North Atlantic Treaty Organization
Research and Technology Agency
HFM-180/RTC Technical Course
Strategies to Address Recruiting and Retention Issues in the Military

COMPENSATION: PAY AND BENEFITS
U.S. NAVY RESEARCH INITIATIVES AND APPLICATIONS

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Navy Personnel Research, Studies, & Technology
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Compensation: Pay and Benefits U.S. Navy Research initiatives and Applications
RTO-TR-HFM-107 Recruiting and Retention of Military Personnel

• Compensation Chapter focused on:
  - Overview of current compensation.
  - Modeling and estimation of selective reenlistment bonuses (SRB), auctions, choice theory as they pertain to offering flexible compensation plans.
  - Provide brief overview and update.

• Additions to this discussion include:
  - Indirect incentives – promotions
  - The use of economics based experiments in setting compensation.
    » Risk Preference
    » Time Value of Money
      - SRB
      - 401K Plans (retirement)
      - Enlistment Bonuses
      - GI Bill
Retention and SRB Payouts

Average SRB Awarded by Paygrade

<table>
<thead>
<tr>
<th>Paygrade</th>
<th>Fiscal Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
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<tr>
<td>E-2</td>
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<td>–</td>
<td>–</td>
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<td>1,858.88</td>
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<td>E-3</td>
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<td>16,433.75</td>
<td>17,729.22</td>
<td>16,481.23</td>
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<tr>
<td>E-4</td>
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<td>24,965.71</td>
<td>25,130.32</td>
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<tr>
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<td>29,839.60</td>
<td>27,780.06</td>
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<td>26,930.01</td>
<td>28,827.33</td>
<td>29,430.72</td>
<td>30,091.91</td>
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<td>E-7</td>
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<td>16,062.12</td>
<td>19,564.49</td>
<td>23,001.23</td>
<td>24,729.64</td>
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<tr>
<td>E-8</td>
<td></td>
<td>18,284.16</td>
<td>22,380.24</td>
<td>22,027.16</td>
<td>23,134.63</td>
</tr>
</tbody>
</table>

- SRB is in addition to base pay, average FY02 base pay for enlisted $43K, not including SRB or other special pays.
- For the sample period, 1995-2004, SRB multiplier ranged from 0-8. By 2008 SRB multiplier exceeds 10 for certain skill groups.
Retention and SRB Payouts (con’t)

Table 3H-3: Weapons Control – SRB Experiments for GME 3
Categories Model (Full Sample 66,509 Observations)

