Microsimulation of Demand for Health Insurance:
A Method Based on Elasticities

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CBO's Health Insurance Simulation Model (HISIM)

■ The first version was developed in 2002 to model various proposals for expanding coverage, including direct subsidies, changes to tax incentives, and insurance market reforms.

■ The model was expanded in 2008-10 to estimate additional proposals, including expansion of public programs, individual mandates, and further insurance market reforms, culminating in estimates of the Affordable Care Act (ACA).

■ The model is updated regularly to incorporate new data, the most recent economic forecast, changes in law or regulations, and technical improvements.

■ Baseline estimates are published two or three times a year and are used for scoring changes to current law.

Data Used in HISIM

- *Survey of Income and Program Participation (SIPP)*—the base data on individuals and families.

- *Medical Expenditure Panel Survey, Household Component*—for determining individual-level expenditures.

- *National Health Expenditure Accounts*—a benchmark for total spending.

- *National Compensation Survey*—for grouping workers together into synthetic firms.

- *Medical Expenditure Panel Survey, Insurance Component*—a benchmark for private insurance premiums.

Major Outcomes Modeled by CBO's HISIM

- **Effects on the federal budget**
  - Changes in outlays and revenues
  - Net effect for the current year (2014) and the next ten years (2015–2024)

- **Changes in coverage by source of coverage**
  - Uninsured
  - Employment-based coverage
  - Medicaid
  - Exchange (Subsidized and unsubsidized)
  - Other (Including nongroup coverage outside of the exchanges, Medicare, and military health care)

- **Occasional analyses of premiums, individual out-of-pocket spending, and outcomes by relationship to the Federal Poverty Level**

Advantages of Microsimulation Modeling of Health Insurance Coverage Versus Other Approaches

■ By simulating behavior for each individual and family unit, the estimates capture the distribution of responses rather than average response by cell or subgroup, as in a simpler spreadsheet-type approach.

■ By taking advantage of detailed information collected in household surveys such as the SIPP on individuals and families and the relationships between key variables such as income, health status, employment status, and coverage, the estimates better reflect outcomes under new policies.

Advantages of Microsimulation Modeling of Health Insurance Coverage Versus Other Approaches (Continued)

- By using microdata, the estimates capture nonlinear relationships between key variables.

- By applying parameters drawn from research to predict behavioral responses and forecast the effect of a change in policy, the estimates are more accurate:
  - Take-up elasticities can be applied to individuals and families faced with new options.
  - Firm-offer elasticities can be applied to the simulated firms to predict who will offer coverage to their employees when new options are available.

Benchmarking and Calibration

- Base survey data are from 2005, a non-recession year.

- The model is calibrated each year to account for price changes and incorporate CBO's latest economic forecast, including inflation, unemployment, and income.

- The SAS-Optimizing Routine is used to reweight survey observations to simultaneously match targets for coverage, employment status, and immigration status.

- Projecting the income distribution is an important part of updating the model.

Benchmarking and Calibration (continued)

■ Benchmarks are set on the basis of the latest data on insurance coverage and employment-based private health insurance premiums.

■ This year, HISIM calibrated exchange premiums and plan characteristics to the actual data.

– Exchange plans appear to have narrower networks, lower payment rates, and tighter management of care than employment-based plans.

– Current projections of exchange premiums in 2016 are about 15% lower than CBO's previous projections.

Modeling Individuals' Coverage Decisions Using Elasticities

■ Individual behavior is modeled using an elasticity approach, not an expected utility approach.

– The approach allows the application of take-up elasticities drawn from research based on real-world behavior.

– Elasticities incorporate inertia and other behavioral responses that economic theory may not be able to fully explain but are nonetheless observed in previous studies.

– Elasticities may vary by population subgroups depending on their income and their insurance status under prior law.

• Medicaid enrollees respond differently to new options than do Medicaid-eligible individuals who are uninsured.

■ One drawback is that elasticities taken from from previous studies have limitations when projecting behavior under new scenarios.

