

Making Big Decisions: The Impact of Moves on Marriage among U.S. Army Personnel ⁱ

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Online Appendix

i. The views expressed herein are those of the authors and do not represent the U.S. Military Academy, the Department of the Army, the Department of Defense, or the Federal Reserve Bank of Minneapolis or the wider Federal Reserve System. All errors are of course our own.

Appendix A. Additional Background on Marriage Benefits in the Army and the Five Years of Service Sample

Marriage Benefits in the Army

MacDermid Wadsworth et al. (2018) document that the U.S. military views families as a key partner in defense readiness under the all-volunteer force. In particular, they note that Department of Defense directives "... specify an extensive list of required programs and services aimed at supporting families, including deployment support, relocation assistance, childcare at subsidized rates, education, care for family members with special needs, programs to improve spouses' access to jobs and careers, counseling, and financial planning assistance." Despite this assistance, MacDermid Wadsworth et al. document that, since 1980, marriage rates in the military had generally converged towards those of civilians, perhaps in part, as they note, because the stress, long hours, and unpredictability of military life may counter the generally supportive environment for marriage within military policy.¹

The Army supports marriages in a number of ways that differ from the civilian population. First, enlisted soldiers of lower ranks are typically required to live in on-post housing (barracks). If the individual gets married, however, she is allowed to move off post with her spouse.² Second, those living off-post receive tax-free housing pay (BAH), in addition to their regular pay, and married soldiers receive a larger BAH than those without dependents.³ BAH is set by duty location, and an individual without dependents will receive at least 75% of what a soldier with a family will receive.⁴

Family members also receive free health care through TRICARE (the military health care system). As soldiers are often separated from their family for deployments and trainings, during these time periods a soldier is compensated with a \$250 monthly family separation allowance.⁵ When the Army moves a soldier to a new post, the Army will pay for the whole family and their belongings travel to the new

¹ Segal and Segal (2004) describe the military as a "greedy" organization that "requires great commitment, time, and energy." Specifically, they discuss the risk of injury or death, separation from family, relocations, residence in foreign locations, long and unpredictable hours, the need to conform, and the masculine nature of the institution. (p. 32-33)

² In some rare situations, on-post housing is overcapacity and soldiers are allowed to move off post.

³ Housing pay does not increase with the number of dependents.

⁴ For a description of how BAH is calculated, see <http://www.defensetravel.dod.mil/Docs/perdiem/BAH-Primer.pdf>

⁵ Military Pay Charts over Time: <http://www.dfas.mil/militarymembers/payentitlements/military-pay-charts.html>

destination, either by car or plane.^{6 7 8} Because of these added benefits from marriage, it is possible that some marriages form fraudulently. These added benefits, however, would not differentially effect movers versus non-movers. The only added benefit from being married during a move is a greater weight allowance on a move, an incentive that is likely not great enough to impact marriages.

As servicemembers are compensated more while married there is an incentive to get and stay married.⁹ If a couple is married for ten years while serving, the spouse may be eligible for half of the servicemembers' retirement pension. Eligibility for this benefit depends on the state where the individual applies for divorce, although they have a choice over where they apply (home state, previous state where they lived, etc.).

Patterns of marriage and divorce among military members have been examined by previous researchers. However, a strong consensus about these patterns has yet to emerge. This is likely due in part to the fact that participation in the institutions of marriage and the military has changed dramatically across cohorts, so even the basic patterns from descriptive analysis are sensitive to the time period under study. Consistent with this, MacDermid Wadsworth et al. (2018) shows that marriage rates among enlisted military members were considerably below those of the civilian population prior to the 1990s, then rose to levels above those of the civilian population, before converging back to levels closer to, but still above, those of civilians by 2002. Papers focusing on the late 1990s and 2000s find that marriage rates in the military, particularly in samples restricted to males, consistently exceed those of civilians.¹⁰ The differences in marriage rates between civilians and the military have been attributed to differences in selection, younger ages of first marriage among military members, and substantial benefits for marriage in the military. Researchers have also examined divorce propensity across military and civilian populations. Using longitudinal data from the NLSY79, Lundquist (2007) finds that marriages within a military employment spell are more likely to divorce as compared to a matched sample of civilians. However, other researchers find that divorce rates are

⁶ An E4 soldier with a dependent gets an extra 1,000 pounds to transport, an additional \$830 in Dislocation Allowance Pay.

