towards the end of their careers.[2]

Third, the military is a promising laboratory in which to study the career transitions of older workers. Since retirees from the military rarely retire from the workforce entirely, we are able to accurately observe the career decisions of a large set of older workers, with an array of skills from all over the country. We propose to use this laboratory to explore how broader trends in the civilian labor market, such as increasing job polarization or increases in female labor force participation, have affected older workers. For example, by focusing on how the reenlistment decision of older service members responds to the relative erosion of middle-skill manufacturing jobs in their home labor markets, we will shed light on the adjustment costs borne by older workers facing labor market shocks.

Data In order to explore the causes and consequences of military selection, we must observe reenlistment decisions, measures of individual quality or productivity, and other individual characteristics that may be important determinants of this decision. We have secured access to this data through a recent partnership with the Office of Economic Manpower Analysis (OEMA) at United States Military Academy. Using the Total Army Personnel Database, we have constructed a panel from 1992 through 2015 of all enlisted army personnel. The data includes their demographic information (age, marital status, home of record, AFQT, education, occupation, etc) and career trajectories within the military (deployments, promotions, rank, separations, etc). OEMA is also in the process of matching this dataset to Social Security data, which will allow us to observe post-military earnings as well.

Empirical Approach The ideal experiment to test for selection into and out of the military would be to randomly change one's expected return to staying in the military in a way that is uncorrelated with individual ability. We would then look at the change in the average ability or productivity of those who choose to stay in the military before and after the change. Since this group endogenously changes in response to the change in the policy, we would conclude that any changes in the ability distribution after the policy was caused by the policy.[3] Specifically, we would estimate an equation of the following form for either stayers only or leavers only:

$$z_i = \alpha + \delta E[W_i^m - W_i^c] + \beta X_i + u_i \tag{1}$$

where z_i is a measure of ability (e.g. AFQT) or productivity (e.g. non-military wages for leavers), $E[W_i^m]$ is expected total military compensation, $E[W_i^c]$ is expected total civilian compensation, and X_i is the full set of observables used in the military's compensation decision. The identifying assumption underlying this specification is that, conditional on

[1] In FY2014, the average active duty non-disability service member retires at 43 while the average officer is 47 years old (Kamarack 2015).

[2] This contrasts with most retirement policies studied in the literature, where the decision is made later in life and generally after the individual's prime earning years.

[3] This empirical specification is similar in spirit to Gruber, Levine and Staiger (1999) and the "downard cost curve" test of Einav, Finkelstein and Cullen (2010).

observables, changes in the relative returns to staying in the military are uncorrelated with individuals' ability types. We propose to leverage quasi-experimental variation both within and outside the military that we will argue closely approximate this ideal experiment.

Fortunately for us, the military applies coarse and well-documented compensation schemes, and, in order to meet manpower requirements, varies these policies frequently. This provides rich and plausibly exogenous variation in $E[W_i^m]$, the expected return to staying in the military. The first variation we plan to exploit comes from the selective reenlistment bonuses (SRB), which are cash retention incentives offered to service members who reenlist for a specified period of time. The availability and size of a bonus depends on several factors including rank, military occupational specialty, years of service (YOS), and the duration of the new contract. Importantly, these bonuses are not tailored to the individual level. As Figure 1 shows, SRB offers change frequently and at irregular intervals, creating a great deal of variation. The second source of within-military variation we intend to leverage are changes in future benefit packages that frequently accompany drawdowns. Specifically, we plan to exploit changes in Temporary Early Retirement Authority (TERA), which allows eligible services members to receive a reduced pension with less than the usually required 20 years of service. As Figure 2 shows, this program was extensively taken up after the Gulf War. Lastly, we also plan to exploit variation in health insurance benefits (specifically TRICARE for life) and education benefits for dependents (specifically the post 9/11 GI bill), both of which stipulate year of service thresholds and which were reformed over our sample period. Examples of Equation 1 using this variation are:

$$\text{AFQT}_{i|stay} = \alpha + \delta \text{SRB}_i + \beta X_i + u_i \tag{2}$$

$$\text{Post-Mil. Wage}_{i|leave} = \alpha + \delta \text{TERA-Eligible}_i + \beta X_i + u_i \tag{3}$$

Outside the military, we plan to leverage shocks to expected civilian labor force compensation that change the relative return to reenlisting in the military by varying $E[W_i^c]$, the expected return to leaving the military. Specifically, we plan to use the Chinese import shocks as a shifter of civilian labor force compensation (Autor, Dorn and Hanson 2013). The intensity with which these shocks affect a service member depends on their skill level as well as their home location, as the industry mix in local labor markets makes some areas more exposed to trade than others. Estimates of how re-enlistment varies with these shocks will shed light on the costs of these shocks on older workers. We believe that this analysis will provide new evidence about mid-career transitions, the extent of skill transferability across similar occupations (e.g. military truck driver to commercial driver), and the evolving costs of these transitions over one's career. We will also be able to examine changes not only in the likelihood of separation from the military, but also, conditional on separation, whether retirees with a pension engage in other forms of work, which will provide some evidence about the effects of early retirement programs on overall labor supply.