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>SRB+0.5</th>
<th>SRB+1</th>
<th>SRB+1.5</th>
<th>SRB+2</th>
<th>SRB+2.5</th>
<th>SRB+3</th>
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<tbody>
<tr>
<td>Implied Elasticities (0)</td>
<td>0.45</td>
<td>0.40</td>
<td>0.36</td>
<td>0.33</td>
<td>0.30</td>
<td>0.28</td>
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<tr>
<td>Prob Leave</td>
<td>0.4615</td>
<td>0.4008</td>
<td>0.3554</td>
<td>0.3224</td>
<td>0.2982</td>
<td>0.2802</td>
<td>0.2664</td>
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<tr>
<td>Prob Extend</td>
<td>0.2032</td>
<td>0.2118</td>
<td>0.2135</td>
<td>0.2115</td>
<td>0.2075</td>
<td>0.2025</td>
<td>0.1971</td>
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<tr>
<td>Prob Re-enlist (infinity)</td>
<td>0.3580</td>
<td>0.3842</td>
<td>0.4078</td>
<td>0.4289</td>
<td>0.4478</td>
<td>0.4647</td>
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<tr>
<td>Prob Re-enlist (0)</td>
<td>0.3353</td>
<td>0.3875</td>
<td>0.4311</td>
<td>0.4661</td>
<td>0.4943</td>
<td>0.5173</td>
<td>0.5364</td>
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<tr>
<td>% Change Re-enlist (infinity)</td>
<td>6.8%</td>
<td>14.6%</td>
<td>21.6%</td>
<td>27.9%</td>
<td>33.6%</td>
<td>38.6%</td>
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</tr>
<tr>
<td>% Change Re-enlist (0)</td>
<td>15.6%</td>
<td>28.6%</td>
<td>39.0%</td>
<td>47.4%</td>
<td>54.3%</td>
<td>60.0%</td>
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<tr>
<td>Mean $SRB</td>
<td>1,244</td>
<td>1,677</td>
<td>2,129</td>
<td>2,582</td>
<td>3,034</td>
<td>3,486</td>
<td>3,938</td>
</tr>
<tr>
<td>Normalized % Change Re-enlist (infinity)</td>
<td>6.3%</td>
<td>12.2%</td>
<td>17.7%</td>
<td>22.7%</td>
<td>27.3%</td>
<td>31.5%</td>
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<tr>
<td>Additional Re-enlisted Personnel</td>
<td>3,458</td>
<td>7,715</td>
<td>11,506</td>
<td>14,964</td>
<td>18,090</td>
<td>20,817</td>
<td></td>
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<tr>
<td>Normalized % Change Re-enlist (0)</td>
<td>12.3%</td>
<td>23.0%</td>
<td>31.7%</td>
<td>38.8%</td>
<td>44.7%</td>
<td>49.5%</td>
<td></td>
</tr>
</tbody>
</table>
Unemployment

• Unemployment – indirect measure of probability of being employed in outside sector.
  - Used as primary indicator of retention and enlistment behaviors, forecasting end-strength and setting specific compensation.
    » Selective Reenlistment Bonuses (SRB)
    » Enlistment Bonuses
    » Assignment Incentive Pay
Unemployment Primer


- Unemployment rate is the percentage unemployed divided the labor force.
  - Labor Force is the sum of the number of people employed and unemployed.
  - To be considered unemployed individual must be in a temporary layoff status or be actively seeking employment within the last 4 weeks.

- Unemployment is a lag indicator
  - Unemployment may continue to increase or remain stagnate up to 2-3 quarters after the economy has shown positive economic growth.

  » Caution needed in using unemployment to forecast retention, accessions, and end-strength.
Types of Unemployment Statistics

- Types: industry, national, occupation, regional, and characteristics.
  - Best choice as explanatory variable for retention and end-strength forecasts is likely to be dependent on model specification.
    » 28 DoD Occupation Skill Groups Retention Model.
      - National unemployment more robust predictor relative to educational unemployment.
## Comparison of Unemployment Rates

### Comparison of Occupational and National Unemployment

_Bureau of Labor Statistics_

<table>
<thead>
<tr>
<th>Occupation</th>
<th>2007 Occupation Unemployment Rate</th>
<th>2007 National Unemployment Rate</th>
<th>2007 Percentage Difference between National and Occupation Unemployment Rate</th>
<th>2008 Occupation Unemployment Rate</th>
<th>2008 National Unemployment Rate</th>
<th>2008 Percentage Difference between National and Occupation Unemployment Rate</th>
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</thead>
<tbody>
<tr>
<td>Management</td>
<td>2.1</td>
<td>4.6</td>
<td>54.34</td>
<td>2.7</td>
<td>5.8</td>
<td>53.44</td>
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<tr>
<td>Service</td>
<td>5.9</td>
<td>4.6</td>
<td>-28.26</td>
<td>6.7</td>
<td>5.8</td>
<td>-15.51</td>
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<tr>
<td>Sales and Office</td>
<td>4.3</td>
<td>4.6</td>
<td>6.52</td>
<td>5.3</td>
<td>5.8</td>
<td>8.62</td>
</tr>
<tr>
<td>Production and Transportation</td>
<td>5.8</td>
<td>4.6</td>
<td>-26.08</td>
<td>7.6</td>
<td>5.8</td>
<td>-31.03</td>
</tr>
</tbody>
</table>
Comparison of Unemployment and Active Duty Enlisted

