

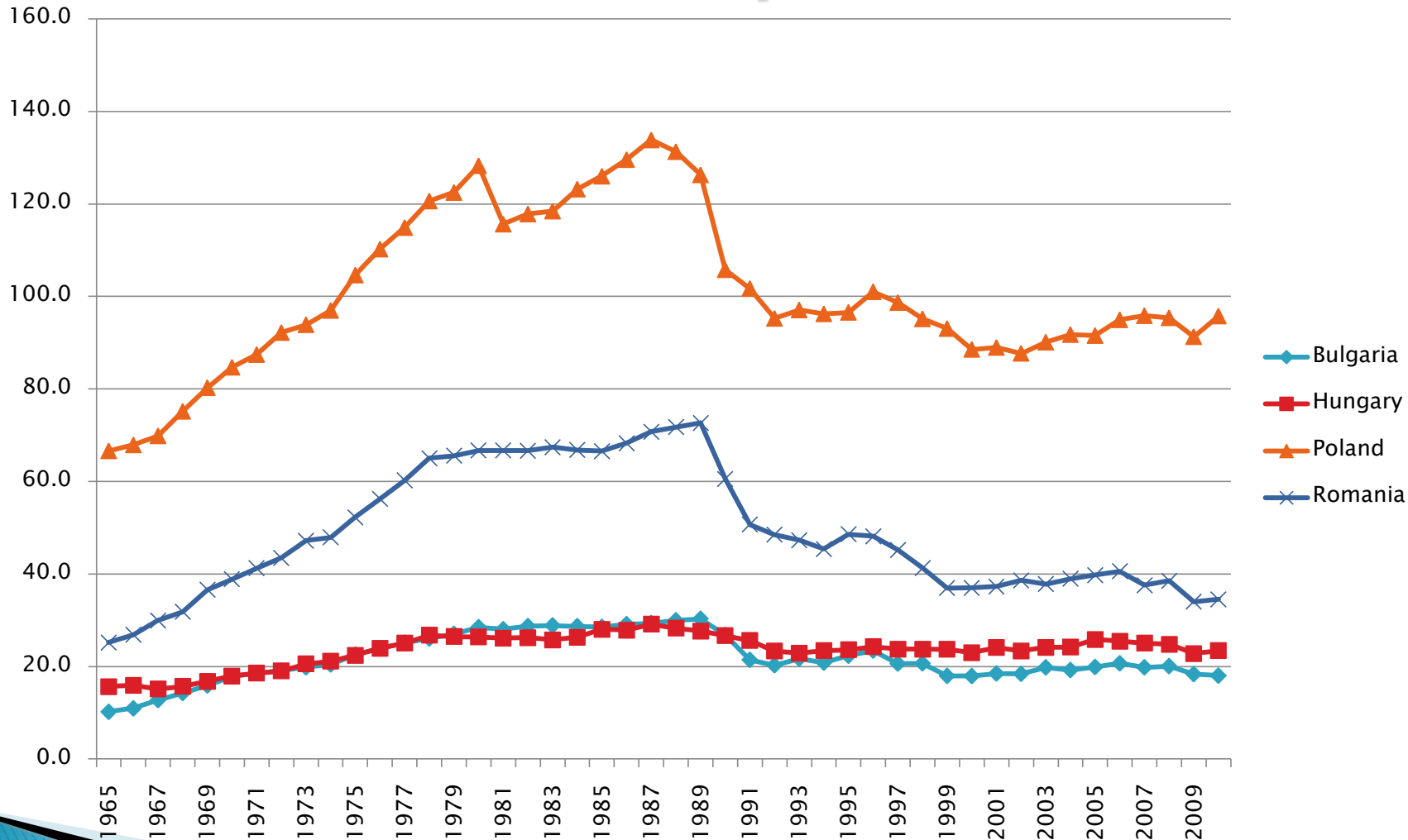
# **The Jevons' Paradox: Transitional and Developing Countries**