⁷ Dislocation Allowance (DLA) by rank and year can be found here:
<http://www.defensetravel.dod.mil/site/otherratesDLA.cfm>

⁸ Weight Allowances: <http://www.belvoir.army.mil/jppsoma/files/Outbound/WeightAllowance.pdf>

⁹ Article 134 of the Uniform Code of Military Justice (UCMJ) states that adultery is a punishable offense, although enlisted soldiers are not often prosecuted.

¹⁰ See Karney, Loughran, and Pollard (2012) for a summary.

similar for military members and civilians (Karney, Loughran and Pollard 2012). Similarly, there is disagreement in the literature as to whether deployments increase the likelihood of divorce (Karney and Crown 2007; Negrusa, Negrusa and Hosek 2014).¹¹

Previous papers have also examined the relationship between moves in the military and spousal employment, which could relate to family structure decisions. While causality has not been established, it has been well documented that being a military spouse is associated with higher levels of unemployment and lower wages (see, for example, Castaneda and Harrell (2008), Lim et al. (2007), Wardynski (2000), and Harrell et al. (2004)). Inability to find a job as a result of moves could lead to fewer spouses wanting to marry military members or, once married, increases in familial stress as spouses struggle to obtain or maintain a job. Castaneda and Harrell (2008) report the most common reasons for working are related to paying expenses and personal fulfillment, but also boredom. Employment availability in an assigned location may play a significant role in a spouse's happiness.¹²

Appendix B. Detailed Discussion of Sample Summary Statistics

The military has traditionally been male dominated, and consistent with that women make up only 13% of our sample. The Army also has a long history of disproportionately high service from African-Americans. Nearly 20% of our overall sample is black, but these rates differ markedly between men and women with a larger share of women (38%) being African American. The Armed Forces Qualification Test (AFQT) is given to all soldiers entering the military. It measures cognitive ability, helps screen individuals into the Army, and helps determine their military occupation within the Army. In our sample, the average AFQT was 60 (the cutoff for entering the Army is a score of 30, and the highest is 100). Women in our sample score slightly lower than men on average. This difference

¹¹ Some of these differences are likely due to differences in data sources, with some researchers relying entirely on publicly available data such as the CPS and NLSY for both military and civilian samples, and others having access to military personnel data for the military population statistics. Neither is obviously better, as the advantage of higher quality administrative data in military personnel records may be offset by the challenge of trying to construct comparable statistics from public data on civilians.

¹² There is also a literature on the impact of combat deployments on military families. Angrist and Johnson (2000) use military survey data and find that deployments of a male soldier decrease wives' employment rates but that deployments of female soldiers are associated with no change in husband's employment. Deployments of female soldiers are, however, associated with higher rates of divorce. A recent study by RAND finds that marital stress increases during deployments, but marital satisfaction is similar when compared to eligible soldiers who did not deploy (Meadows et al. 2016).

represents about a 3.4 point higher mean for men (56.70 versus 60.10). Although the difference is statistically different at the 1% level, it is economically small when compared to a standard deviation on AFQT score of nearly 20 points for both women and men.

Men and women in our sample are similar on a number of other characteristics. The average soldier is 26 years old, and 10-13% are Hispanic. Because we limit our sample to enlisted individuals, 76 percent are high school graduates, and roughly another 9 percent have some post-secondary education but no BA. The shares with other levels of educational attainment are small. About 20 percent of our sample is still serving a first term without having renewed; the remaining 80 percent have re-enlisted. Ultimately, roughly one-third to one-half stay for at least ten years. In our sample, which is censored to include people who are still in the Army, the average soldier is observed in the Army for 8.4 years.

