



NAVAL
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Assessing the Effects of Individual Augmentation on Navy Retention

Ron Fricker & Sam Buttrey

West Point

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What is Individual Augmentation?

- Individual sailors and officers sent to augment other (often non-Navy) units
- Differs from usual deployments
 - Individual vice unit deployment
 - Often with little notice
- Then-CNO Admiral Mullen:



“I see this as a long-term commitment by the Navy. I’m anxious to pitch in as much as we possibly can, for the duration of this war. Not only can we do our share, but [we can] take as much stress off those who are deploying back-to-back...”¹

1 “CNO to Sailors: IAs critical to War on Terror,” Navy Newsstand, story number NNS070123-10, release date 1/23/2007 8:31:00 p.m. Accessed on-line at www.news.navy.mil/search/display.asp?story_id=27425 on 8 March 2007.



Research Question: Does IA Affect Navy Retention?

- With almost 20,000 AC sailors and Navy officers IA deployed in the past 6 years, Navy leadership interested in whether it's hurting retention
- RADM Masso, Deputy Chief of Naval Personnel:

“Since 2002, 82 percent of our IA’s have come from the Reserve component, yet I see letters of resignation from officers listing a fear of IA duty as being the reason they are getting out. IA duty affects two percent of the surface warfare officer (SWO) community, yet if you speak to a junior officer on the waterfront, you would think that half of their wardroom are IA’s.”²



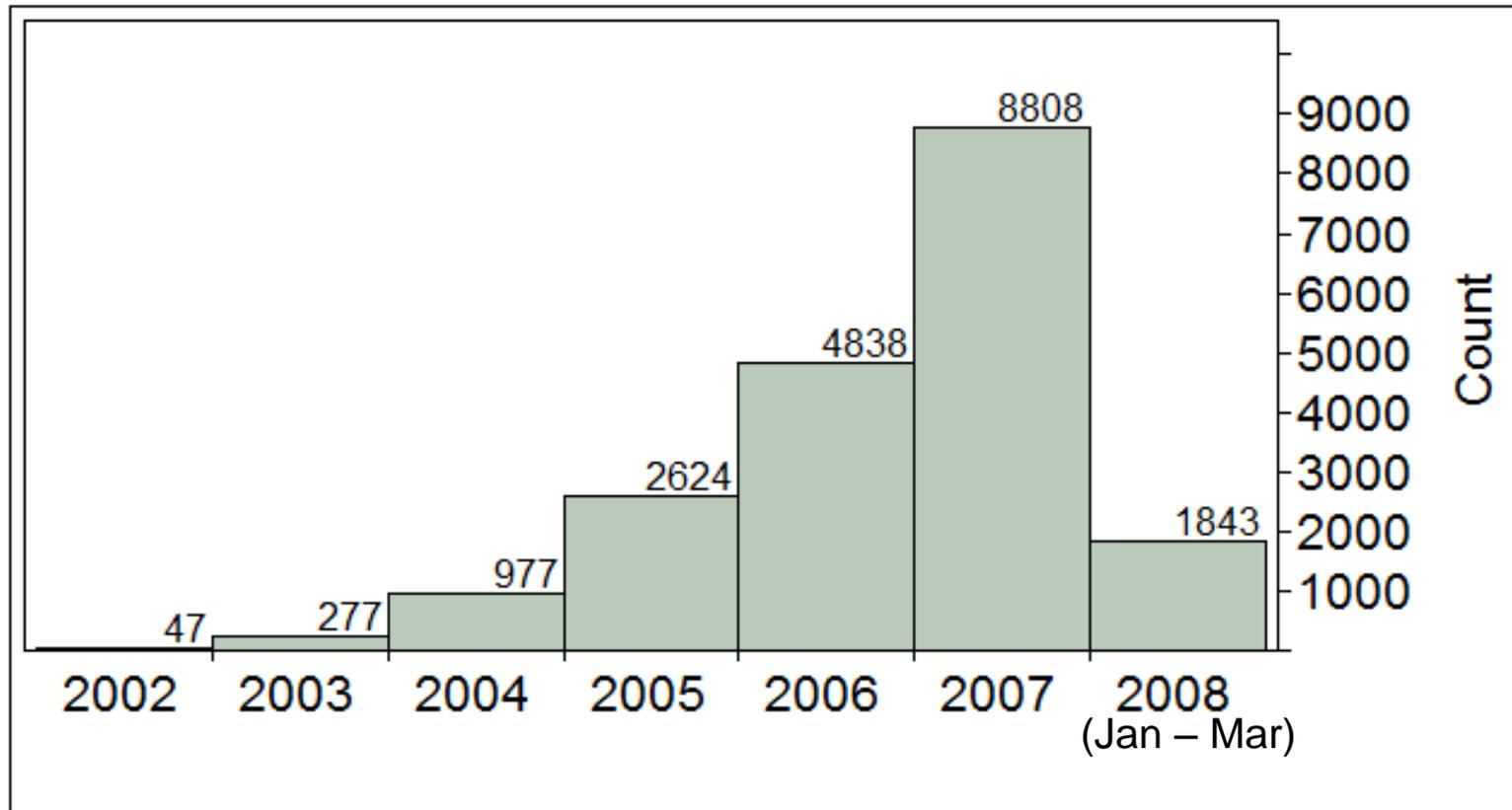
2 “Masso Dispels IA Myths at Surface Navy Association Conference,” Navy Newsstand, story number NNS070111-07, release date 1/11/2007 4:35:00 p.m. Accessed on-line at www.news.navy.mil/search/display.asp?story_id=27281 on 8 March 2007.



- From prior studies of effects of Perstempo:
 - Some deployment positively related to retention, too much can be negative
 - Hostile deployments generally positively related to retention
- See:
 - Hosek and Totten (1998, 2002) for enlisted personnel studies
 - Fricker (2001) for study of military officers