The General Form of HISIM's Take-Up Response

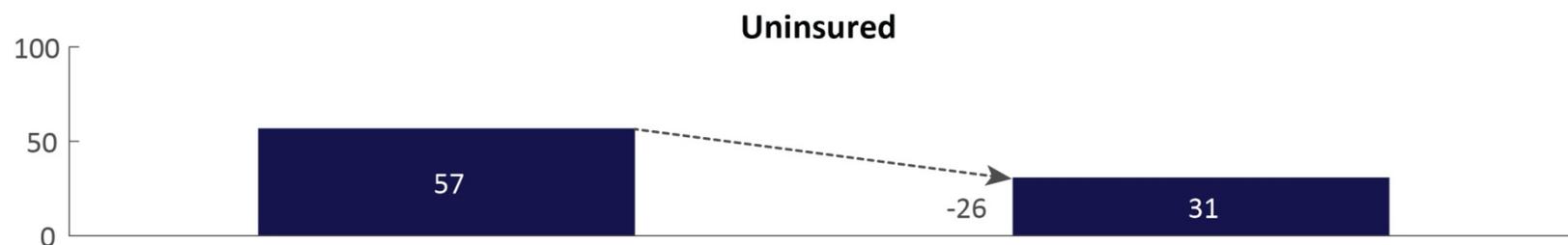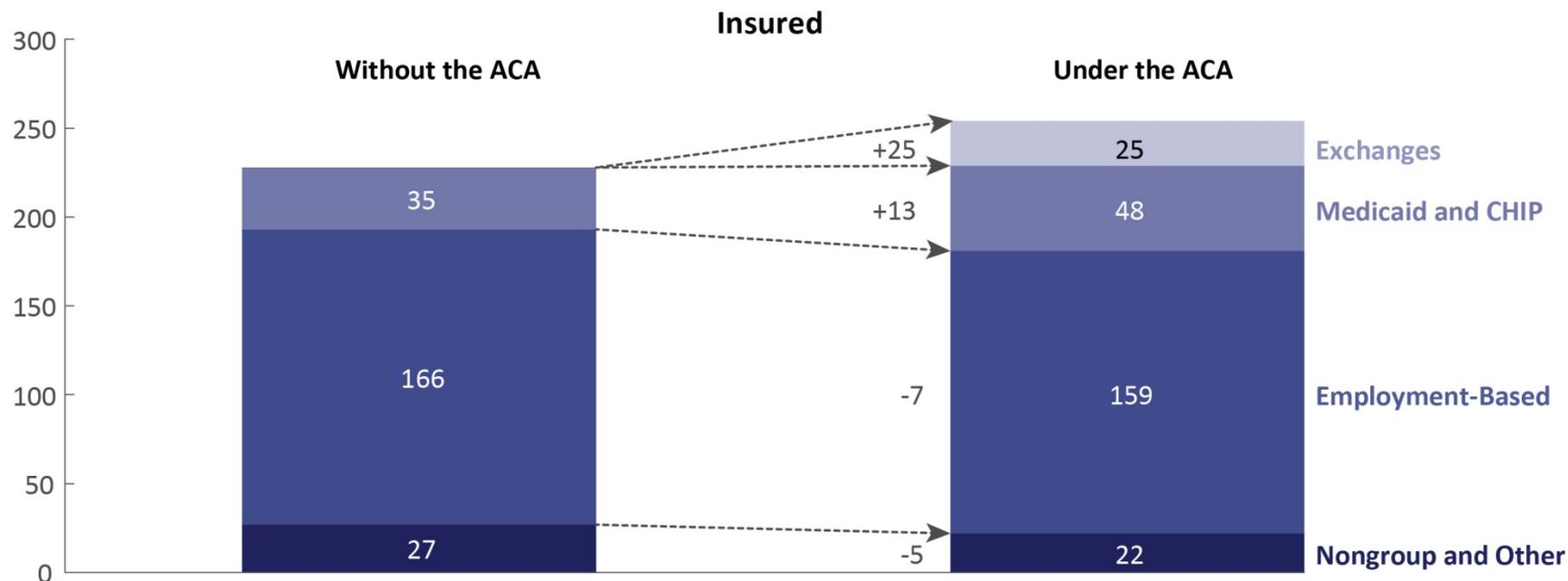- For each person i considering coverage k:

  - $\Delta pr(⟦coverage⟧\_ijk)=\varepsilon\_jk*\%\Delta p\_ijk$

  Where j is the initial type of insurance coverage (including uninsured) for person i and k is the type the person is considering selecting.

- ε_jk is the elasticity of the change in probability of taking-up coverage type k, given the person's initial coverage status j, and with respect to a percent change in price, $\%\Delta p\_ijk$ in moving from coverage j to coverage k.