Conclusion In this project, we will use several different empirical methods and novel data to explore how the quality of military personnel responds to both retirement policies within the military and trends in civilian labor markets. This project will not only help inform the military's policies, but it will also enhance our understanding more generally of retirement benefits and the career transitions of older workers.

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Figures

Figure 1: Variation in Selective Reenlistment Bonuses for Selection Military Specialties

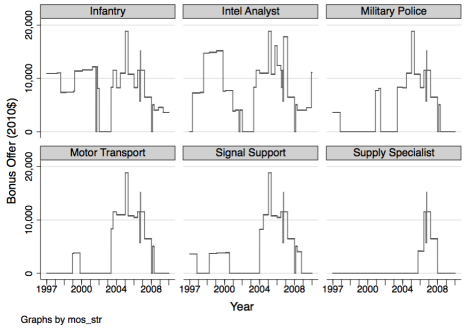
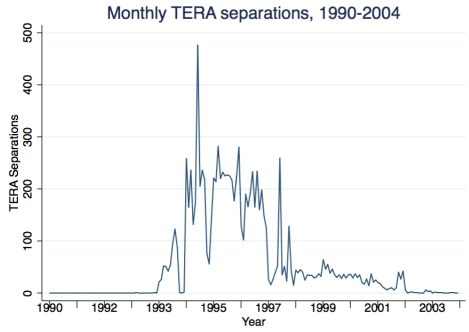


Figure 2: Actual Take-Up of the Temporary Early Retirement Program (TERA)



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EDUCATION

2013 - PhD, Economics. Massachusetts Institute of Technology, expected completion in 2018

2007-2011 B.A., Mathematics and Economics (*magna cum laude*), Columbia University
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AWARDS AND FELLOWSHIPS

2015 National Science Foundation, Graduate Research Fellowship, Honorable Mention
2013-2015 MIT Department of Economics Fellowship
2011 Romine Prize for Best Undergraduate Thesis in Economics
2011 Columbia University Economics Departmental Honors
2011 Phi Beta Kappa

RESEARCH POSITIONS

2013 - Research Assistant to David Autor, MIT
2012-2013 Senior Research Analyst, Federal Reserve Bank of New York
2011-2012 Research Associate, Federal Reserve Bank of New York
2010 Summer Student, Institute for Fiscal Studies

WORKING PAPERS

"Working Hard in the Wrong Place: A Mismatch Based Explanation to the U.K's Productivity Puzzle" (Joint with Aysegul Sahin, Giorgio Topa and Giovanni Violante), August 2015. *Forthcoming, European Economic Review*.

"Job Search Behavior Over the Business Cycle" (Joint with Toshihiko Mukoyama and Aysegul Sahin), Federal Reserve Bank of New York Staff Reports, August 2014.

"The Forward Guidance Puzzle" (Joint with Marco Del Negro and Marc Giannoni), Federal Reserve Bank of New York Staff Reports, October 2012.

OTHER WRITING

"Why is the Job Finding Rate Still So Low?" (Joint with Victoria Gregory, Aysegul Sahin and Giorgio Topa), *Federal Reserve Bank of New York Liberty Street Economics*, February 2014

"Is Job Polarization Holding Back the Labor Market?" (Joint with Stefania Albanesi, Victoria Gergory and Aysegul Sahin), *Federal Reserve Bank of New York Liberty Street Economics*, March 2013

"The Bathtub Model of Unemployment: The Importance of Labor Market Flow Dynamics" (Joint with Aysegul Sahin), *Federal Reserve Bank of New York Liberty Street Economics*, March 2012.