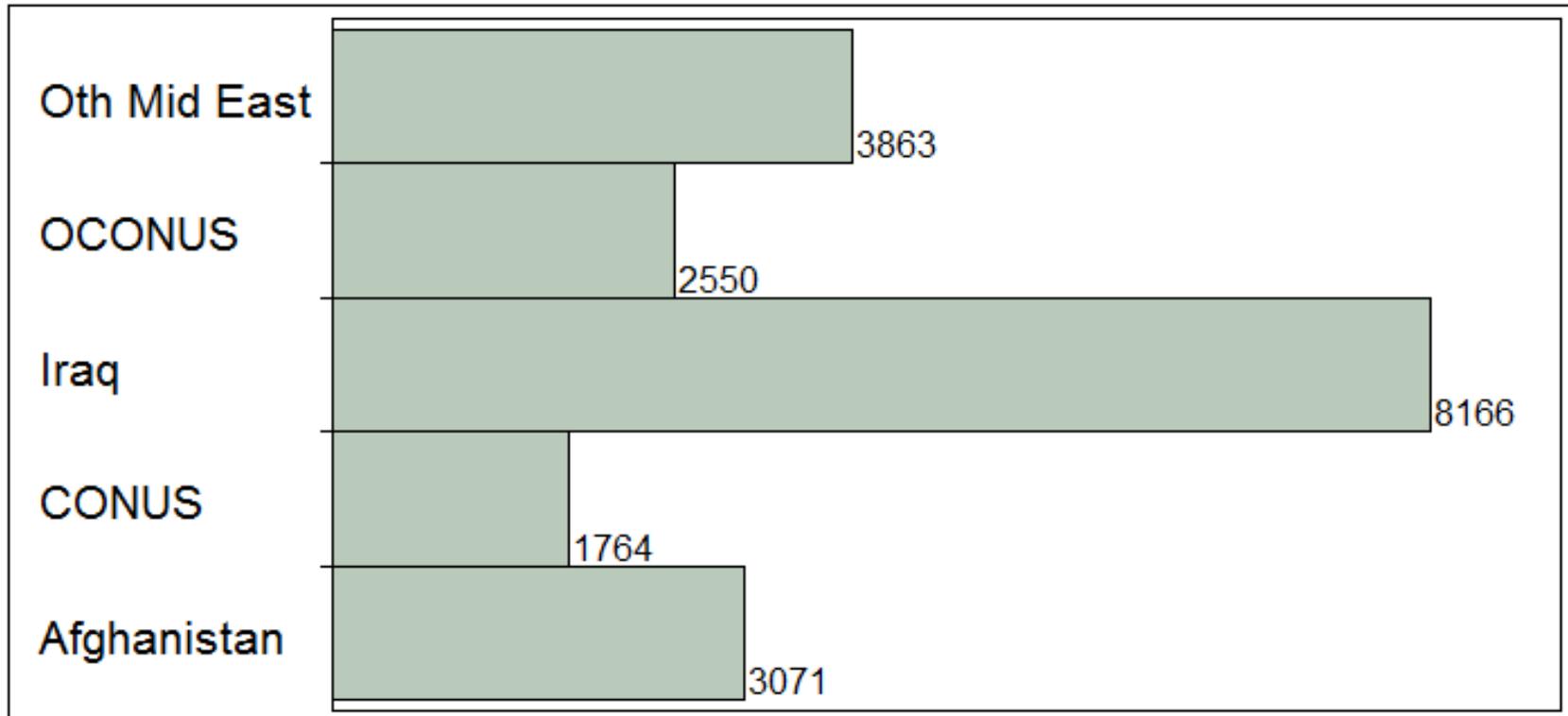
Number Deployed (AC Only) by Year





Deployments Predominantly to Iraq, Afghanistan & the Middle East

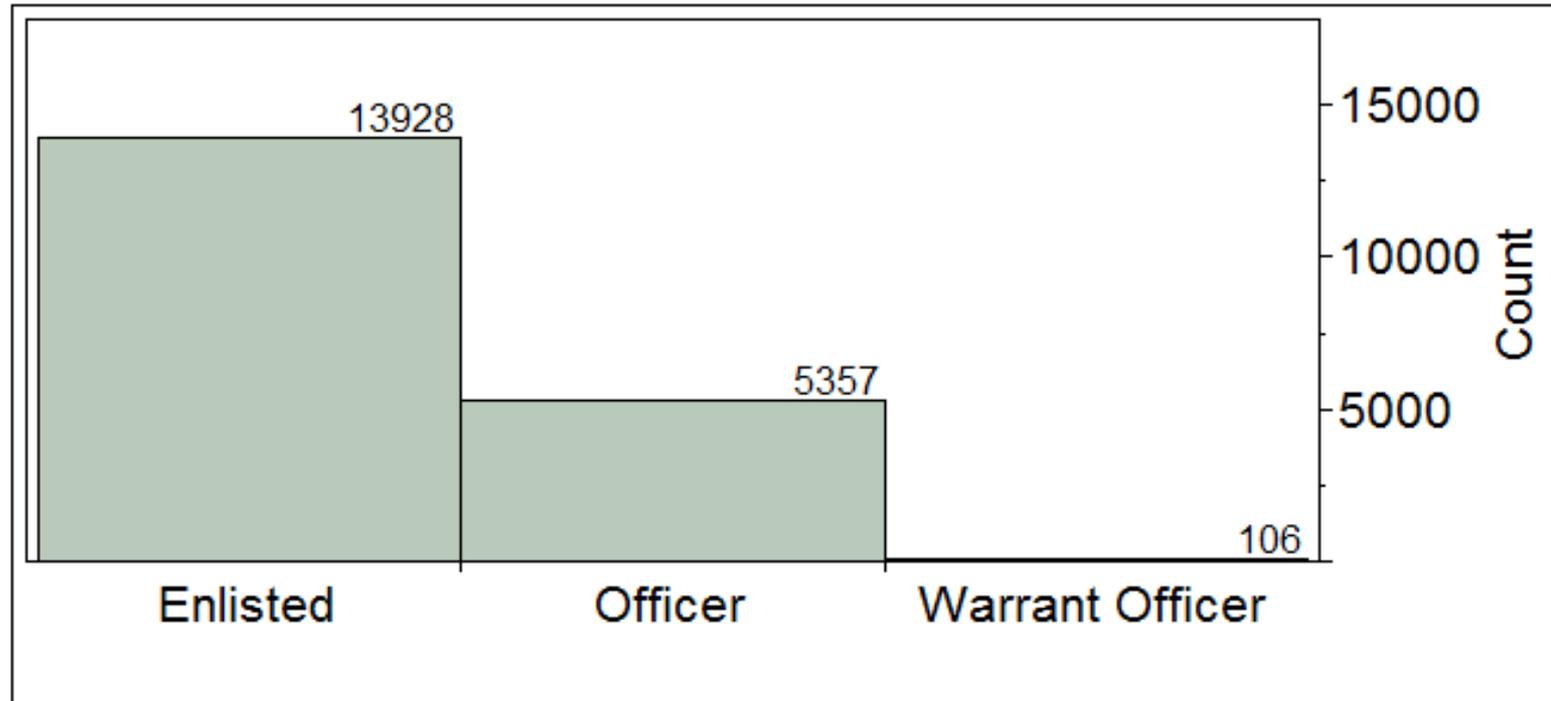
Deployment Locations





Almost 20,000 Navy Personnel IA Deployed Since March 2002

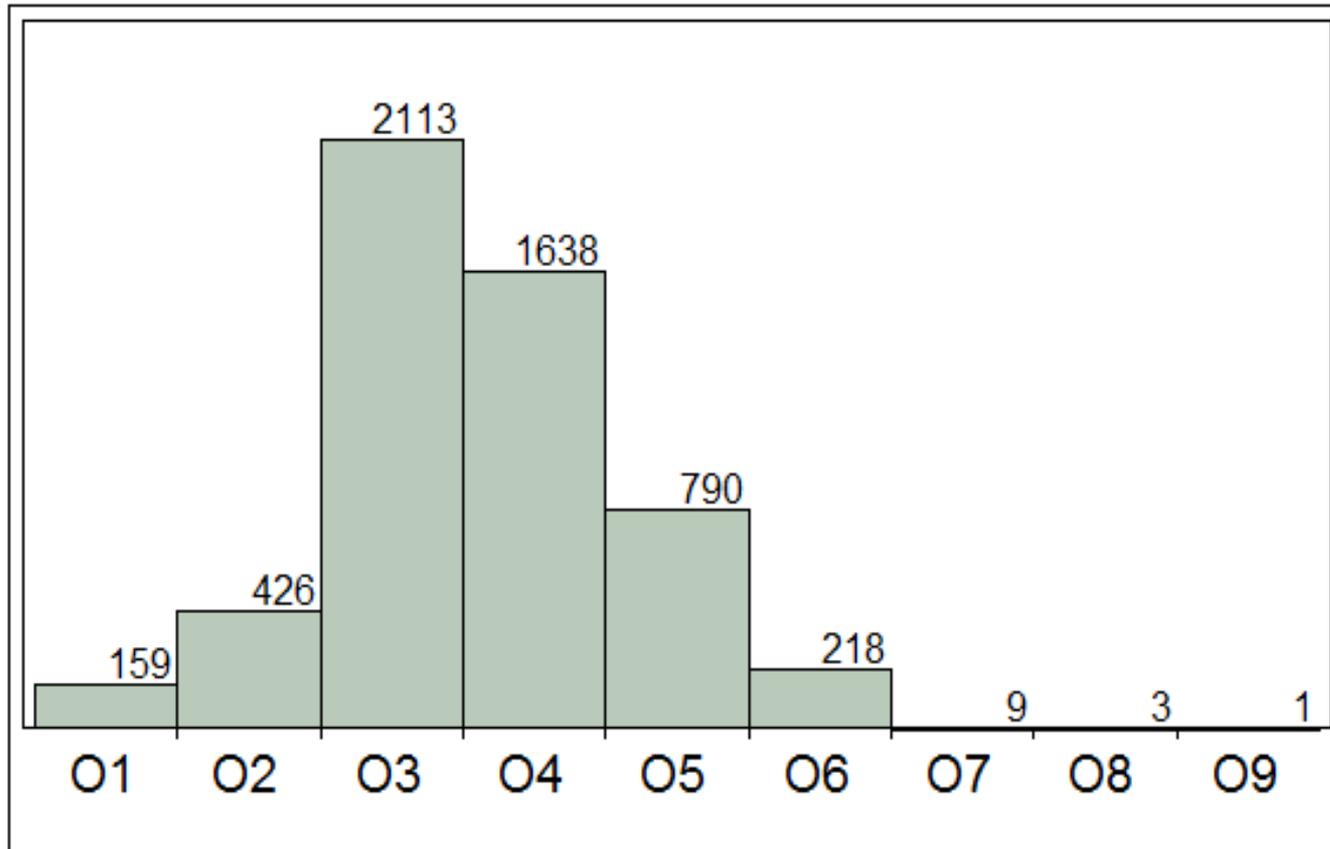
Enlisted vs. Officer





Of the Officers Deployed, 70 Percent are LTs and LCDRs

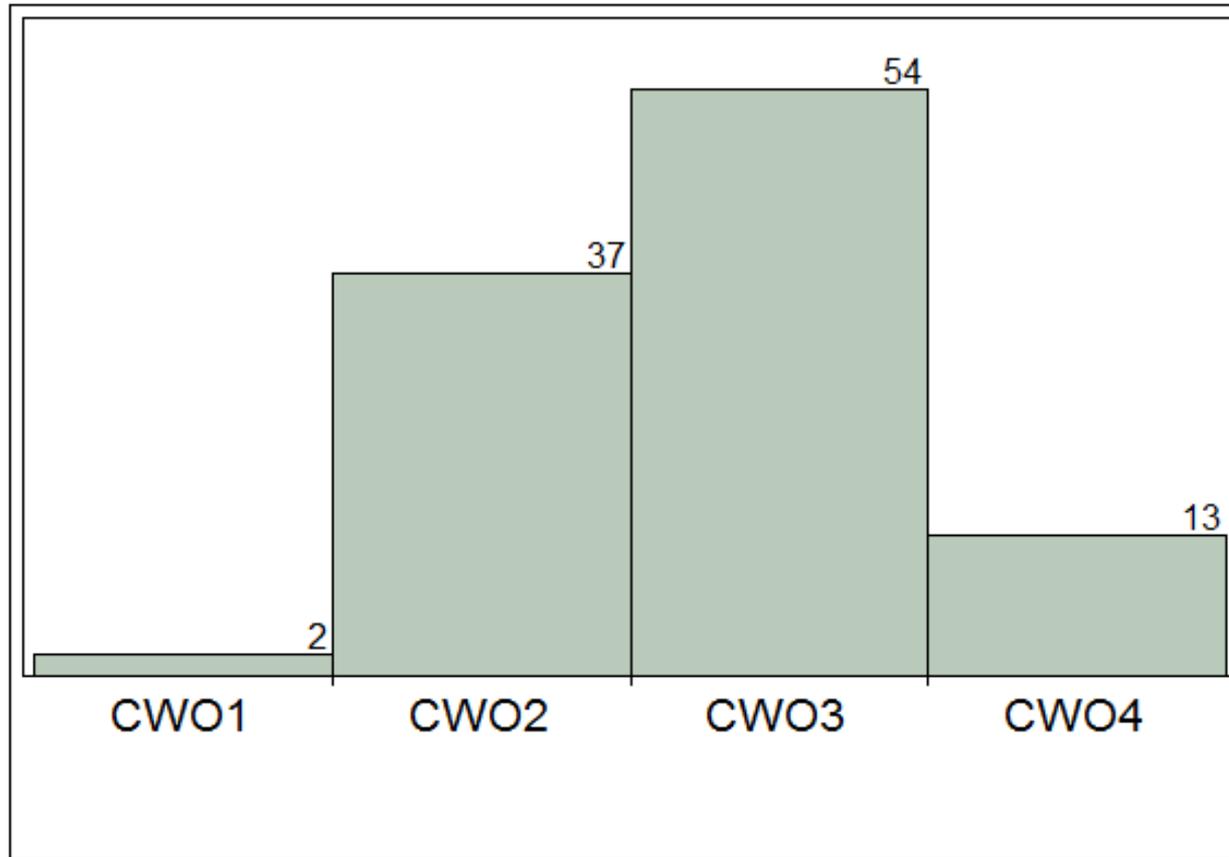
Officer Ranks





Of the Warrant Officers Deployed, 86 Percent are CWO3s and CWO4s

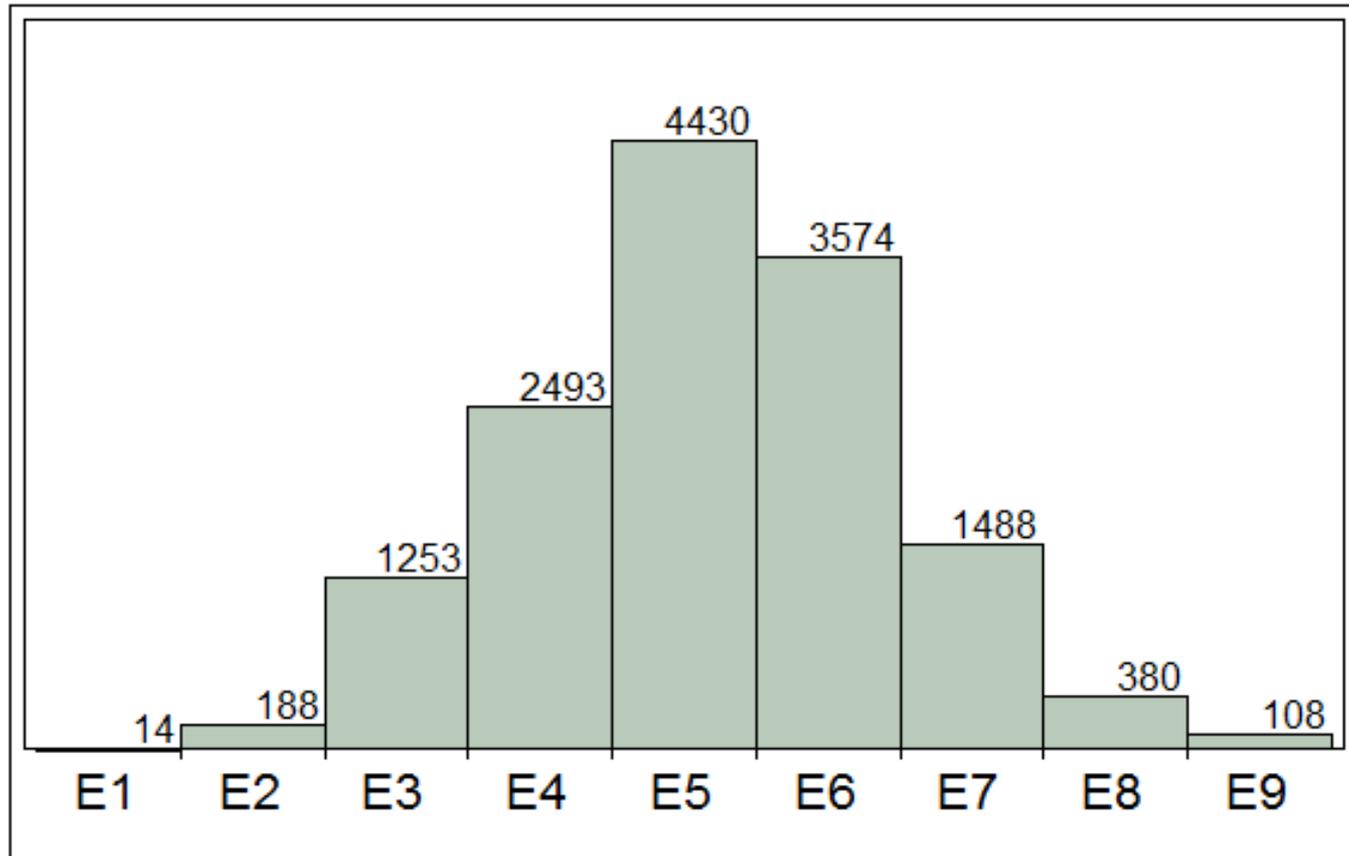
Warrant Officer Ranks





Of the Enlisted Personnel Deployed, 75 Percent are Petty Officers

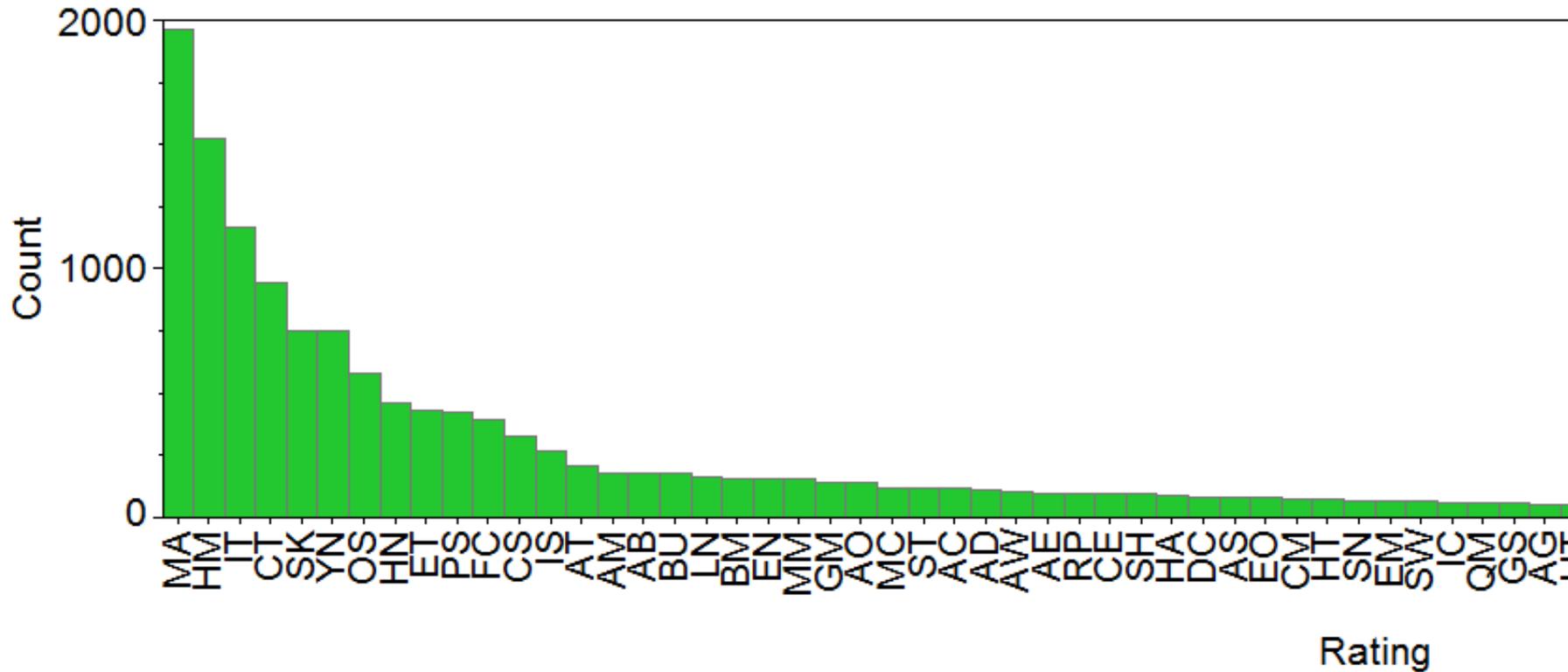
Enlisted Pay Grades





Deployed Sailors Largely in Security, Medical, IT, Admin, & Supply Ratings

Enlisted Ratings





- IA data (OPNAV Pers-4)
 - Information on Navy personnel deployed as IAs
 - 21,340 records (Mar 02 – Mar 08 + future IAs)
 - Relevant fields
 - Identifiers: Name, rank, SSN
 - IA scheduling: Date deployed, est. BOG, est. return date
 - Other IA information: Location, billet title, UIC
- USN data (DMDC)
 - Information on all Navy personnel for past decade
 - 893,461 records (Oct 97 – Sept 07)
 - Relevant fields
 - Identifiers: Name, rank, SSN
 - Demographics: rate/designator, gender, race, family status
 - Deployment experience



- Spot checked IA database
 - Sent their data to some who had been on IAs and asked if it was accurate
 - With the exception of date of return from IA, and sometimes billet title, was generally judged accurate
 - Date entered before start of IA and not subsequently updated
 - Not an issue for our analysis
- Identified unusual data (rank = “MAJ”?) and revisited with OPNAV Pers-4



Assessing DMDC Data Accuracy