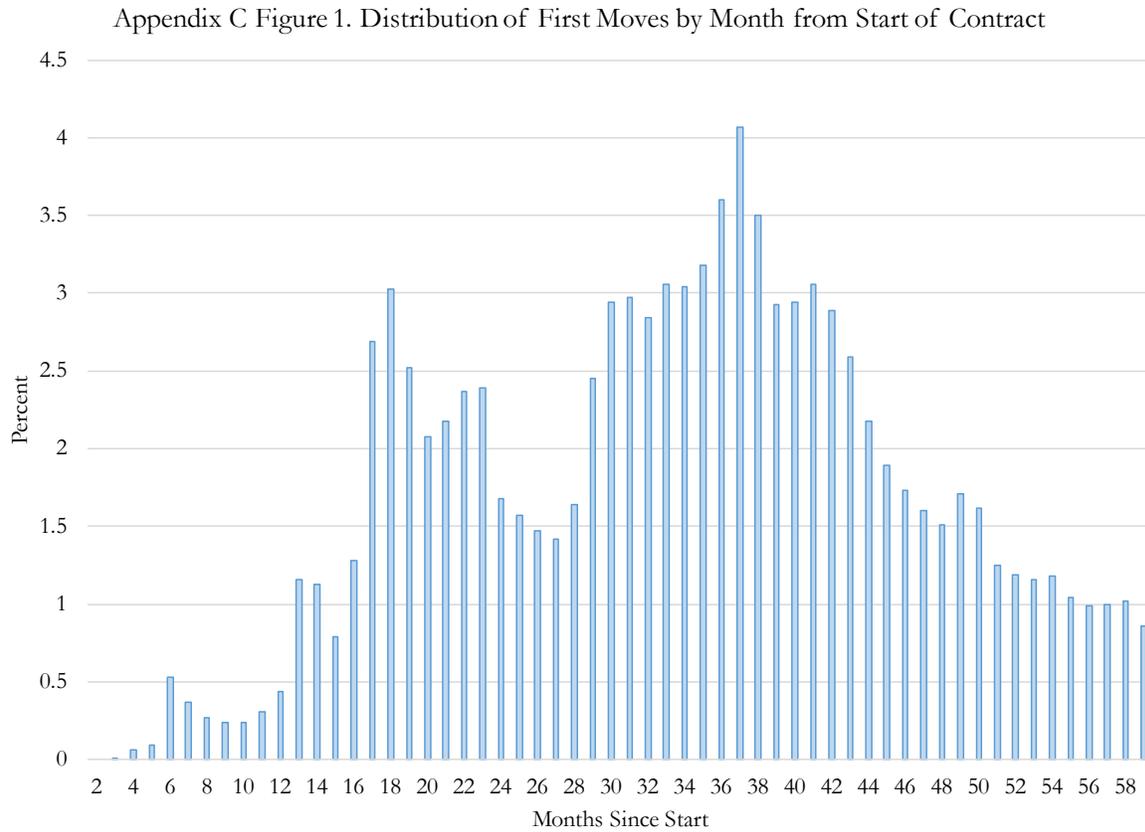
By the time women and men reach five years of Army service, they face notably different family structures. Women in our sample are much more likely to be married to another service member. Women and men in our sample marry at similar rates, but women are more likely to divorce in that period.

Table B1: Summary Statistics for the Five Years of Service Sample of Enlisted Army Members

	All	Men	Women
Panel A: Demographics			
Female	0.13	0	1
Age	26.03 (3.76)	26.01 (3.72)	26.15 (4.07)
Black	0.20	0.17	0.38
Hispanic	0.12	0.12	0.13
Other Race	0.06	0.06	0.08
AFQT Score	59.65 (19.08)	60.1 (19.18)	56.7 (18.11)
GED	0.1	0.11	0.05
High School Dropout	0.01	0.01	0.00
High School Graduate	0.76	0.76	0.75
Some College / Associates	0.09	0.09	0.15
College Plus	0.03	0.03	0.05
Ever Deployed	0.69	0.72	0.53
Months Deployed	10.3 (8.81)	10.78 (8.81)	7.14 (8.16)
In First Contract, Not Yet Renewed	0.19	0.19	0.21
Stay in through 10 Years of Service	0.44	0.46	0.36
Total Years of Service	8.40 3.72	8.45 3.75	8.05 3.49
Currently married to another Military Member	0.07	0.04	0.26
Ever Married to another Military Member	0.10	0.06	0.38
Total Moves	0.58 (0.62)	0.58 (0.62)	0.62 (0.62)
Panel B: Outcomes			
Ever Married Not Married when Enter	0.55	0.55	0.59
Married at 5 Years Not Married when Enter	0.53	0.53	0.52
Married at 5 Years	0.61	0.62	0.57
Age Married Not Married when Enter	23.13 (3.09)	23.21 (3.07)	22.64 (3.14)
Ever Have Dependent Child No Dependent Children when Enter	0.37	0.37	0.34
Dissolve Marriage Ever Married during 5 Years	0.09	0.07	0.22
N	182,694	158,592	24,102

Note: Department of Defense Data. Includes active duty enlisted soldiers that stay in the Army for at least 5 years of service who are never stationed abroad. Standard deviations are in parentheses below the means for continuous variables.