TEACHING EXPERIENCE

2010	Intermediate Macroeconomics, Columbia University, TA for Xavier Sala-i-Martin
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Dear Sir or Madam:

I am writing on behalf of **Christina Patterson**, a third-year PhD student in economics at MIT who is applying to the NBER Pre-Doctoral Fellowship Program on the Economics of an Aging Workforce. Christina is a labor economist with strong interests in applied macroeconomics. I am very pleased to have the opportunity to highly recommend Christina as an extremely bright student that I think would strongly benefit from the opportunity afforded by this fellowship.

Christina was an undergraduate double major in mathematics and economics at Columbia University, where she graduated with a near-perfect (3.958) GPA. She then worked for two years as a research assistant at the NY Federal Reserve Bank. I remember reading her admissions folder when she applied to MIT, and her letters of recommendation from her economics supervisors at the Fed were glowing (as evidenced by her being made a co-author on several of the projects she worked on while at the Fed, as you can see from her CV). Based on that strong record, she received an MIT graduate fellowship and has earned strong grades in all of her coursework at MIT. She earned a strong A in the graduate labor economics course that I co-teach with David Autor, and her work in that course was truly outstanding. I think this record makes clear that she is both quite bright and extremely hard working.

Christina's progress on independent research is ahead of where most students are at her point in her graduate school career. In addition to the research project that is the focus of her fellowship proposal, Christina has made quick progress on a very interesting and promising research project looking at how the distribution of tasks may insure some workers better than others against industry-specific labor market shocks. For both of these projects, Christina has proved to be quite entrepreneurial and mature in the research process, working extremely well independently to identify economically interesting questions, be agile with using appropriate theoretical frameworks to think through the relevant concepts, work quickly but carefully on pulling together a relatively wide variety of datasets, and thinking clearly through how to design appropriate empirical tests. While still quite early in her graduate career, I'm quite optimistic that she is on an excellent trajectory to be a very promising applied economist working at the intersection of micro and macroeconomics.

Most of my interactions with Christina have been focused on the project that is the focus of her proposal, so let me say a bit more specifically about that project. Together with another of MIT's economics PhD students (Jonathan Petkun), Christina is proposing to examine selection in military retention. The broad goal is to use some classic frameworks – such as the Roy model – to understand how the US military can retain high-quality workers, and what impact policy reforms that are currently under consideration – such as a major change to the military pension system – might affect the quality of our military force. As I'm sure you know, there is a long and well-established literature investigating the elasticity of retention (i.e. "how many bodies" are retained for a given change in military wages, as in Charlie Brown's 1985 *AER* paper); however, much less is known about quality (i.e. "who do we retain and who do we lose" for a given change in military pension benefits). A priori, the quality question is likely to be important given evidence from a 1991 *National Academies* report (Wigdor-Green) that documented evidence that AFQT scores showed strong correlations with objective measures of performance across essentially all military occupational specialties.

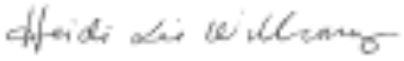
In order to shed light on this quality question, Christina and Jon navigated a way to use a large number of detailed administrative datasets on the US Army through a collaboration with LTC Bill Skimmyhorn, an economist at the US Military Academy. To the best of my knowledge, this data has not previously been made available to non-military student researchers, so accessing this data is itself quite a feat. These rich datasets include a variety of ability proxies (including AFQT scores), and Jon and Christina are proposing combining these data with a variety of policy changes in order to test for positive or negative selection out of the military in response to changes in the relative returns to military service. They are proposing to integrate this variation into a structural model of retention behavior (as in Rust-Phelan 1997 and Daula-Moffitt 1995) in order to (prospectively) investigate proposed reforms to the military pension and retirement plans.

Christina's co-author Jon recently presented a very early stage version of this project at the MIT public finance lunch, and got quite positive feedback on the proposal. I should say that several of the sources of policy variation they are proposing have already been found to have a strong "first stage" in terms of the quantity margin of retention (such as the Selective Reenlistment Bonuses, studied in a recent paper by Michael Greenstone, Steven Ryan, and Michael Yankovich), which means that I think there is very little risk that Christina and Jon won't have an interesting and valuable paper come out of this effort. My expectation is that this would be a first paper in a stream of papers that Christina and Jon would pursue on related topics using this data.

I think Christina is a very promising student that would greatly benefit from the opportunity afforded by this pre-doctoral fellowship program. I hope that you will give her the opportunity – especially given that she is still early in her graduate career, I suspect that this opportunity could greatly shape her research agenda. She is also quite personable/friendly, and a pleasure to work with.

Please do not hesitate to contact me if I can be of further assistance.

Sincerely,



Heidi Williams