- Used subject matter expertise to judge data reasonableness
- Looked for consistency and expected patterns in longitudinal data
- Found various anomalies, as would be expected
 - E.g., “Expiration of term of service” or ETS generally good but not always precise



Assembling the Analytical Dataset

- Ten years of longitudinal (monthly) data
 - 893,461 records
 - 1,825 fields per record
 - 4.5 gigabytes of data
- Merge with IA data set
 - 814 records (out of 21,340) in IA data do not have records in longitudinal data
 - Non-Navy personnel: USCG, USAF, USMC, civilian
- Subset to only those relevant records

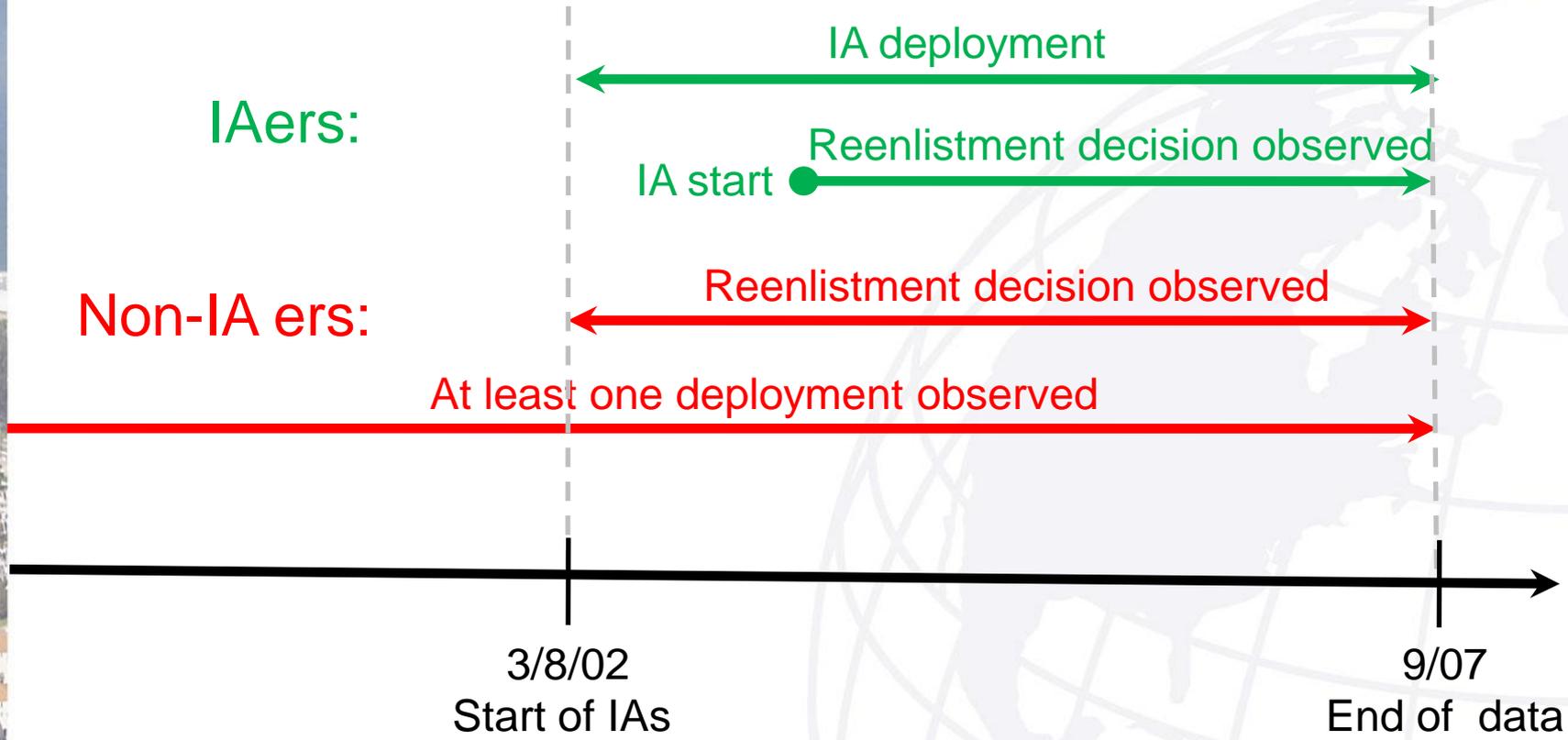


Modeling Effects of IA: Enlisted Personnel

- Approach: Model individuals at their reenlistment decision point
 - Compare between those that had an IA deployment prior to their decision versus those that did not
- Relevant cohort: those “at risk” of (1) an IA and (2) leaving the Navy
 - Also subset to only those with deployment experience
- “IAer:” An individual who made a stay-in/get-out decision after an IA deployment
 - If stay-in/get-out decision observed prior to IA, then individual was a “non-IAer” at that time

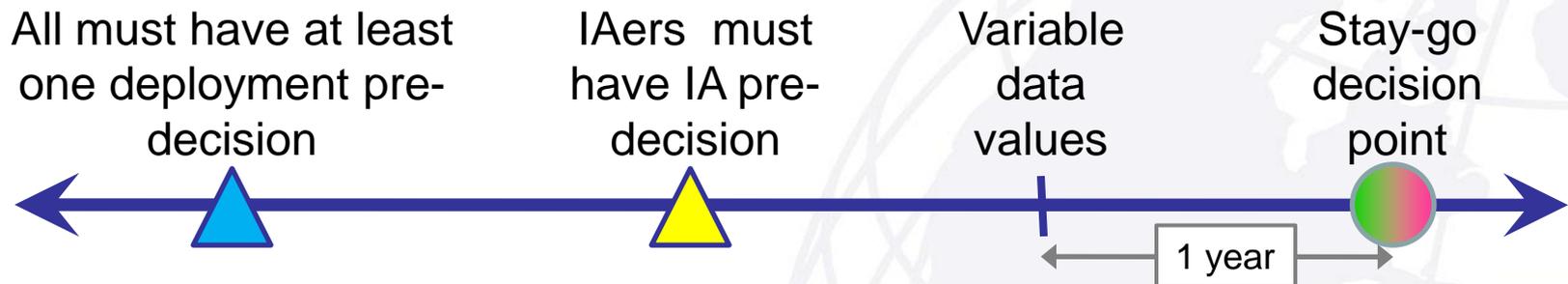


IAers and Non-IAers in a Picture...

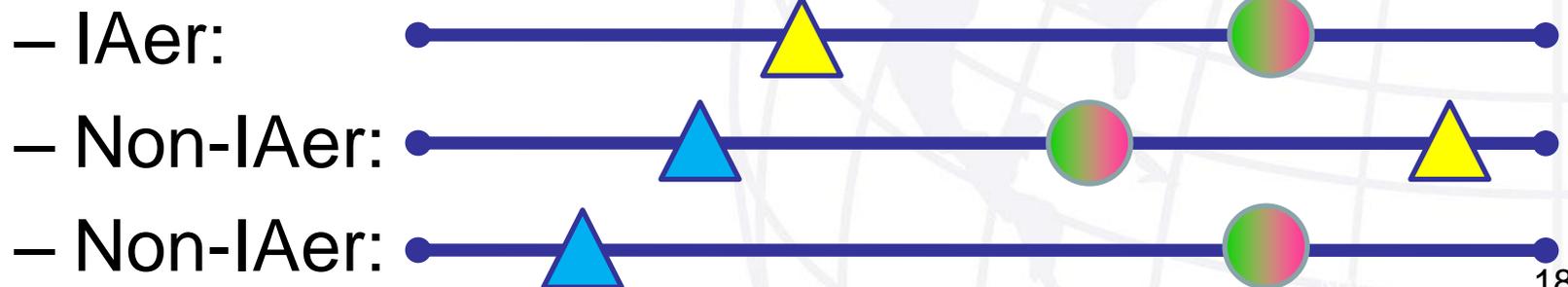


Modeling the Decision Point: Stay In or Get Out of the Navy

- Model a binary decision point
 - Function of pay grade, AFQT, education, gender, race/ethnicity, family status, IA



- Examples:





- Analysis based on observational information from administrative datasets
- Can't identify volunteers versus non-volunteers
- Must (imperfectly) infer some critical data on decision points
 - Expiration of enlistment contract
 - Deployment experience