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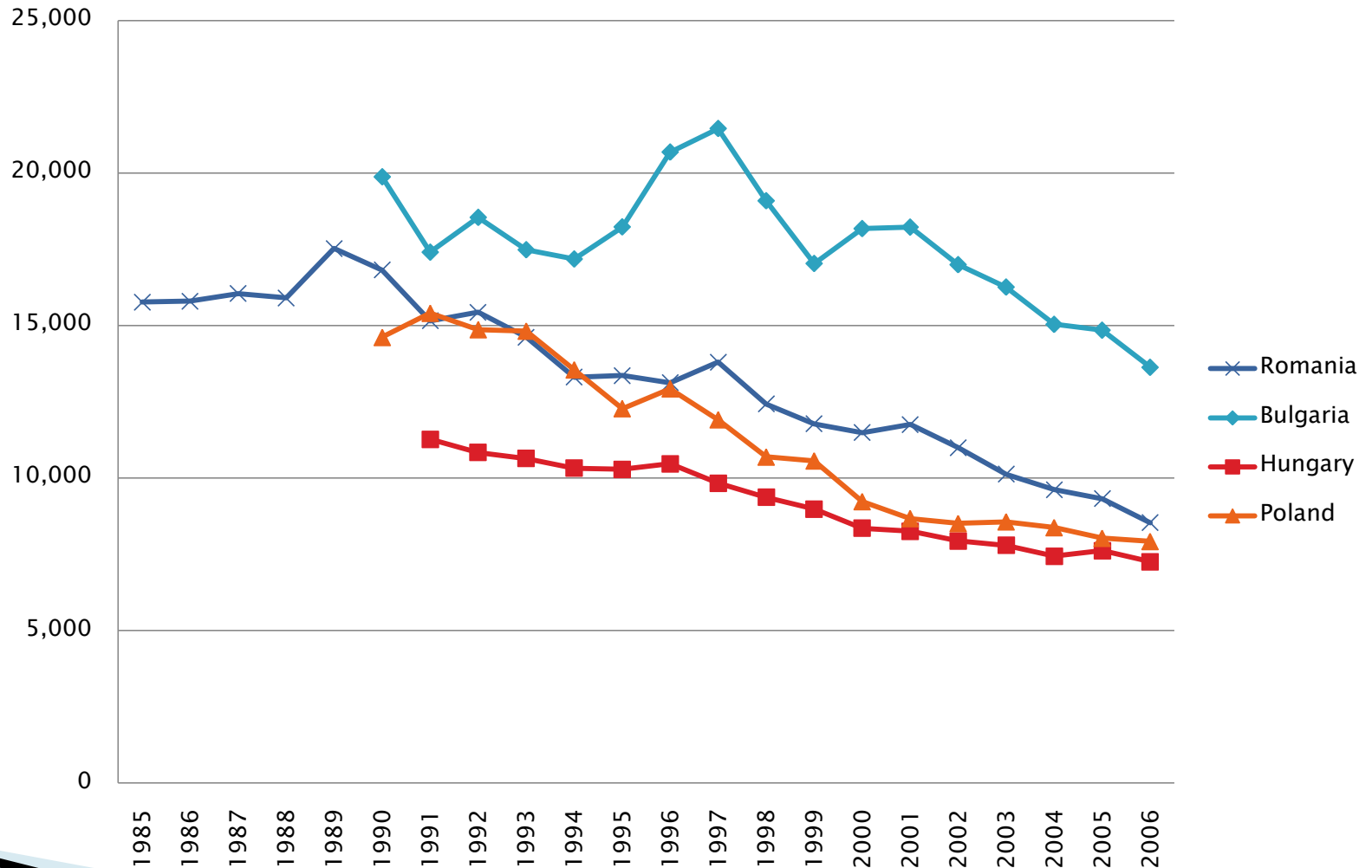
# Example from Research on Transitional Economies

- ▶ Eastern European Countries: Poland, Hungary, Bulgaria, Romania
- ▶ Total primary energy consumption
- ▶ Energy Intensity
- ▶ Population