Estimated Effects of the Affordable Care Act on Health Insurance Coverage, 2024

(Millions of nonelderly people)

Insured

Without the ACA / Under the ACA

	Without the ACA	Change	Under the ACA	Category
Exchanges		+25	25	Exchanges
Medicaid and CHIP	35	+13	48	Medicaid and CHIP
Employment-Based	166	-7	159	Employment-Based
Nongroup and Other	27	-5	22	Nongroup and Other

Uninsured

Without the ACA	Change	Under the ACA
57	-26	31

Estimated Budgetary Effects of the Insurance Coverage Provisions of the Affordable Care Act, 2015 to 2024
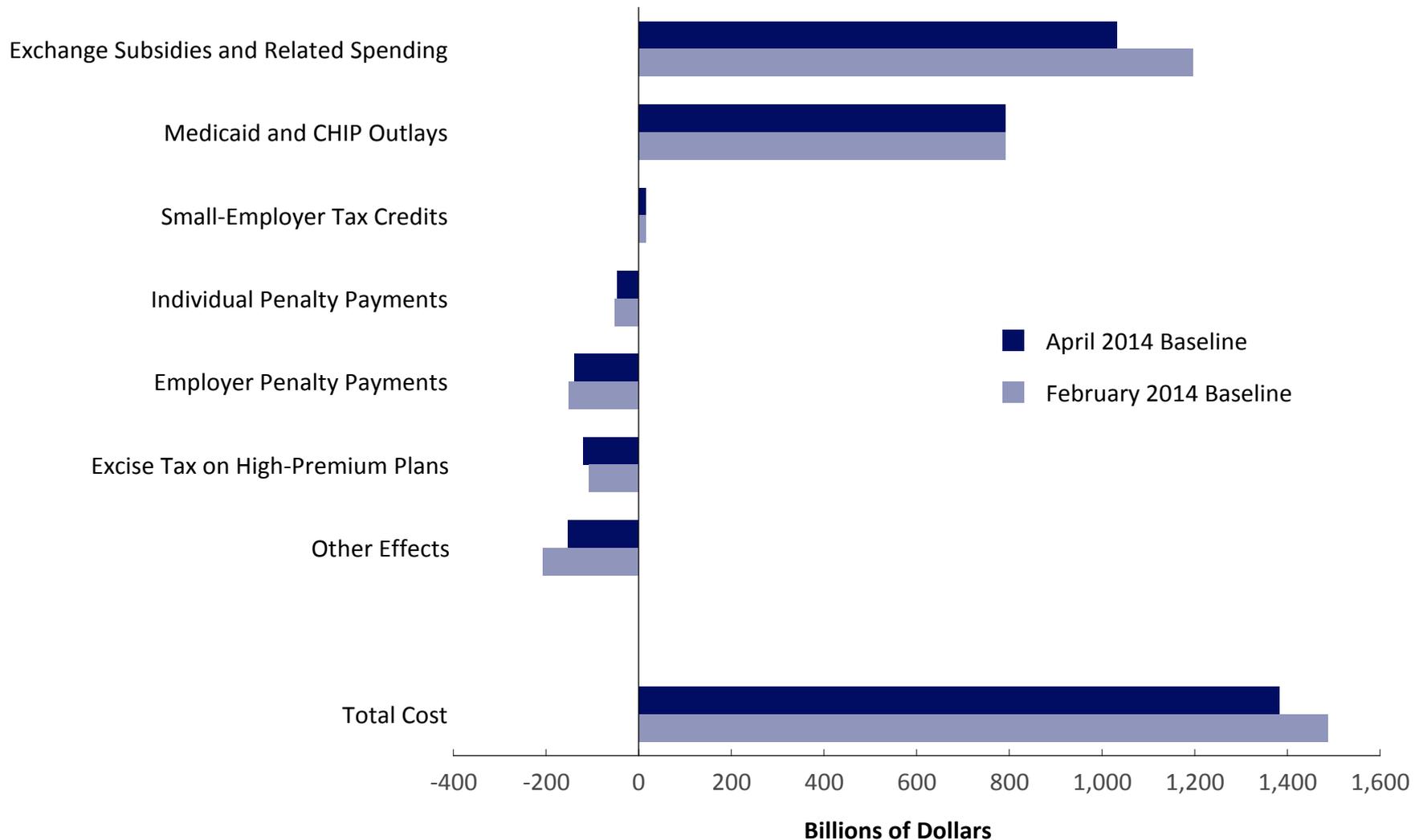
Comparison of CBO and JCT's Estimates of the Net Budgetary Effects of the Coverage Provisions of the Affordable Care Act

(Billions of dollars, by fiscal year)