Data Issue: Identifying Reenlistment Decision Points

- Issue: DMDC data has months until expiration of term of service (ETS) field, but data messy
- Methodology: Sailor reenlisted if:
 - Reenlisted at end of contract: ETS goes down to 0 and then jumps up
 - Allowed up to 6 months of 0's to still count as reenlistment
 - Allowed other variations at end of contract period to account for administrative delays and glitches
 - Early reenlistment: ETS counts down, but before hitting 0, jumps by >20 months
 - Used 12 month delay after first enlistment because ETS can jump around (particularly up) quite a bit



Identifying Deployment Experience

- DMDC data is from “Proxy Perstempo” file
- Monthly deployment status inferred from combination of individual’s unit, unit location, separation pays (FSA and IDP), and family status
- We look at individual’s monthly history and simply dichotomize into
 - Ever deployed at some time in career
 - Never deployed during Navy career



Navy (DMDC) Data

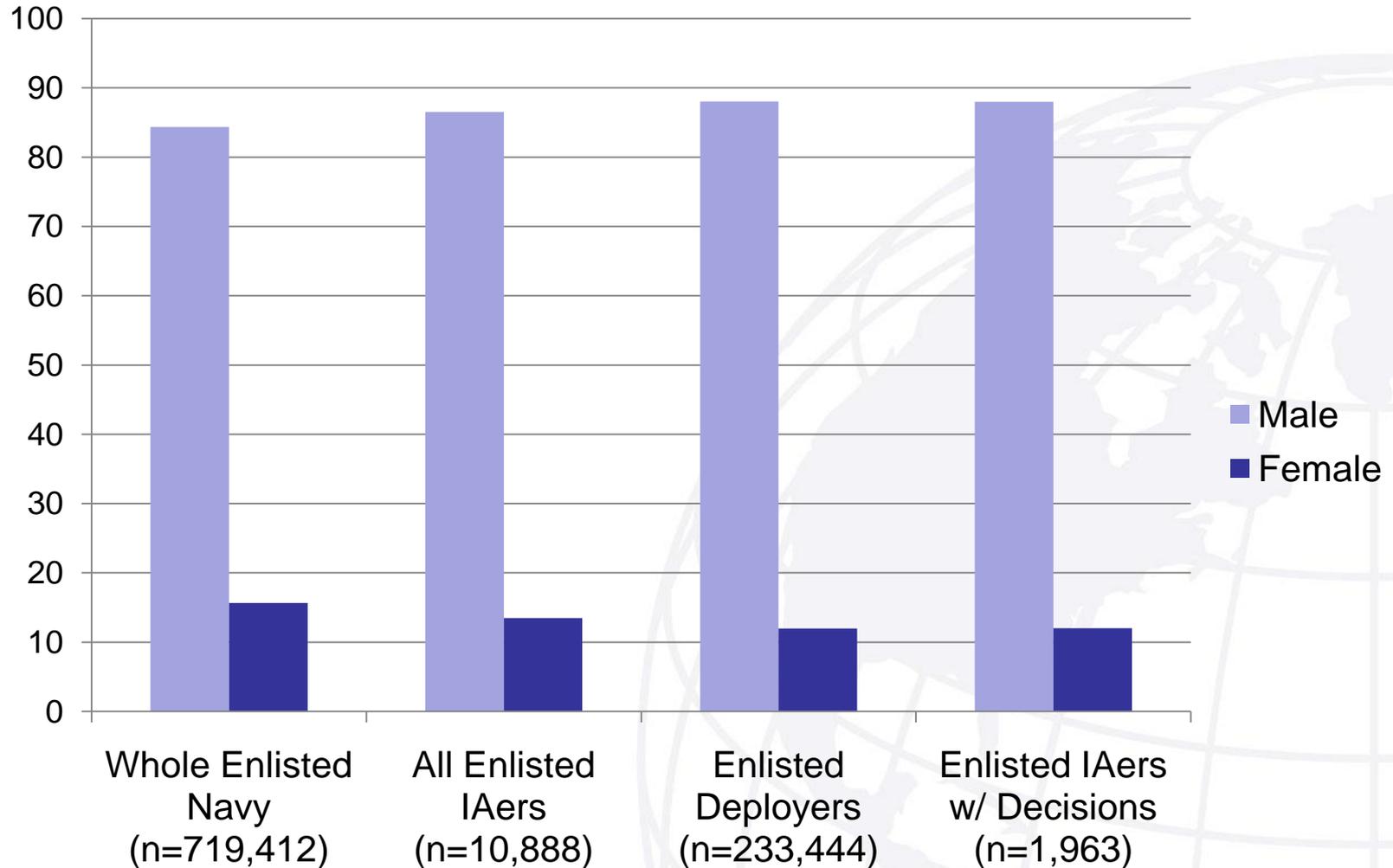
893,461	Total active duty Navy personnel (10/97-9/07)
-174,049	Officers and records with duplicate SSNs
- 448,949	No decision after 3/02, all data missing, or invol. sep.
-36,637	No deployment experience (prior to decision)
<u>-382</u>	No data year prior to decision
233,444	

IA Data

15,469	Total Navy IA personnel (3/02-9/07)
-4,534	Officers and warrant officers
<u>-8,972</u>	No decision after IA deployment
1,963	

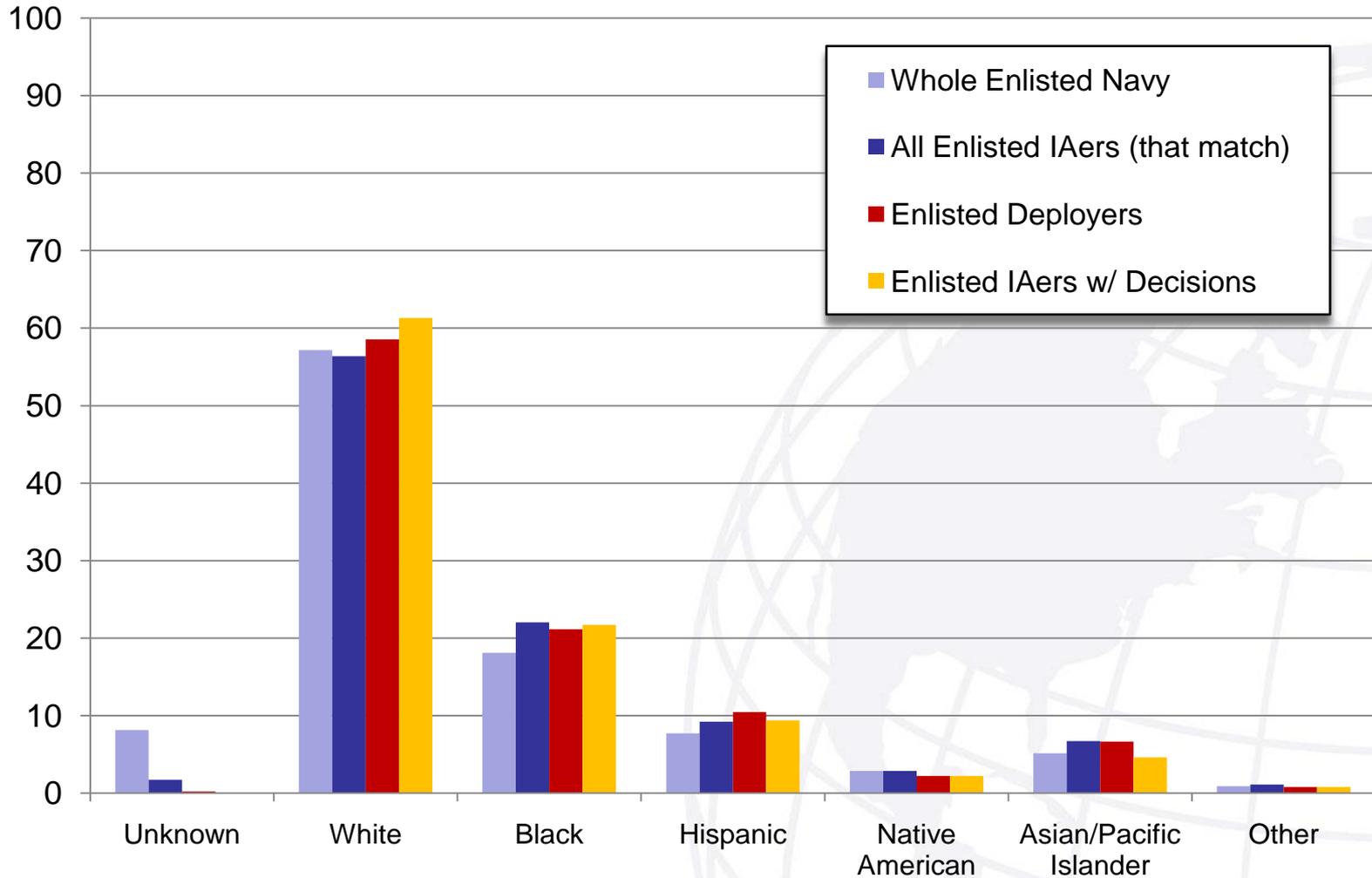


Comparing the Populations by Gender (Enlisted Only)



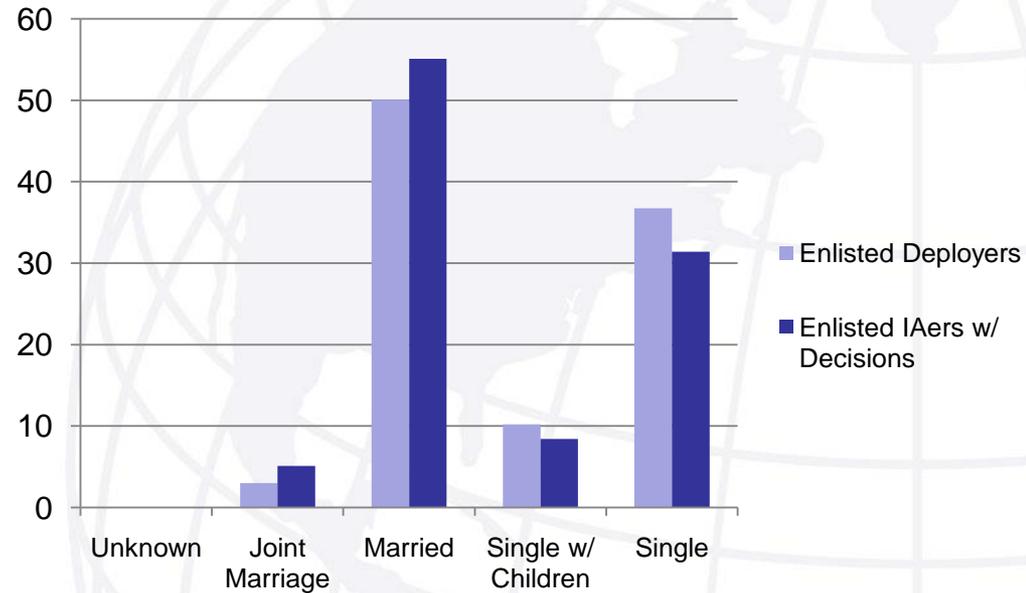
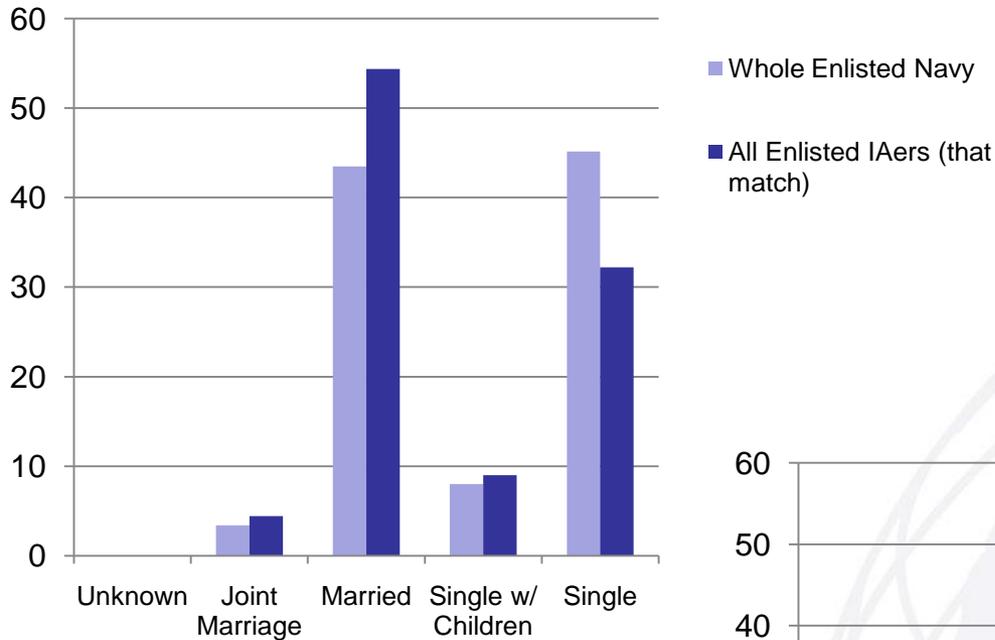