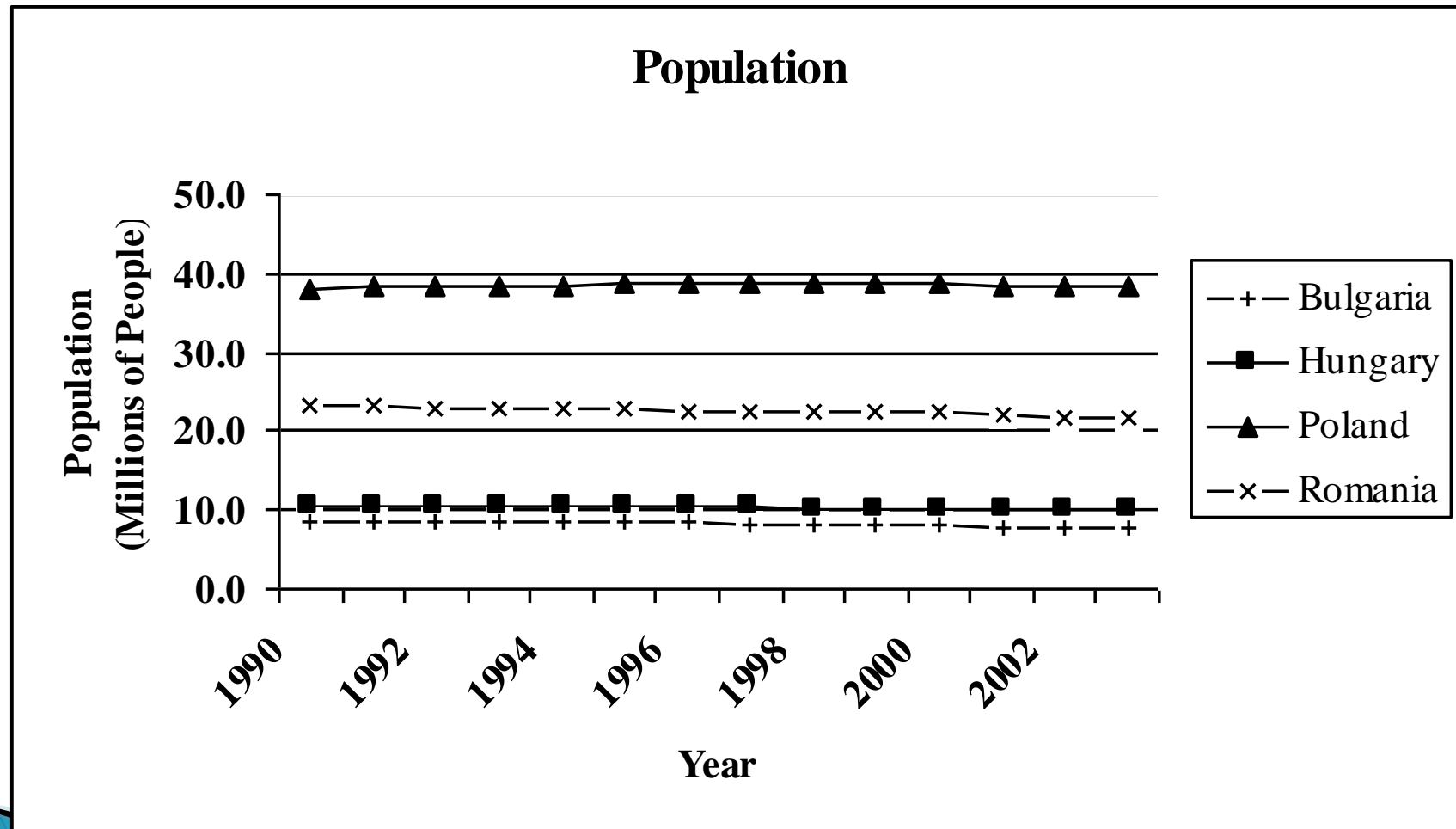
# Primary Energy Consumption: Million Tonnes Oil Equivalent



# Energy Intensity per Dollar of GDP: BTU per 2000 US Dollar



# Population 1990– 2003



# Regional Analysis

- ▶ Energy intensity has greatest impact (marginal terms)
- ▶ Population and GDP also have impacts
- ▶ Digging deeper
  - Exports, Imports, Government Consumption, Household Consumption
    - Exports, Government Consumption, Household Consumption; no impact (-)
    - Imports **has** an impact (+)
    - Preliminary analysis indicates Foreign Direct Investment has an impact (+)

