California WaterFix
Economic Analysis

Dr. David Sunding
UC Berkeley and The Brattle Group
October 27, 2016
Water Fix Economic Analysis

• Goal of the study: Quantify the benefits and costs of the project to the south of Delta contractors
  – CVP
  – SWP
  – Excluded: Exchange contractors, Friant, wildlife refuges
WaterFix Water Supply

• Proper frame of reference for an economic analysis is water supply with and without the project
  – Comparing some state of the world to the status quo
  – What does it cost vs. what do you get
• WaterFix is a long-term project, so the baseline is dynamic and not static
• We settled on the “eroding baseline” to isolate the effects of the tunnels
  – Apply same operating criteria for the tunnel and no-tunnel states of the world
Water Supply

• At present: 4.7 maf
  – EIR/EIS No Action Alternative
• Post-WaterFix: 4.9 maf
  – Combined CVP and SWP at Early Long Term
• No-tunnel eroding baseline: 3.9 maf
  – Incorporates effects of future regulations
  – Isolates impacts of new conveyance
• Implies incremental yields of ~1.0 maf
  – Most of this is supply preserved and not new supply created
Water Supply

• Effects of climate change are significant over the longer term

• Assuming 140cm of sea level rise, SWP yields are
  – With tunnels: 2.5 maf
  – Without tunnels: 1.3 maf
  – Implies that climate change could reduce SWP yields by nearly half
  – Tunnels basically eliminate this risk
  – Not monetized in my economic analysis
WaterFix Cost

• Present value cost is $13.9 billion including construction, mitigation, land, O&M
• $10.0 billion assigned to south of Delta contractors
• $3.9 billion assigned to the exchange contractors, Friant and the refuges – outside the scope of the analysis
• Implies that WaterFix has an annualized incremental cost of ~$400/af
  – Untreated, incremental annual cost at the Delta
  – How is this derived?
Incremental Cost

• Present value cost to SOD contractors is $10.0 billion.
• Assume project produces ~1 maf of improvement in water supply
• Implies a present value cost of $11,000 per acre-foot
• Assume a 3 percent real rate of interest
• What is the annual payment that will produce a present value of $11,000 at a 3 percent real rate? Answer: $400
• Levelizing costs makes them easy to compare
Cost

- To compare the cost of WaterFix to the cost of replacing lost SWP supplies with alternatives, need to add the cost of conveyance and treatment to the WaterFix incremental costs
  - Comparing apples-to-apples costs on a delivered, treated basis
- Thus, WaterFix incremental costs vary by agency
- Assumptions about yields are also critical
Incremental Cost vs. Yield

Water Fix Incremental Cost

Incremental Cost ($/AF) vs. Incremental Yield (MAF)
Urban Benefits

• Calculated the value of avoided shortages resulting from WaterFix for 36 urban water agencies receiving SWP supplies
• Analysis based on CalSim II modeling runs and the SDBSIM shortage value model
• Value of shortages avoided by implementing WaterFix is >$1,400/af
• Compared to incremental cost of WaterFix
• Also compared to the cost of water supply alternatives – generally less expensive
Agricultural Benefits

• Farmers respond to shortage by pumping more groundwater and by fallowing
• Agricultural benefits analysis conducted using SWAP – a calibrated programming model
• SGMA is incorporated into the agricultural analysis
  – Assumed sustainable yields for major groundwater basins in the San Joaquin Valley
• Fallowing becomes more important going forward
Agricultural Benefits

- Land price is a good indicator of farm water value
- Assuming land price of $18,000/acre
  - Implies annual net income of $900/acre using a 5 percent capitalization rate
- Assuming water use of 2.5 af/acre implies annual value of $360/af
  - Measured at the place of use
  - Less at the Delta (~$300/af)
  - Less than the incremental cost of WaterFix
Comparing Costs and Benefits

- Aggregate analysis
  - Summing all incremental benefits and costs across south of Delta contractors
  - Benefits: $16.1 billion vs. Costs: $10.0 billion
  - Passes a benefit-cost test
Comparing Costs and Benefits

• Disaggregated costs and benefits
  – Assuming a proportional cost allocation:
    – $(0.6)$ billion for SWP ag
    – $(1.0)$ billion for CVP ag
    – +$7.6 billion for SWP urban

• Once the cost allocation and financing plan is complete, can recalculate benefits and costs for various groups
Questions