Comparing the Populations by Race/Ethnicity (Enlisted Only)



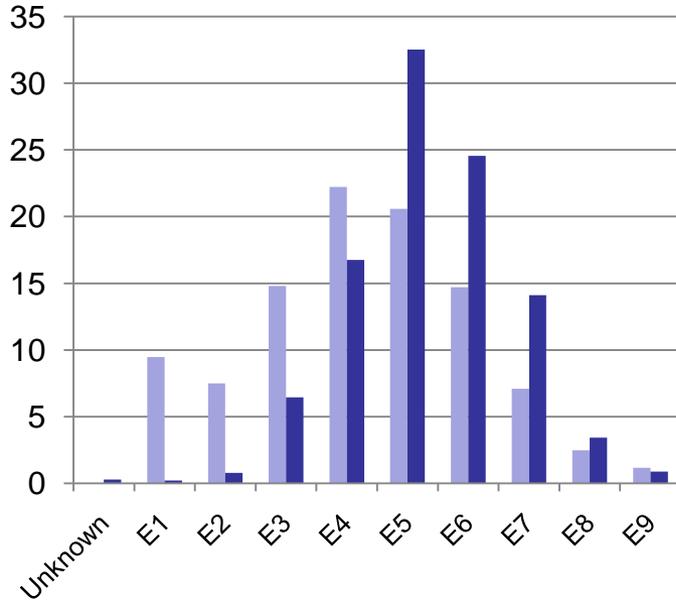


Comparing the Populations by Family Status (Enlisted Only)

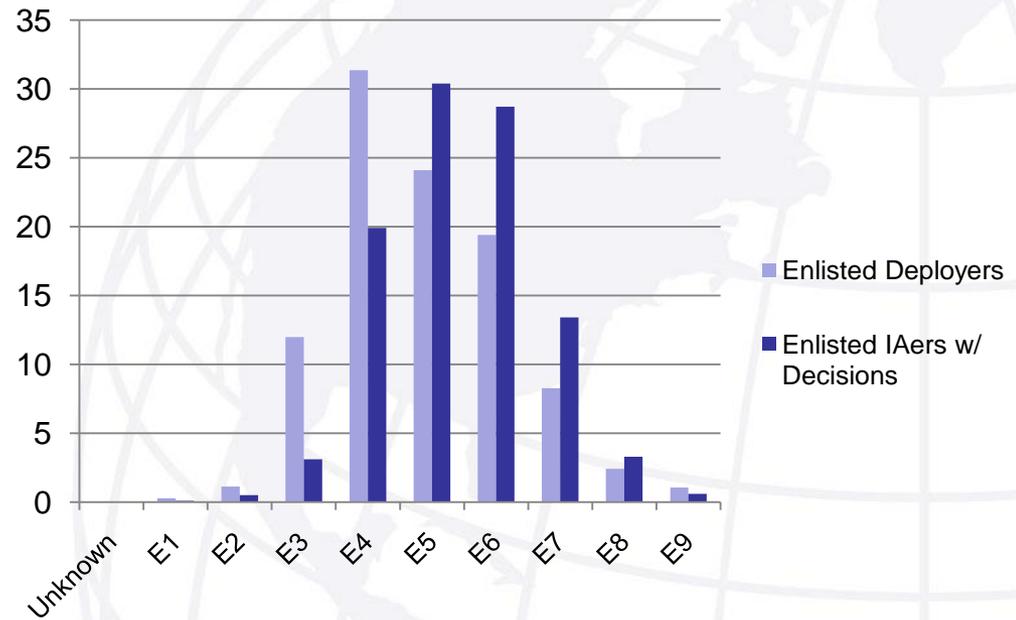




Comparing the Populations by Pay Grade (Enlisted Only)



■ Whole Enlisted Navy
■ All Enlisted IAers (that match)

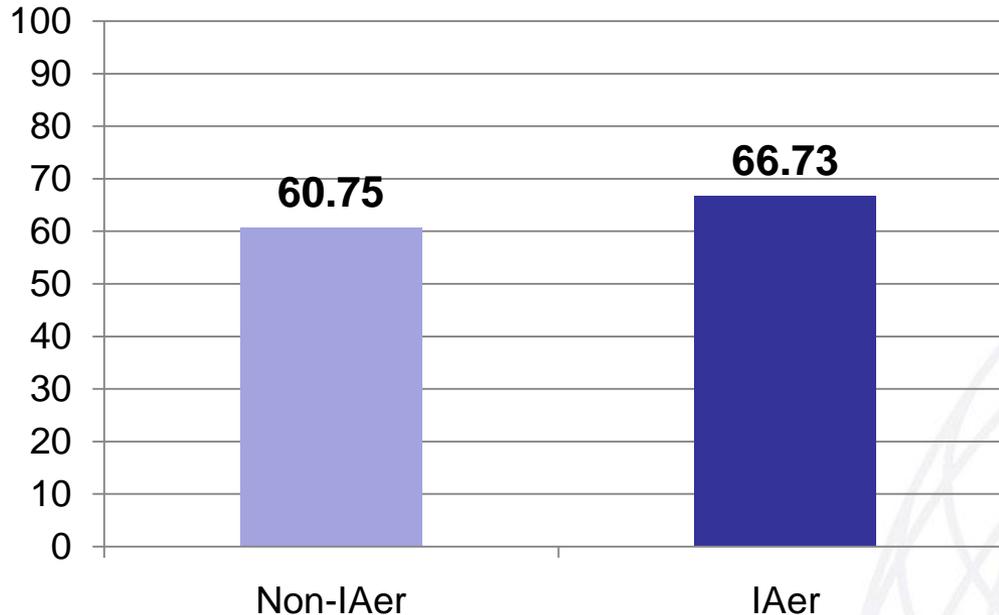


■ Enlisted Deployers
■ Enlisted IAers w/ Decisions



Enlisted Personnel Results: Comparing Raw Rates

Pct Retained by IA Status



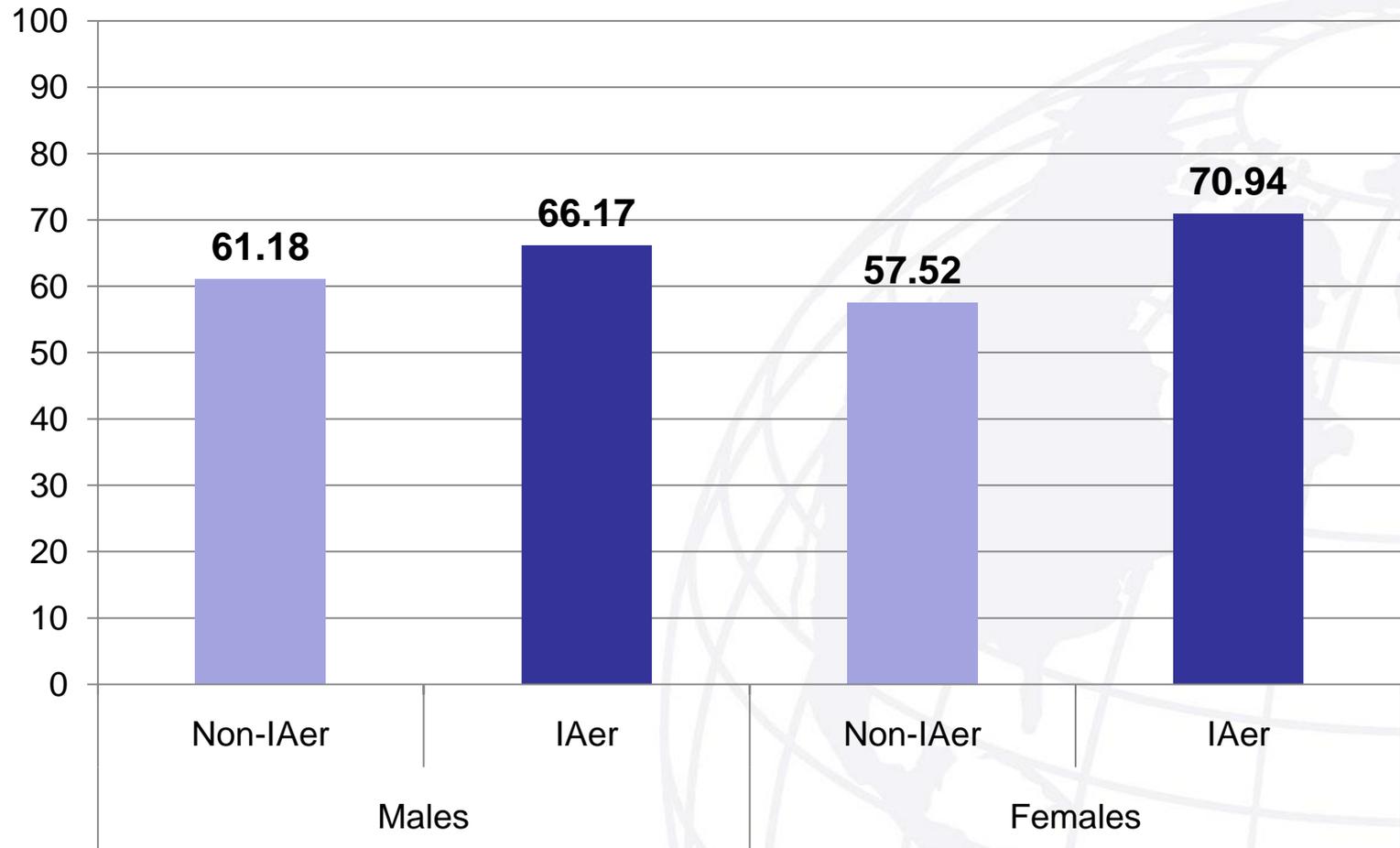
- Odds IAer retained = 2.01
- Odds non-IAer retained = 1.55
- Odds ratio = 1.30
- “Statistically significant” result ($p < 0.0001$)

	IA Deployment?		
	No	Yes	
Left Navy	90,865	653	91,518
Retained	140,616	1,310	141,926
	231,481	1,963	233,444