Comparison of Unemployment Rate with Active Duty Enlisted

Active Duty Enlisted

Time MM/YY

Enlisted Personnel
Unrate
**Weapon Control - Unemployment Analysis**

Sensitivity of individuals to changes in unemployment analyzed using three categories, 0* = leave 1** = extend, 2*** = stay

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean over individuals Unemp.</td>
<td>GME - 3 categories</td>
<td>-.31**,3.57***</td>
<td>-</td>
</tr>
<tr>
<td>Mean over individuals Unemp Education</td>
<td>GME - 3 categories</td>
<td>-.45*, 1.51**, -15***</td>
<td>-.14*,.69**, -.28***</td>
</tr>
<tr>
<td>Mean AFQT</td>
<td></td>
<td>72.4</td>
<td>74.7</td>
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</tbody>
</table>

- Sensitivity of enlisted personnel to unemployment declines over time.
- Results consistent over 2001-2008 sample period, for 28 DoD occupational skill Groups.
- Results could be driven by higher AFQT’s over sample period, and significant increases in base pay and SRB.
Career Case Manager
Technologies
CCMT arose to support the Sea Warrior concept of self-detailing and Sailors taking responsibility for career management.

CCMT provides Sailors with empirical information about promotion potential to support the self-management of their career.

Helps Sailors determine the best job for:

1. Quickest advancement
2. Change factors that impact advancement speed
   - Sea Duty
   - Exam Score
   - Duty Locations – CA, duty/unit type
   - Final Multiple Factors
   - Education
3. Geographic Stability
NETPDTTC Advancements – How They Work

• Final Multiple Components
  - Exam Score
  - PMA – based on 1-4 scale
  - PNA – points awarded if individual passed exam but was not advanced
    » PNA points vary by PG
    » Higher exam score greater number of PNA pts awarded
    » PNA points can be lost if individual fails next exam
  - Minimum TIR
  - Awards – not included in CCMT FM – makes up < 4% of FM
  - E-7 advancements only consider PMA, Exam, and board recommendation
  - Components of FM weighted by PG and TIPG
    » Greater weight placed on exam score for lower PGs w/greater weight on performance for E-6 and above – See BUPERSINST 1430 and 1610
Advancements – How They Work (con’t)

• Eligible for advancement - must meet min TIPG
  - Varies by PG
• Exam score (standard score 20-80)
  - Performance Mark Average $\geq$ 3.6, in order to take the exam
  - E-4 to E-6 can take exam 2x/year
  - E-7 can take exam 1x/year
• Inverse relationship between vacancies and cut score
  - Cut Score – minimum exam score needed to be considered for advancement
    » Cut score is adjusted in every advancement cycle
Forecasting Promotion Probabilities: Three Approaches

• Mean forecasting
  - Matrix multiplication of the mean estimated promotion-probability matrix
    » (Average E3 characteristics)*(global matrix)
    - Global matrix is mean across paygrades
• Individual forecast based on Sailor specific characteristics/row
  - (Individual characteristics at starting point of forecast)*(global matrix)
    - Global matrix is mean across paygrades
• Cohort Effect
  - (Individual characteristics at starting point of forecast)*(global matrix)
    » Global matrix – is mean for each paygrade
ADMIN with Transfers

- Transfers are defined within or out of skill group

<table>
<thead>
<tr>
<th>Predicted Transition Probabilities</th>
<th>E-3</th>
<th>E-4</th>
<th>E-5</th>
<th>E-6</th>
<th>E-7</th>
<th>LOSS</th>
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<tbody>
<tr>
<td>E-3</td>
<td>21.6</td>
<td>63.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>15.3</td>
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<tr>
<td>E-4</td>
<td>0.0</td>
<td>46.3</td>
<td>32.4</td>
<td>0.0</td>
<td>0.0</td>
<td>21.3</td>
</tr>
<tr>
<td>E-5</td>
<td>0.0</td>
<td>0.0</td>
<td>53.5</td>
<td>33.4</td>
<td>0.0</td>
<td>13.1</td>
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<tr>
<td>E-6</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>43.8</td>
<td>26.7</td>
<td>29.5</td>
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</table>