Appendix C. Robustness Analysis and Alternative Specifications



Note: Appendix C Figure 1 reports a histogram of the time soldier have from when they start until their first move during their first five years. The sample only includes soldiers who initially sign up for three year term lengths.

Table C1: Alternative Clustering Methods for Main Table 4 Impacts

	Ever Married	Married at 5 Years	Married at 5 Years
	Not Married when Enter	Not Married when Enter	All
Domestic Moves	0.079	0.075	0.064
Robust Standard Errors	(0.002)	(0.002)	(0.002)
Cluster on First Location	<0.012>	<0.012>	<0.010>
Cluster on First Location x Year	[0.004]	[0.004]	[0.004]
Cluster on Job x Rank x Year	{0.003}	{0.003}	{0.002}
Observations	144,254	144,254	182,694
R-squared	0.129	0.124	0.141
Mean	0.55	0.53	0.61
Indep Mean	0.57	0.57	0.58

Notes: This table reports results from Table 4 for the full sample of enlisted soldiers who stay through a 5 year term length. Below the coefficient, Robust standard errors are included in (); standard errors clustered on first location of assignment are included in <>; standard errors clustered on first location interacted with first year of assignment are in []; and standard errors clustered on job x rank x year interactions are included in {}.

Table C2: Table 4 Analysis with Clustering on Job x Rank x Year

	(1)	(2)	(3)	(4)
	All	Male	Pre-9/11	Term 6 Sample
Panel A: Ever Married Not Married when Enter				
Total Number of Moves	0.079*** (0.003)	0.085*** (0.003)	0.092*** (0.004)	0.061*** (0.009)
Observations	144,254	125,395	64,311	17,774
R-squared	0.129	0.116	0.162	0.255
Mean of Marriage Rates	0.55	0.55	0.52	0.50
Average Number of Moves	0.57	0.56	0.66	0.41
Panel B: Marriage at 5 Years Not Married when Enter				
Total Number of Moves	0.075*** (0.003)	0.082*** (0.003)	0.087*** (0.004)	0.057*** (0.009)
Constant				
Observations	144,254	125,395	64,311	17,774
R-squared	0.124	0.111	0.156	0.248
Mean of Marriage	0.53	0.53	0.50	0.48
Average Number of Moves	0.57	0.56	0.66	0.41
Panel C: Marriage at 5 Years				
Total Number of Moves	0.064*** (0.002)	0.071*** (0.002)	0.076*** (0.003)	0.047*** (0.008)
Observations	182,694	158,592	80,774	22,267
R-squared	0.141	0.134	0.172	0.255
Mean of Marriage	0.61	0.62	0.59	0.57
Average Number of Moves	0.58	0.58	0.67	0.41

Notes: This table reports coefficients on the number of moves someone experiences during their first five years in the Army from a linear probability model. The data includes those who enlist between 1991 and 2008. The dependent variable is denoted in the title of each panel. Panels A and B include everyone that stays in the Army for 5 years who was not married when they entered, Panel C includes the full five years of service sample. Each regression includes controls for education, AFQT score, race, deployment months, age, age squared, as well as full interactions of job, rank, year, and sex. ***, **, and * denotes significance at the 1%, 5%, and 10% level respectively with standard errors clustered by the interaction of job x rank x year reported in parentheses below the coefficient.