Comparing Retention Rates by Gender

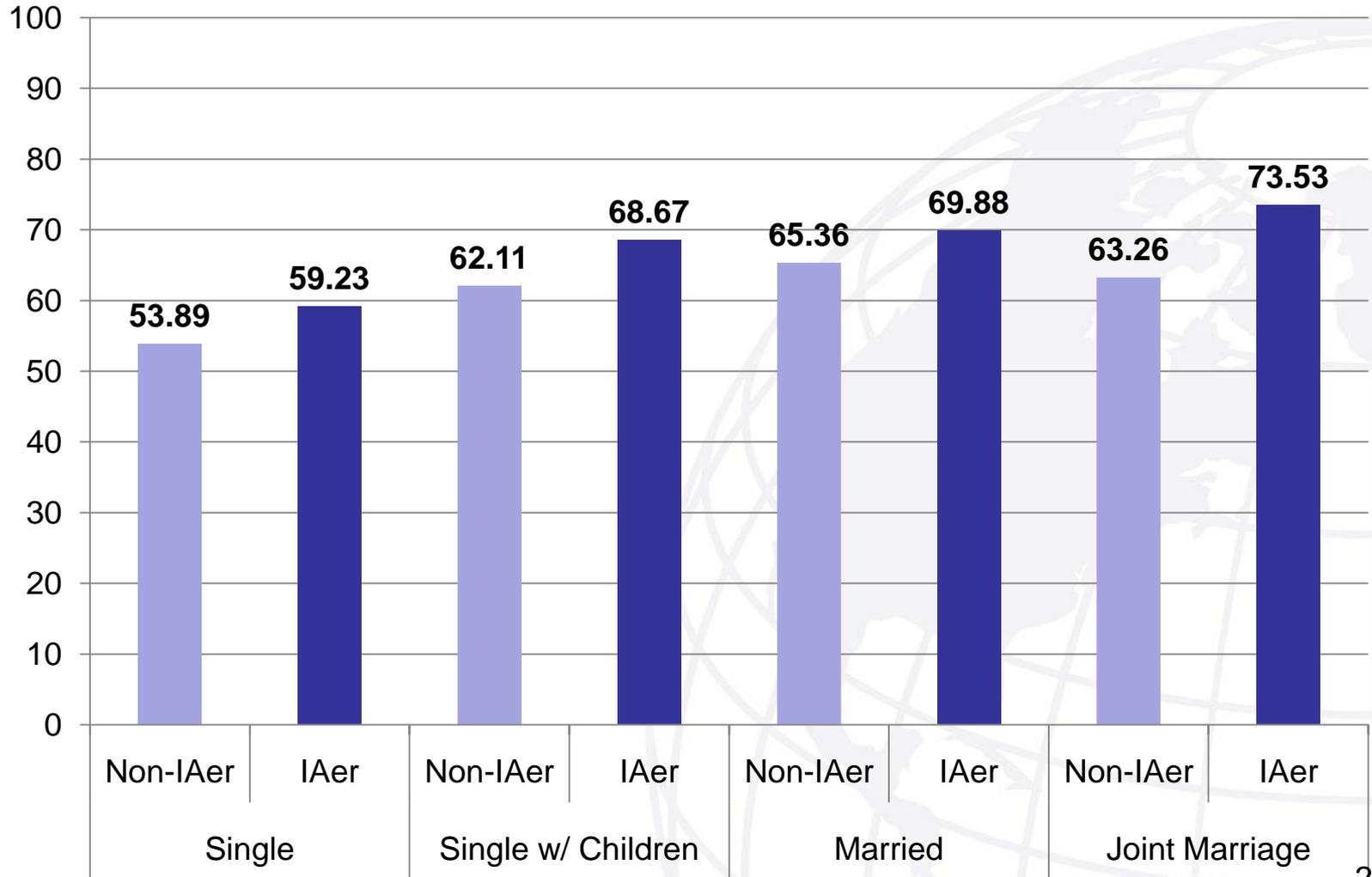
PCT Retained by Gender and IA Status





Comparing Retention Rates by Family Status

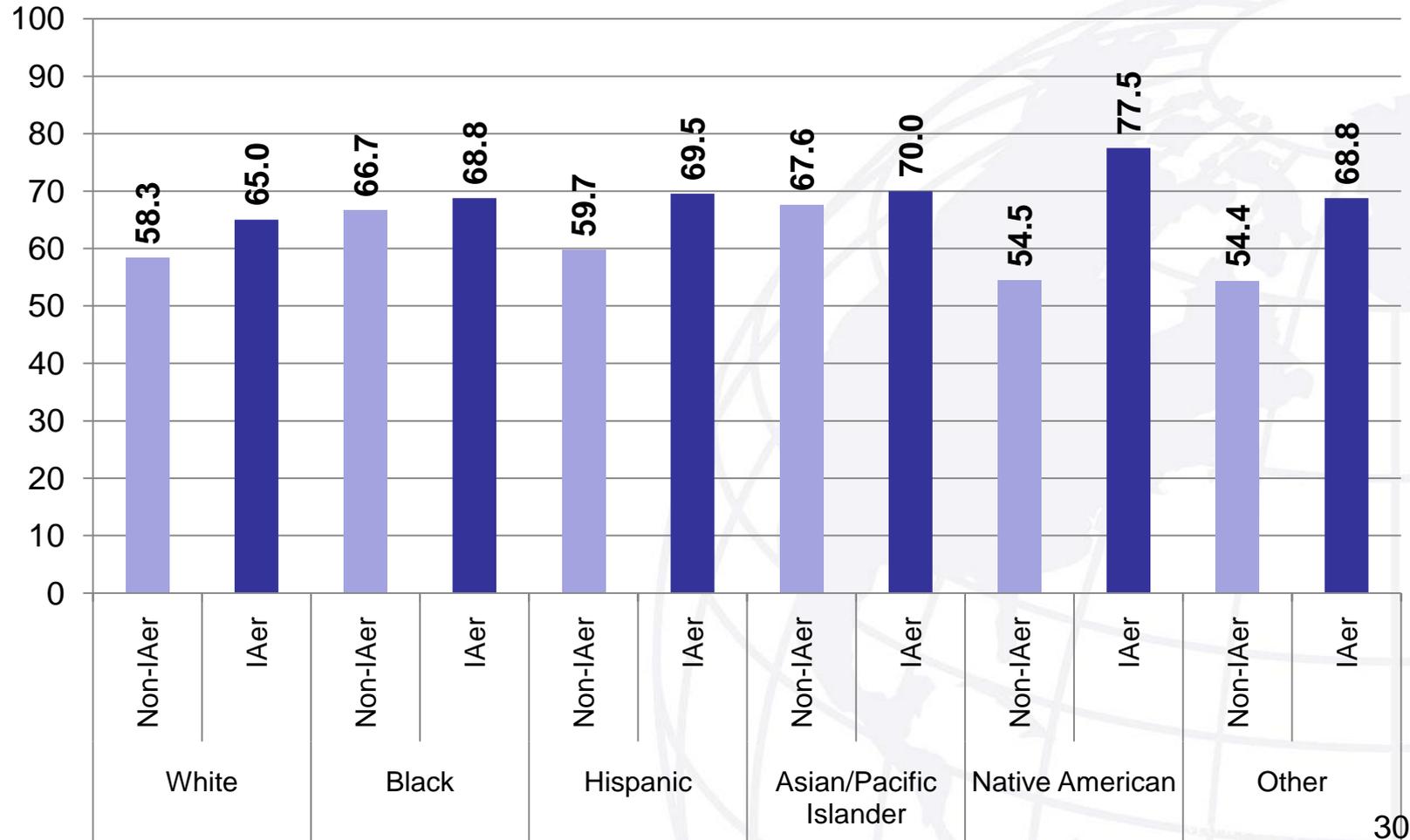
PCT Retained by Family and IA Status





Comparing Retention Rates by Race/Ethnicity

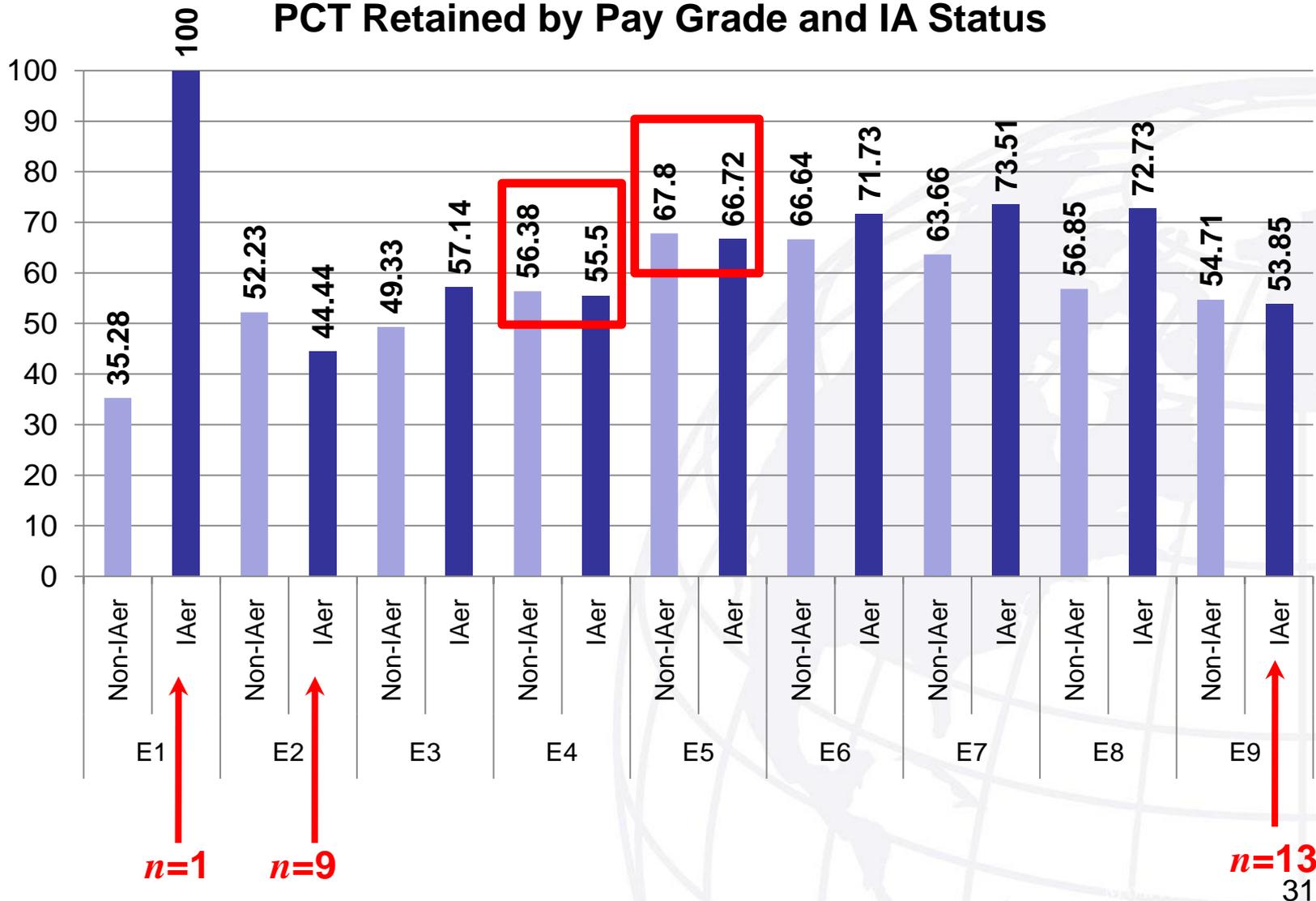
PCT Retained by Race/Ethnicity and IA Status





Comparing Retention Rates by Pay Grade

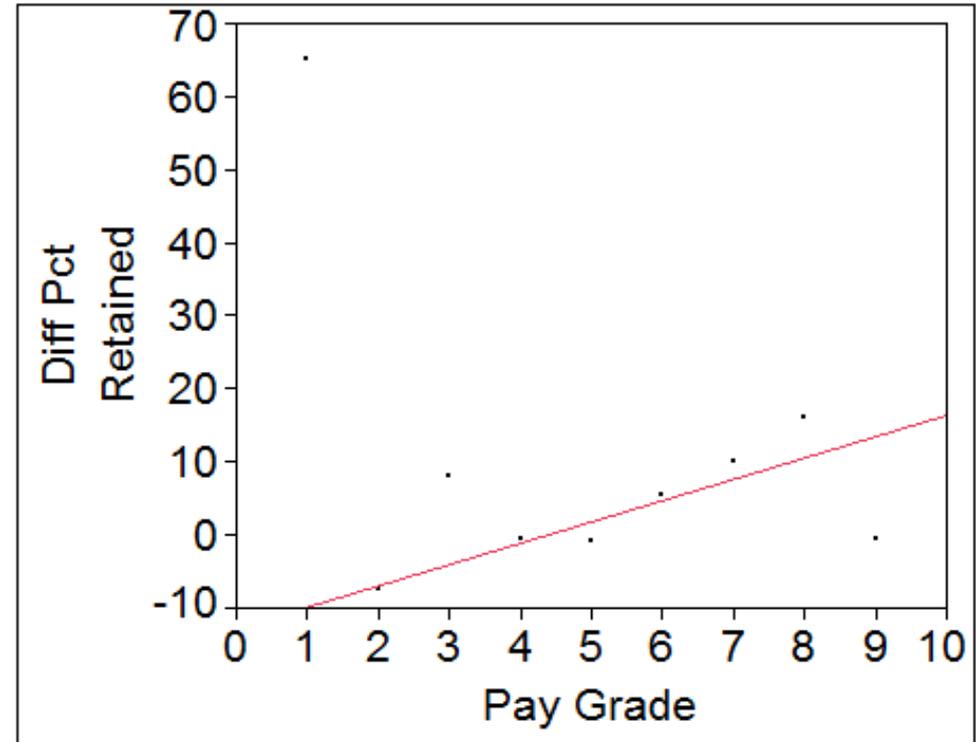
PCT Retained by Pay Grade and IA Status





Weighted Simple Linear Regression of Δ Pct Retained on Pay Grade

Pay Grade	Δ Percent Retained	Number IAs
E1	64.72	1
E2	-7.79	9
E3	7.81	56
E4	-0.88	373
E5	-1.08	604
E6	5.09	573
E7	9.85	268
E8	15.88	66
E9	-0.86	13



$$\Delta \text{ Pct Retained} = -12.8 + 2.9 * \text{ Pay Grade}$$



- Model with just simple indicators:

