Direct Employment Resulting from Proposed Commercial Cargo and Crew Expenditures in the President's 2011 Budget Request

Prepared by The Tauri Group

[detailed version]

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THE TAURI GROUP

Independent Analysis

- Goal: An objective, rigorous, credible, realistic estimate of the number of direct jobs created by proposed NASA expenditure on commercial providers of launch services for crew and cargo at the level in the FY 2011 President's Budget Request
- Approach:
  - Limit scope to $6.1 billion Commercial Crew ($5.8 billion) and Commercial Cargo ($0.3 billion) line items
    - Focus exclusively on direct jobs associated with this budget area
    - Do not include indirect jobs and impact multipliers
    - Do not include jobs resulting by additional in-kind investment by industry
  - Ensure objective results through non-advocate assessment
    - Independent study commissioned by Commercial Spaceflight Federation
    - Conducted by The Tauri Group, an analytic consulting firm based in Alexandria, VA

Background

- On February 1, 2010, NASA released its FY 2011 President's budget request with $6.112 B allotted to the development of commercial crew and commercial cargo capability (amounts in millions):

	2011	2012	2013	2014	2015
Commercial Crew	$500	$1,400	$1,400	$1,300	$1,200
Commercial Cargo	$312	--	--	--	--

Source: NASA

- The Commercial Crew line item reflects a budget that (as stated in the budget document), "Embraces the commercial space industry and the thousands of new jobs that it can create by contracting with American companies to provide astronaut transportation to the Space Station."

Study Methodology

- Study estimates direct jobs resulting from NASA expenditure of proposed Commercial Crew and Commercial Cargo budget of $6.1B
- Expenditure of funds modeled
  - Two possible expenditure scenarios considered
    - Scenario 1: Two capsules
    - Scenario 2: Three capsules with downselect
    - Note: “Capsule” refers to in-space crewed vehicles; designs may include lifting bodies or other configurations
  - Multiple cases of possible winners considered within each scenario
    - For each scenario, many different combinations of companies modeled
    - Companies considered are those currently providing launch systems to the DoD and NASA, firms that have publically expressed interest, and aerospace firms with demonstrated capability
    - Companies modeled in terms of location, business model, launch vehicle
  - Results analyzed; final results reflect average values across alternative outcomes
- Jobs estimated using U.S. Bureau of Economic Analysis model Regional Input-Output Modeling System, (RIMS II)
- All inputs adjusted for an estimated 2.5% annual inflation

Scenario Assumptions

- Year-by-year breakout reflects time phasing of the proposed NASA budget
- Budgeted funds assumed to be used for Commercial Crew:
  - Design (Year 1 supports initial design and engineering for a number of teams)
  - Capsule development
  - Non-recurring human rating of launch vehicle(s)
    - Atlas V human rating assumed in all outcomes
    - Human rating for Falcon 9 or Taurus II incorporated in some outcomes
  - Pad upgrades and launch infrastructure
    - Atlas V pad upgrades assumed in all outcomes
    - Pad development for the Falcon 9 or Taurus II in some outcomes
  - Demonstration launches
  - Risk spread among established and entrepreneurial approaches
- Includes Commercial Cargo FY 2011 line item
  - Does not include initial COTS launches, nor launches under Cargo Resupply Services contract

Regional Input-Output Modeling System (RIMS II)

- Outcomes were modeled using multipliers from the Regional Input-Output Modeling System (RIMS II)
  - Developed by the U.S. Bureau of Economic Analysis
  - Widely used in the public and private sector to model new programs or constructions
  - Used by the FAA to estimate the impacts of space activities
- RIMS II uses industry specific, regional data from every area in the US to estimate the outputs of additional demand or spending
- This analysis used the RIMS multipliers for Guided Missile and Space Vehicle Manufacturing
  - Includes space and military rocket manufacturing; prototype development, and assembly
  - Excludes satellite development and manufacturing

RIMS II Strengths and Limitations

- Strengths
  - Converts NASA spending directly to job numbers; eliminates bias, and inconsistency between employment and revenue information in industry-sourced data
  - Widely used and accepted approach for impact studies
  - Uses region and industry-specific data
- Limitations
  - Industry multipliers do not distinguish between commercial developers and government contractors in terms of efficiencies and business models
  - Uses industry averages, so may not account for firms with atypical business models

Proprietary Input from Primary Sources

- Interviews conducted with multiple potential funding recipients, who provided estimates and general information on:
  - Engineering approach, business model, and location of activities
  - Anticipated funding request
  - Degree of high end design and assembly, versus standard parts manufacturing
  - Number of demonstration flights
  - Partner vehicles
- Conversations and data protected under non-disclosure agreements between The Tauri Group and firms who provided data
- These inputs used to refine, validate, and expand on open source data

Calculation of Jobs

- Multiple cases of each scenario considered; each case reflects companies, work locations, and business model
- Resulting jobs calculated using RIMS II
- Results from each case averaged; results from Scenarios 1 and 2 averaged. Results characterized in terms of:
  - Jobs associated with initial design activity
  - Jobs associated with capsule development
  - Jobs associated with demonstration launch-related activity
    - Human rating launch vehicle
    - Infrastructure upgrades (pad enhancements)
    - Crew demonstration launches
      - Cargo demonstration launches funded by $312M FY2011 line item included; does not include cargo demonstration launches funded from original $500M COTS program
  - Operational crew and cargo launches not included

Results

- Overall average of more than 11,800 jobs per year over 5 years
- Peak of 14,200 jobs in FY 2012
- Progression of number of jobs reflects the budget spending profile
- Job estimates vary by about 10% across possible outcomes

Estimated Direct Jobs Resulting from Expenditure of $6.1B Commercial Crew and Commercial Cargo Budget					
	FY2011	**FY2012**	**FY2013**	**FY2014**	**FY2015**
Total	7,520	14,200	14,010	12,188	11,031

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