# Individual Country Analysis

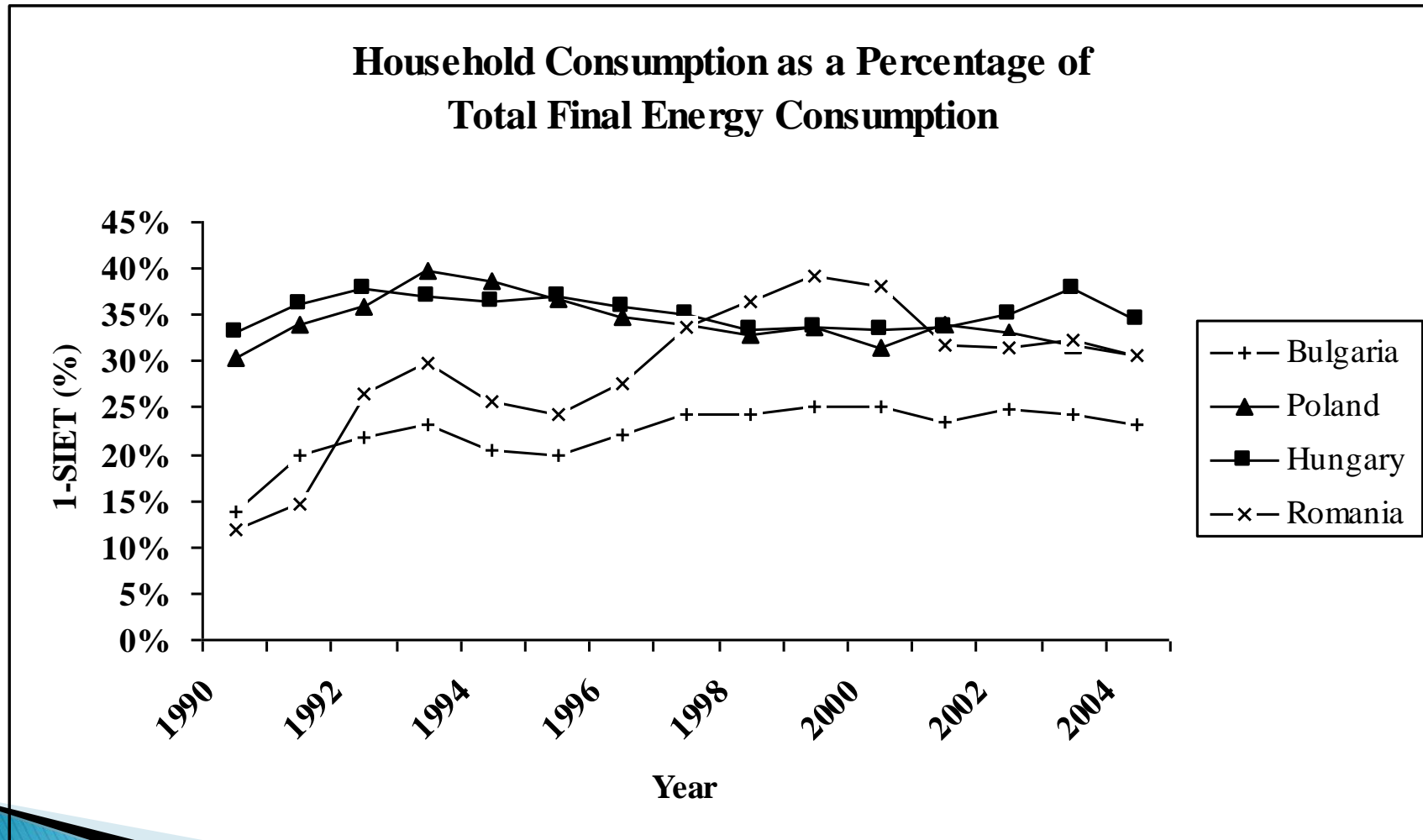
- ▶ The Jevons' Paradox likely
- ▶ Hungary: population density (+)
- ▶ Poland: population density (+), exports (+), imports (-), household consumption (+), government consumption (-)
- ▶ Bulgaria:

# Alternative Approach

- ▶ MULTI-SCALE INTEGRATED ANALYSIS OF SOCIETAL METABOLISM
  - ANALYSIS OF DIFFERENT LEVELS
    - NATIONAL LEVEL (level n)
    - LEVEL N-1: THE DIFFERENCE BETWEEN THE PRODUCTION COMPARTMENT AND HOUSEHOLDS
    - LEVEL N-2: AGRICULTURE, PRODUCTIVE SECTOR, TRANSPORTATION AND COMMUNICATIONS, GOVERNMENT AND OTHER, HOUSEHOLDS (URBAN AND RURAL)



# MSIASM Example



# Energy Issues in Developing Countries

- ▶ Population Growth, demographics, population density, and fertility
- ▶ Heavy Industrialization
- ▶ Transportation
- ▶ Resources to satisfy growth in energy consumption
- ▶ Subsidies
- ▶ Energy per capita; lack of information
- ▶ Shift in energy type

# Energy Issues in Transitional Countries

- ▶ Population migration, demographics, and fertility
- ▶ Major structural changes to the economy
  - Industries moving out
- ▶ Resources for energy consumption
- ▶ Energy per capita
- ▶ Governmental structures; national, EU, etc.

# What Other Gaps Should Be Addressed