Table C3: The Effect of Number of Moves on Marriage with and without Demographic Controls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All		Male		Pre-9/11		Term 6 Sample	
Panel A: Ever Married Not Married when Enter								
Total Number of Moves	0.087*** (0.002)	0.079*** (0.002)	0.094*** (0.002)	0.085*** (0.002)	0.098*** (0.004)	0.092*** (0.004)	0.070*** (0.008)	0.061*** (0.008)
Observations	144,254	144,254	125,395	125,395	64,311	64,311	17,774	17,774
R-squared	0.118	0.129	0.103	0.116	0.152	0.162	0.239	0.255
Mean of Marriage Rates	0.55	0.55	0.55	0.55	0.52	0.52	0.50	0.50
Average Number of Moves	0.57	0.57	0.56	0.56	0.66	0.66	0.41	0.41
Oster Adjust Coefficients	0.051		0.061		0.063		0.018	
Panel B: Married at 5 Years Not Married when Enter								
Total Number of Moves	0.083*** (0.002)	0.075*** (0.002)	0.090*** (0.002)	0.082*** (0.003)	0.094*** (0.004)	0.087*** (0.004)	0.067*** (0.008)	0.057*** (0.008)
Observations	144,254	144,254	125,395	125,395	64,311	64,311	17,774	17,774
R-squared	0.114	0.124	0.099	0.111	0.147	0.156	0.235	0.248
Mean of Marriage	0.53	0.53	0.53	0.53	0.50	0.50	0.48	0.48
Average Number of Moves	0.57	0.57	0.56	0.56	0.66	0.66	0.41	0.41
Oster Adjust Coefficients	0.045		0.060		0.051		0.000	
Panel C: Married at 5 Years								
Total Number of Moves	0.074*** (0.002)	0.064*** (0.002)	0.081*** (0.002)	0.071*** (0.002)	0.084*** (0.003)	0.076*** (0.003)	0.058*** (0.007)	0.047*** (0.007)
Observations	182,694	182,694	158,592	158,592	80,774	80,774	22,267	22,267
R-squared	0.107	0.141	0.094	0.134	0.134	0.172	0.212	0.255
Mean of Marriage	0.61	0.61	0.62	0.62	0.59	0.59	0.57	0.57
Average Number of Moves	0.58	0.58	0.58	0.58	0.67	0.67	0.41	0.41
Oster Adjust Coefficients	0.052		0.061		0.065		0.027	

Notes: This table reports coefficients on the number of moves someone experiences during their first five years in the Army from a linear probability model. The data includes those who enlist between 1991 and 2008. The dependent variable is denoted in the title of each panel. Panels A and B include everyone that stays in the Army for 5 years who was not married when they entered, Panel C includes the full five years of service sample. All columns include full interactions of job, rank, year, and sex. The even columns includes controls for education, AFQT score, race, deployment months, age, age squared, as well as full interactions of job, rank, year, and sex. ***, **, and * denotes significance at the 1%, 5%, and 10% level respectively with robust standard errors reported in parentheses below the coefficient.

Appendix C.4. Non-Linearities of Additional Moves and International Moves

The table below (Appendix Table C4) looks at the effects of moves taking into account the fact that additional moves may have a non-linear impact on marriage. Column 1 includes our main results and Column 2 includes a dummy whether there was “any move.” Having any move increases the likelihood of marriage by 9.8 percentage points. Column 3 conditions on those who have at most one move and Column 4 conditions on having at most three moves and includes dummies for having 1, 2, or 3 moves compared to having no moves at all. In both columns, a single move increases the likelihood of marriage by 9.3 percentage points. Having two moves increases marriage rates by 13.3

percentage points and having three moves increases it by 15.7 percentage points, suggesting that additional moves increase the likelihood of marriage, but at a diminishing rate.

Table C4: Non-linear & International Impacts of Moves

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Domestic				Including Abroad Moves		
	All	All	Max 1 Move	Max 3 Moves	All	All	Max 1 Move
Moves	0.079*** (0.002)				0.0103*** (0.0013)		0.0495*** (0.0025)
Any Move		0.097*** (0.003)				0.043*** (0.002)	
One Move			0.093*** (0.003)	0.093*** (0.003)			
Two Moves				0.133*** (0.006)			
Three Moves				0.157*** (0.023)			
Observations	144,254	144,254	134,996	144,192	281,163	281,163	206,451
R ²	0.129	0.129	0.131	0.130	0.0879	0.089	0.1051
Mean of Outcome	0.55	0.55	0.55	0.55	0.53	0.53	0.53

Notes: This table reports coefficients on the number of moves someone experiences during their first five years in the Army from a linear probability model. The sample restricts to individuals who were not married when they entered. Columns 1, 2, 5, and 6 include all moves. Columns 3 and 7 restrict to the sample that has at most one move during the five years and One Move is an indicator variable equal to one if they have one move. Column 4 restricts to a max of three moves with each variable representing an indicator variable. Each regression includes controls for education, AFQT score, race, deployment months, age, age squared, as well as full interactions of job, rank, year, and sex. ***, **, and * denotes significance at the 1%, 5%, and 10% level respectively with robust standard errors reported in parentheses below the coefficient.

In columns 5 to 7, we expand our sample to include soldiers who are relocated abroad to explore further differences in the impact of moves by distance and frequency. In this sample, additional moves can be either domestic to the US (as was the case in all previous estimates) or international (defined as Germany or Italy, where spouses are typically allowed to accompany a soldier). As shown, even when including international moves, there is a positive effect on marriage rates.

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