Effect Likelihood Ratio Tests

Source	Nparm	DF	L-R	
			ChiSquare	Prob>ChiSq
IA_Deployer_Ind	1	1	73.7810966	<.0001*
Male_Ind	1	1	105.785082	<.0001*
Race/Ethnicity	5	5	1950.67284	0.0000*
Family Status	3	3	1434.01154	<.0001*
AFQT	7	7	1104.42842	<.0001*
Pay Grade	8	8	2276.28718	0.0000*
Education	7	7	115.065946	<.0001*
Decision_Year	5	5	4610.59905	0.0000*

- Coefficient for IA_Deployer_Ind = 0.427,
so adjusted O.R. = 1.53
 - Remember raw O.R. = 1.30



Logistic Regression Model #3 Results: Only Iraq and Afghanistan IAers

- Model with simple indicator variables:

Effect Likelihood Ratio Tests

Source	Nparm	DF	ChiSquare	Prob>ChiSq
IA_Deployer_Ind	1	1	83.1837511	<.0001*
Male_Ind	1	1	107.094041	<.0001*
Race/Ethnicity	5	5	1952.20467	0.0000*
Family Status	3	3	1435.81747	<.0001*
AFQT	7	7	1101.03547	<.0001*
Education	7	7	116.730484	<.0001*
Decision_Year	5	5	4605.0784	0.0000*
Pay Grade	8	8	2266.25532	0.0000*

- Coefficient for IA_Deployer_Ind = 0.660,
so adjusted O.R. = 1.93
 - Remember raw O.R. = 1.30



- IA deployment generally associated with increased retention
 - Consistent effects for both junior officers and enlisted personnel
 - Relative seniority of IAers explains?
 - Self-selection and other effects present
- Hypothesis seemingly untrue: IA deployment *causes* significant decrease in propensity to stay in the Navy



Directions for Future Research (1)

- Did not evaluate AC (1) mid-grade officers, (2) warrant officers, and (3) prior enlisted
 - Would not expect to find negative effects
 - Regardless:
 - Need more time to pass to evaluate (1)
 - And (2) and (3) are smaller populations
- Should assess IA effects for reservists
 - No reason to believe results for AC personnel apply/translate to reservists



- Repeat this effort annually to assess aggregate effects
 - Outcomes for most of those on or recently returned from IA not yet observed
 - Only 1,963 IAd sailors out of 13,928 have made a stay-in/get-out decision as of 9/07
- Compare non-volunteers to rest of fleet to assess retention impacts on them
 - I.e., expect higher retention rate for volunteers
 - Masking a lower rate for non-volunteers?



- Once enough data available, evaluate whether IA sailors have higher rates of involuntary separation
- Collect pre- and post-deployment attitudinal data via a survey
 - How does IA experience affect propensity to reenlist/stay in the Navy?
- Link survey attitudinal data to outcome data to evaluate how attitudes translate into actions



Back-up Slides



- LT Michael Paisant evaluated the effect of IA deployments on junior officer retention
 - Advisors: S. Buttrey and R. Fricker
- Approach very similar to enlisted evaluation
 - Main difference: method for determining officers' decision point



NAVAL
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SCHOOL
MONTEREY, CALIFORNIA

THESIS

THE EFFECTS OF INDIVIDUAL AUGMENTATION (IA)
ON NAVY JUNIOR OFFICER RETENTION

by

Michael A. Paisant

March 2008

Thesis Advisor: Samuel E. Buttrey
Second Reader: Ronald D. Fricker, Jr.

Approved for public release; distribution is unlimited.



Data Very Similar to Enlisted Data

- IA data (OPNAV Pers-4)
 - Information on Navy personnel deployed as IAs
 - 4,038 officer records (Mar 02 – Mar 07)
 - Relevant fields
 - Identifiers: Name, rank, SSN
 - IA scheduling: Date deployed, est. BOG, est. return date
 - Other IA information: Location, billet title, UIC
- USN data (DMDC)
 - Information on all Navy personnel for past decade
 - 98,708 officer records (Oct 97 – Sept 07)
 - Relevant fields
 - Identifiers: Name, rank, SSN
 - Demographics: designator, gender, race, family status
 - Deployment experience



As with Enlisted Personnel, Officer IAs Generally More Senior

Rank	IA	
	No	Yes
WO's	3.7%	2.2%
O-1	7.8%	1.3%
O-2	8.6%	5.1%
O-3	37.5%	41.6%
O-4	19.8%	28.7%
O-5	13.8%	16.3%
O-6	8.7%	4.8%

Table 1. Percentage of IAs and Non-IAs by Rank

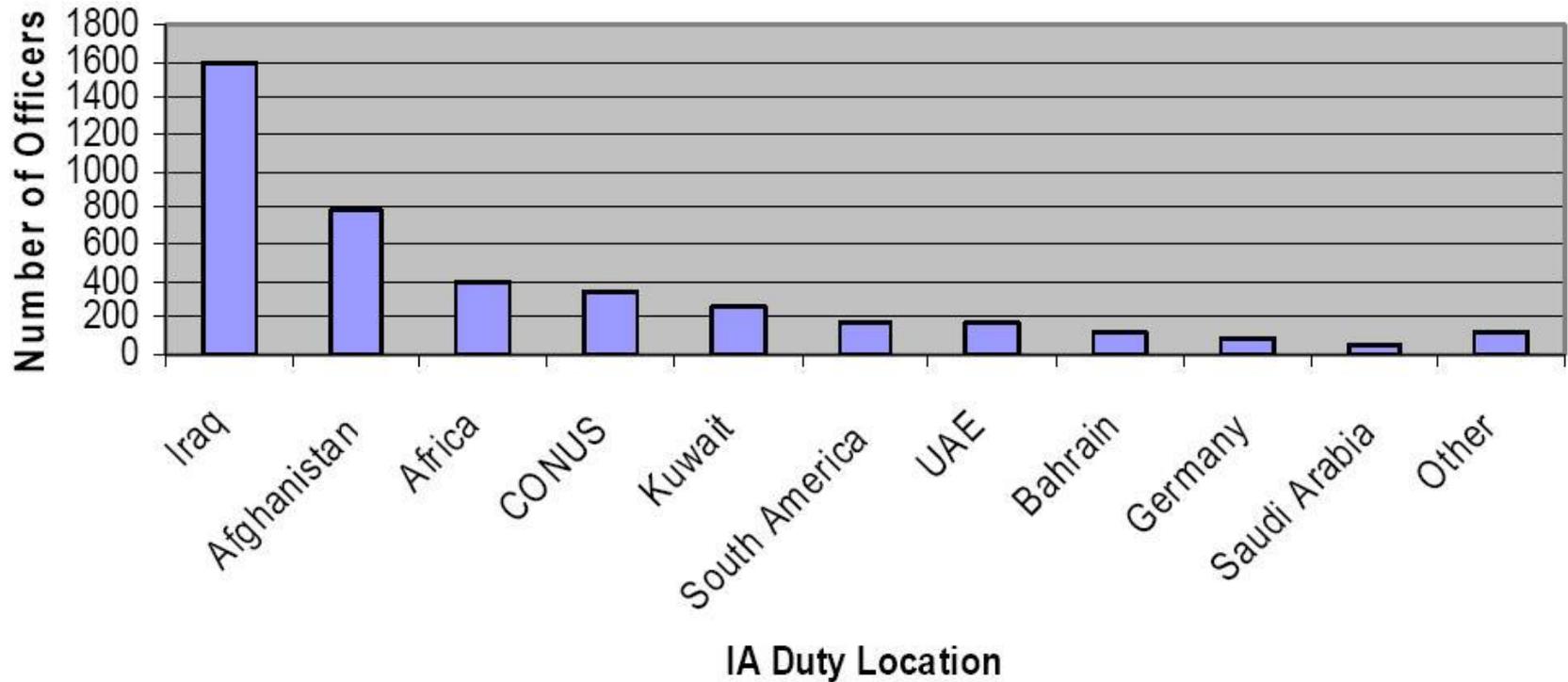
Warfare Community	IA	
	No	Yes
Surface	17.8%	17.1%
Sub	5.8%	4.5%
Supply	6.9%	10.0%
Aviation	23.6%	22.5%
Other	45.9%	45.9%

Table 2. Percentage of IAs and Non-IAs by Warfare Community



Geographic Distribution of Officer IAs Similar to Enlisted IAs

Officers by Location





Gender and Family Status Dist'ns Similar for Officer IAers to Non-IAers

Gender	IA	
	No	Yes
Male	84.1%	87.1%
Female	15.9%	12.9%

Table 3. Percentages of IAs and Non-IAs by Gender

Family Status	IA	
	No	Yes
Joint	3.1%	3.2%
Married	67.3%	68.7%
Single (w/family)	6.7%	5.5%
Single (w/o family)	22.9%	22.6%

Table 4. Percentage IAs and Non-IAs by Family Status



- Remove:
 - Warrant officers and prior enlisted
 - Unusual records (e.g., officers w/ less than college degree)
- Define an officer as “retained” if they have not left within 1 year after end of obligation
- But must determine end of service obligation



- Initial service obligation varies by warfare specialty
- Use DMDC data to identify each officer's warfare specialty and date of entry into the service
- Generally initial obligation is:
 - About 9 years after commissioning for aviators
 - 5-6 years after commissioning for all others



J.O. Surface Warfare Officer and Submarine Officer Timelines

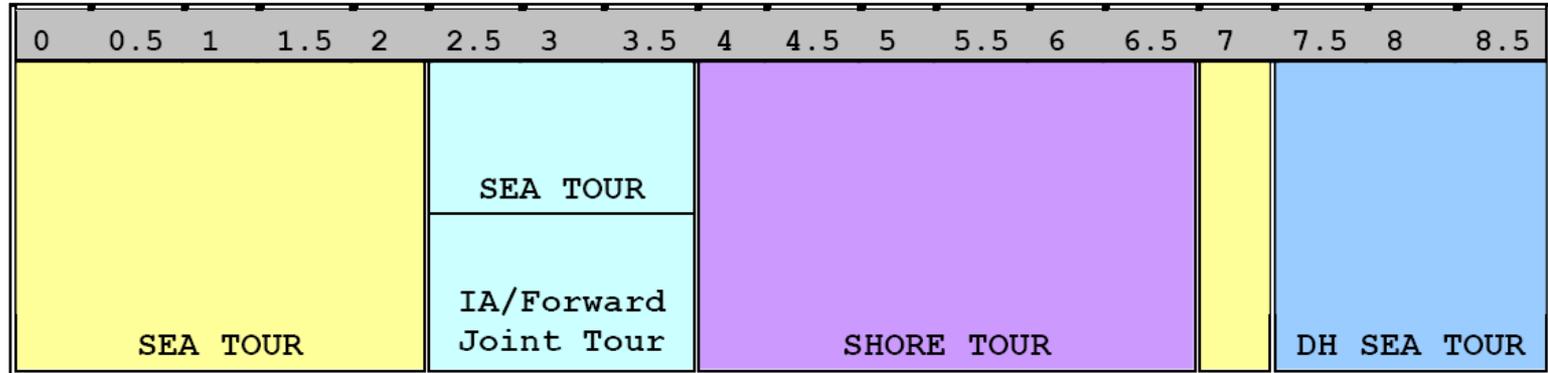


Figure 2. Surface Warfare Officer Career Timeline
(PERS-41 2007)