Within 1 year, 21.6% probability E-3 not advanced
Within 1 year, 63.2% probability of E-3 advanced to E-4
Within 1 year, 15.3% probability of E-3 will be lost
Within 1 year, 33.4% probability of E-5 advanced to E-6

RHS average effect on event data.
Only tells you “within 1 year of sitting for exam or eligible to promote”
Predicted Transition Probabilities T=3

<table>
<thead>
<tr>
<th></th>
<th>E-3</th>
<th>E-4</th>
<th>E-5</th>
<th>E-6</th>
<th>E-7</th>
<th>LOSS</th>
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<tbody>
<tr>
<td>E-3</td>
<td>0.0100</td>
<td>22.78</td>
<td>24.80</td>
<td>6.83</td>
<td>0.00</td>
<td>44.58</td>
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<tr>
<td>E-4</td>
<td>0.00</td>
<td>9.93</td>
<td>24.20</td>
<td>15.51</td>
<td>2.89</td>
<td>47.47</td>
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<tr>
<td>E-5</td>
<td>0.00</td>
<td>0.00</td>
<td>15.29</td>
<td>23.77</td>
<td>17.59</td>
<td>43.35</td>
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<tr>
<td>E-6</td>
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<td>0.00</td>
<td>0.00</td>
<td>8.40</td>
<td>43.52</td>
<td>48.08</td>
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<td>E-7</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<td>LO</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
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If E-3 in time “t” in “t+3,” 24.8% probability of being advanced to E-5
If E-4 in time “t,” 3 years from now 15.51% of being advanced to E-6
Predicted Transition Probabilities go to T=7
Marginal Effects

- Marginal effects:
  - By PG/Skill results show significant effects for:
    » Sea duty
    » Sea Months
    » Concentration Area (CA)
    » CA changes prior to and after advancement
    » Number of times taken exam
    » PMA
    » Education
## Marginal Effects - ADMIN

<table>
<thead>
<tr>
<th>Variable</th>
<th>E-3 to E-4</th>
<th>E-4 to E-5</th>
<th>E-5 to E-6</th>
<th>E-6 to E-7</th>
<th>Loss</th>
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<td>Sea Duty</td>
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<td>12.77</td>
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<td>FC Norfolk</td>
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<td>12.65</td>
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<td>H.S +</td>
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<td></td>
<td>9.9</td>
<td>7.7</td>
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<td>AFQT</td>
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<tr>
<td>PMA</td>
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<td>10.7</td>
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<tr>
<td>Sea Months</td>
<td></td>
<td></td>
<td></td>
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### Surface Combat Weapon – Individual Sailor

#### Start E-4 5 Year Forecast

<table>
<thead>
<tr>
<th>Year</th>
<th>E-4</th>
<th>E-5</th>
<th>E-6</th>
<th>E-7</th>
<th>Loss</th>
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<tr>
<td>Year 1</td>
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<td>Year 2</td>
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<td>37.86</td>
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<td>Year 4</td>
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<td>23.65</td>
<td>9.46</td>
<td>.05</td>
<td>62.03</td>
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<td>Year 5</td>
<td>1.75</td>
<td>18.33</td>
<td>12.57</td>
<td>.14</td>
<td>67.21</td>
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</tbody>
</table>

- **High School + AFQT = 87**
- **MOS = 25**
- **TIR = 8 months**
- **PMA = 3.6**
- **Sea Months = 1**
- **CA= Corpus Christi**
- **Cycle Cut = 179.75**
- **Final Multiple = 124.89**
- **DNEC 0981 = 1**
- **Vertical Launching Systems Maintenance**