

# Techno-Economic Analysis of the U.S. Economy

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# Problems



- **MITRE is involved in developing and analyzing responses to national challenges (examples include challenges in energy, health care, national security, and air transport).**
- **The responses are complex, often cross government agencies, and typically involve new technologies and tax and or subsidy policy.**
- **To better develop and analyze the responses to the national challenges and ensure they are in the public's best interest, it is necessary to measure the big picture implications, including economic and environmental impacts.**

# Background



- **Inter-industry models (including UMD LIFT & Iliad, Monash-USAGE) provide economic analysis from industry supply chains up through the national economy, taking into account technologies, taxes, and subsidies underlying the industry supply chains for products and services purchased by households and government.**
- **Other types of macroeconomic models are more aggregate and cannot as easily model new technologies, taxes, subsidies, and regulations at the industry level.**
- **Incorporating technology change in an inter-industry model requires a technical/operational model of sector**
  - **MARKAL provides such a model for the energy sector.**
- **MITRE knows the taxes and sector operational models for national programs in which MITRE is involved and is well positioned to do the techno-economic modeling with inter-industry models.**

# Objectives



- **Primary objective: Apply technical and economic modeling to improve and coordinate responses to the range of national challenges that MITRE supports.**
- **Supporting objectives:**
  - **Codify existing MITRE knowledge on incorporating technological change in inter-industry models**
  - **Understand how taxes, subsidies, and regulation are represented in inter-industry models and what the models can reveal about projected tax revenue and government expenditure**
  - **Explore model shortcomings, including the role of emergent behavior.**

# Activities



- **Describe methods for incorporating the technologies associated with policies and programs in technical process models and economic inter-industry model based on previous work in energy and the air transport sector.**
- **Describe methods for representing subsidies, risks in unfunded obligations, and tax revenue impacts in the above sectors.**
- **Apply MARKAL, UMD LIFT & Iliad, and other models to develop techno-economic projections in an energy-environment program, including a comprehensive revenue & finance analysis.**
- **Formulate plans to apply these generic techno-economic methods to other MITRE program areas.**

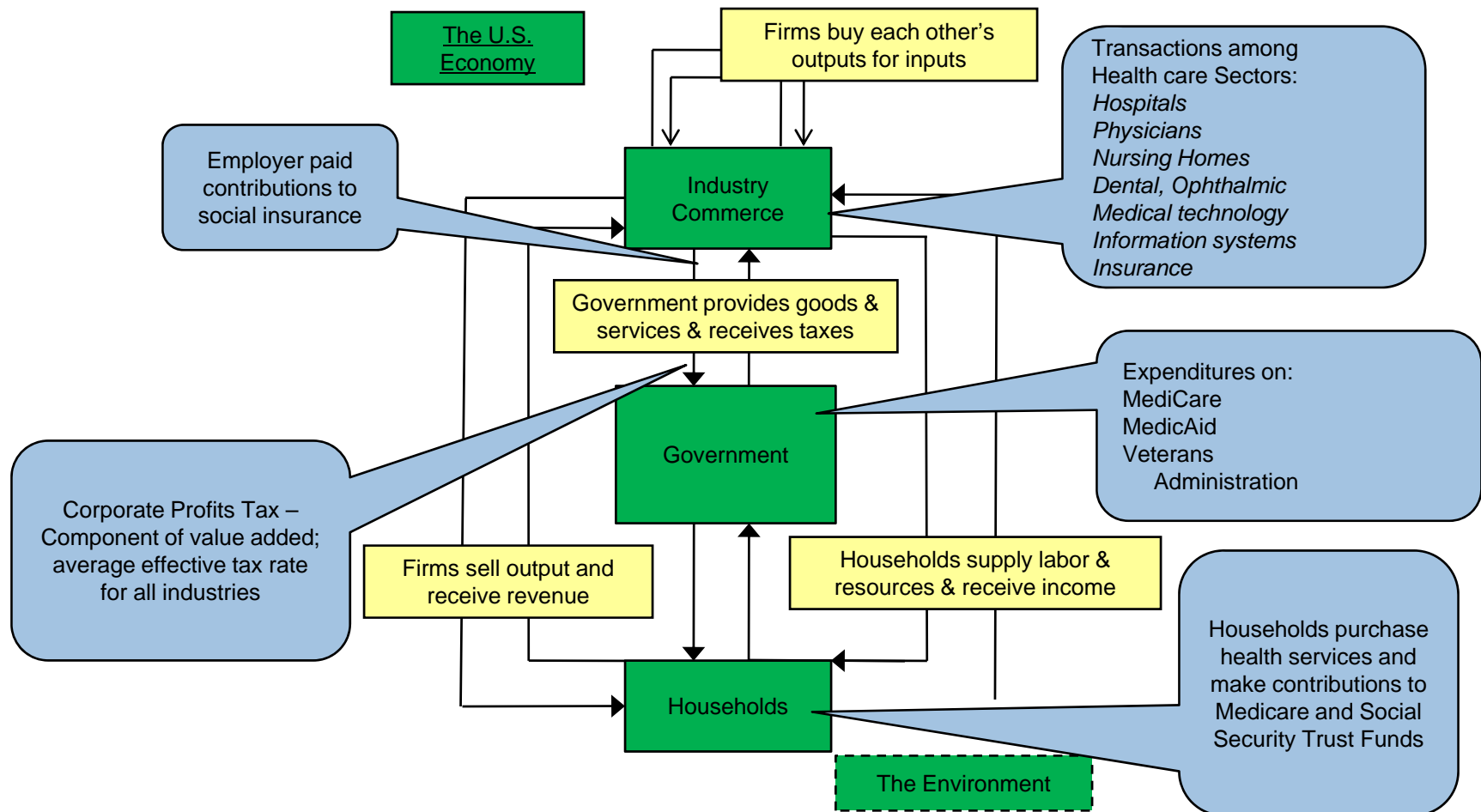
# Highlights



- **Leveraging previous CEM and CAASD research involving inter-industry models:**
  - **CEM research involved analyzing large-scale biofuels initiative**
    - **Used UMD LIFT model for economic analysis**
    - **MITRE work used for Dept of Commerce study**
  - **CAASD research involved analyzing impacts of NextGen**
    - **This work is ongoing**
    - **Applies Monash-USAGE model .**
- **Collaborating with UMD LIFT modelers on submissions to Energy Modeling Forum Study on Energy Demand and Efficiency.**

# Demonstration

## High-Level Context Diagram for the Economy



Use a Large Interindustry Forecasting Input-Output structure to relate Health Care process change and new technologies to the macro-economy

# Impact



- **This applied capability will result in better program and policy formulation at agencies, more comprehensive systems engineering support, and a clear line of sight for MITRE programs to national challenges related to economic security, the nation's revenue gap, and the economic sustainability of major program.**

# Future Plans



- **Continue to support technical and policy planning and analysis of national initiatives.**
- **Scope potential applications in the areas of**
  - **Healthcare**
  - **Tax collection sector**
  - **Financial asset relief programs and stimulus package**
  - **Critical infrastructure**
  - **Emergency response.**