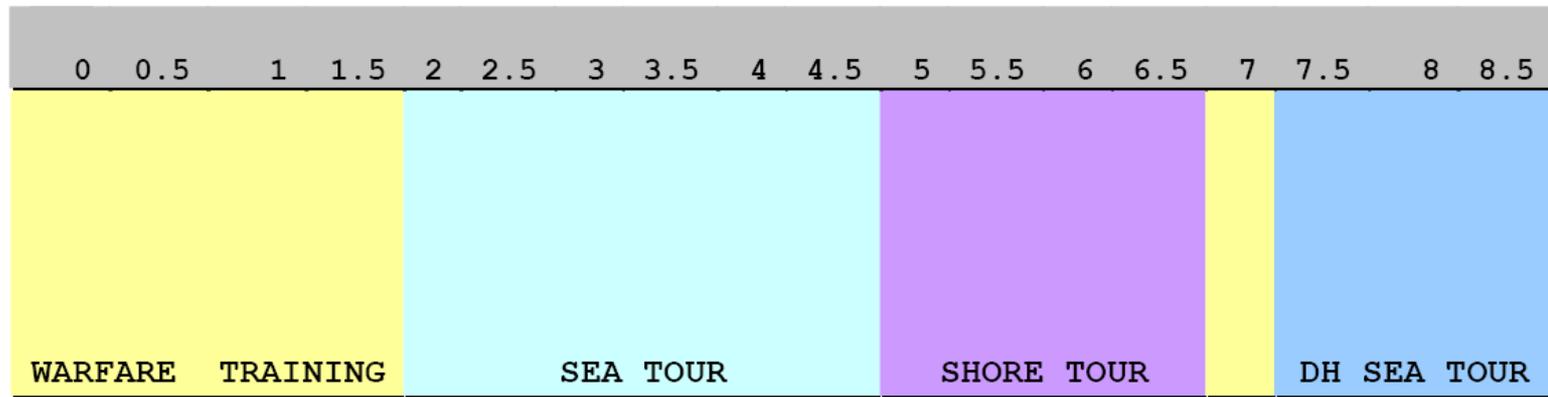


Figure 3. Submarine Officer Career Timeline (Source:
author)



General Timeline Used for SWO, Submarine, and Supply Officers

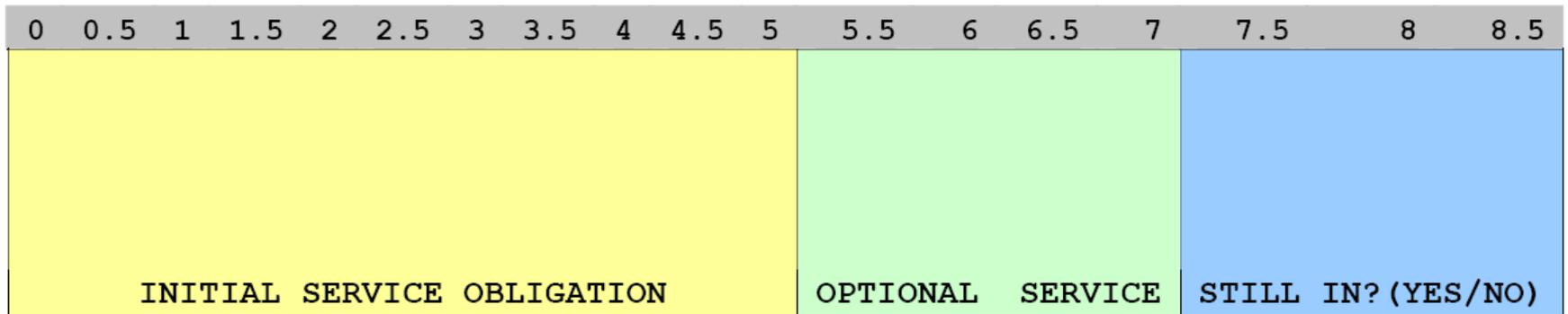


Figure 4. General Timeline used for Surface, Sub and Supply Officers

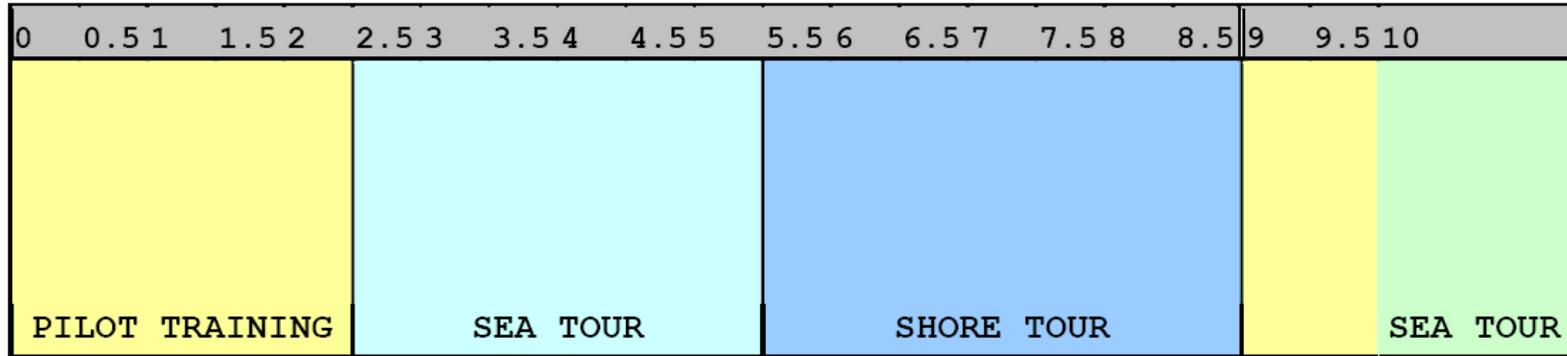


Figure 5. Naval Aviator Career Path Timeline

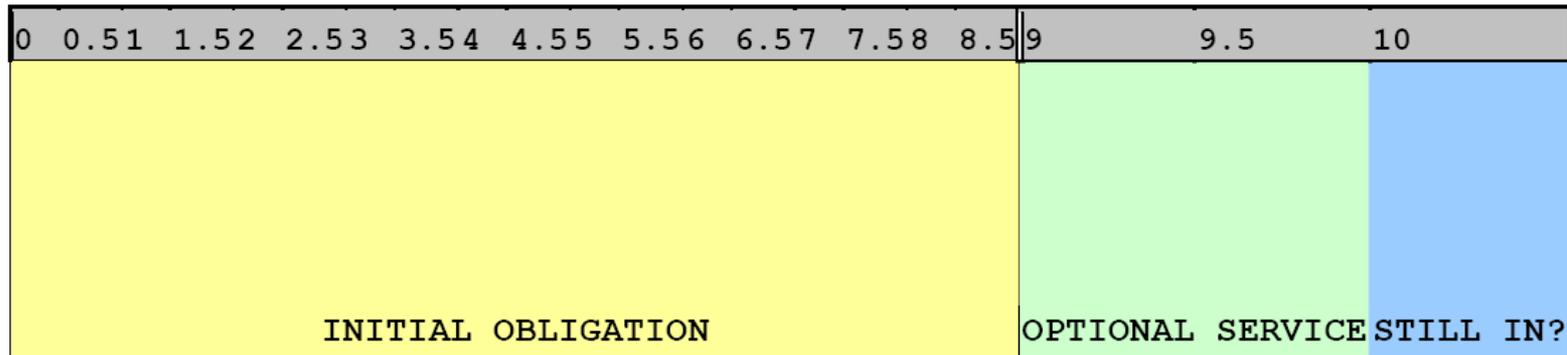
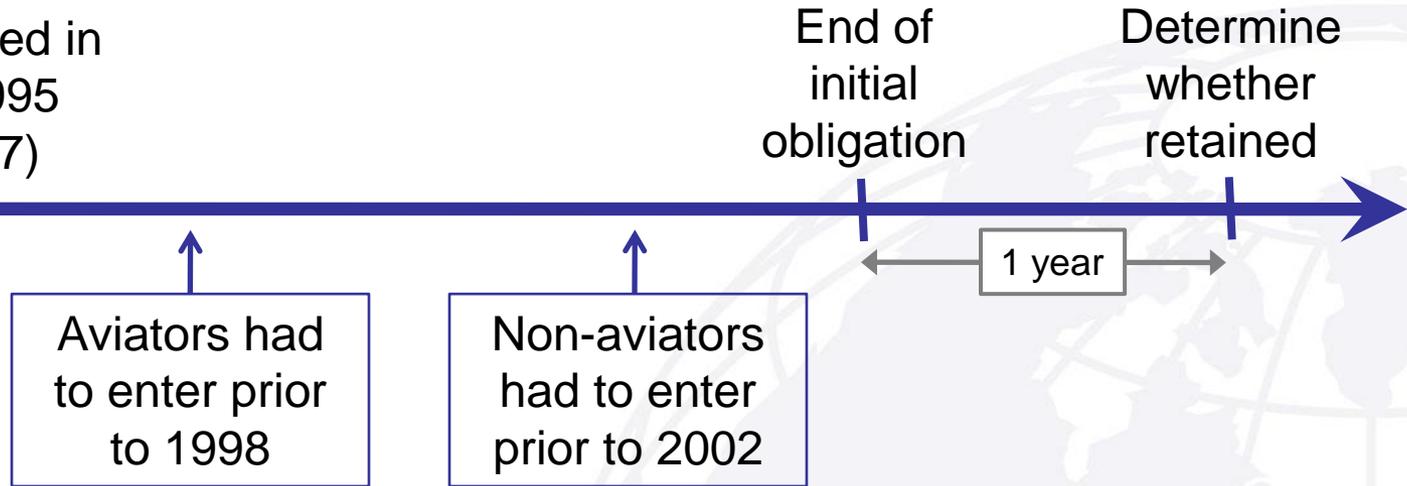


Figure 6. General Timeline used for Naval Aviator

Must have been
commissioned in
or after 1995
(*n*=17,887)



	Loss	Retained	Total	%Retained
IA	310	601	911	66%
Non-IA	9659	7317	16,976	43%
Total	9969	7918	17,887	44%

Table 5. Retention of IA and non-IA officers



Percent Retained by Gender and Warfare Specialty

	IA	Non-IA
Male	85.8%	78.6%
Female	14.2%	21.4%

Table 6. IA and non-IA officers by Gender

	IA	Non-IA
Aviation	18.1%	16.2%
Surface	23.1%	22.9%
Supply	7.0%	5.5%
Sub	6.6%	6.4%
Other	45.2%	49.0%

Table 7. IA and non-IA officers by DESIG



Percent Retained by Race/Ethnicity and Family Status

	IA	Non-IA
White	74.0%	76.6%
Black	8.5%	6.7%
Hispanic	8.9%	6.9%
Indian	0.9%	1.0%
Asian	5.9%	6.0%
Other	0.9%	0.8%
Unknown	1.0%	1.9%

Table 8. IA and non-IA officers by Race

	IA	Non-IA
Joint Marriage	3.5%	4.5%
Married	63.8%	60.7%
Single w/ dependents	4.7%	7.8%
Single w/o dependents	28.0%	26.9%

Table 9. IA and non-IA officers by Family Status



Logistic Regression Model Results

	Log odds (β)	Std. error	t value
(Intercept)	-0.235	0.146	-1.61
Gender	-0.356	0.042	-8.47
White	0.286	0.119	2.39
Black	0.585	0.132	4.41
Hispanic	0.392	0.132	2.96
Indian	0.441	0.197	2.23
Asian	0.326	0.134	2.43
Other	0.549	0.208	2.64
Married	-0.176	0.077	-2.28
Single w/dep	-1.243	0.096	-12.98
Single w/o dep	-1.154	0.080	-14.39
DesigOther	0.235	0.046	5.14
DesigSub	0.171	0.072	2.36
DesigSupply	0.573	0.077	7.44
DesigSurface	0.231	0.052	4.47
IA	0.944	0.074	12.74

- So adjusted O.R. = 2.57



- IA deployment generally associated with increased retention
 - Consistent with effects for enlisted personnel
 - Also consistent with the hypothesis that increased retention associated with seniority
 - Self-selection and other effects present
- Hypothesis seemingly untrue: IA deployment *causes* significant decrease in propensity to stay in the Navy