Long Run Drivers of Health Care Spending Growth and the Sustainability of Historical Trends

Sheila Smith

Office of the Actuary
Centers for Medicare and Medicaid Services

November 16, 2021

The numbers here are based on the 2020 Medicare Trustees Report and therefore do not reflect the impact of the Covid-19 pandemic. However, because this presentation is focused on long run (75 years) projections, when the estimates are updated to include pandemic impacts, these long run conclusions are not likely to be significantly impacted.

Overview

- CMS OACT Factors Contributing to Growth (Factors) Model: Overview
- CMS OACT Factors Model Specification
- Estimation and projection of Factors Model parameters and inputs
- Projections of National Health Expenditures based on the Factors Model

CMS OACT Factors Contributing to Growth Model: Overview

Factors Model Projections of NHE

- The **CMS OACT Factors Contributing to Growth (Factors) Model** projects growth in total National Health Expenditures (NHE) as a function of SSA macroeconomic assumptions, health-care specific assumptions, and internal and outside research on key model parameters
- OACT annually produces 75-year Medicare expenditure projections for the annual report of the Medicare Board of Trustees to Congress
- Long-range projections of National Health Expenditures (NHE) are a key input into projected long run spending trends for Medicare beneficiaries

Five Key Drivers of Health Care Spending

- Long-range (75-year) projections of National Health Expenditures (NHE) are based on macroeconomic and demographic assumptions consistent with OASDI and Medicare Trustees Reports
- Contributions to growth in real NHE per capita from five key drivers based on estimated elasticity of health spending with respect to each factor
  - Demographic composition of population
  - Changes in insurance coverage
  - Relative medical price inflation
  - Growth in aggregate real per capita income
  - Residual (unexplained variation)

CMS OACT Factors Model Specification

Factors Model Equation

$$h = a + \varepsilon_y y + \varepsilon_i i + (1+\varepsilon_p)\, p + d$$

h = growth in constant-dollar health spending per capita

a = growth residual

y = growth in income (GDP per capita)

i = average coinsurance rate (out-of-pocket share of total health spending)

p = growth in relative medical price at time t (relative to GDP deflator)

d = index of demographic contribution at time t

Elasticities:

ε_y = income-technology; ε_i = coinsurance; ε_p= relative medical price

Factors Model Estimation and Projections

Historical estimation:

- Define and measure change in each factor
- Estimate elasticity of health care spending with respect to change in each key factor, ceteris paribus

Projections:

- Project change in parameters over the 75-year projections horizon
- Project growth in each factor, conditional on exogenous macroeconomic assumption and health sector assumptions
- Interpret and project residual (unexplained) variation in health care spending

Factors Model Estimation and Projections

Real per capita health care spending (h) is a function of growth in each model factor (e.g. real per capita income(y))

$$h = f(y)$$

The elasticity of *h* with respect to *y* is:

$$e_{h,y} = \frac{\%\ change\ in\ h}{\%\ change\ in\ y}$$

- The elasticity is the growth in *h* (*ceteris paribus*) that occurs in response to a 1 percentage point change in *y*

Model Parameters and Exogenous Inputs

Parameters:

- Income-Technology elasticity
- Price elasticity
- Insurance coverage elasticity

Inputs:

- Demographic Age-TTD index

Estimation and Projection of Factors Model Parameters

Growth in NHE is a function of economic growth

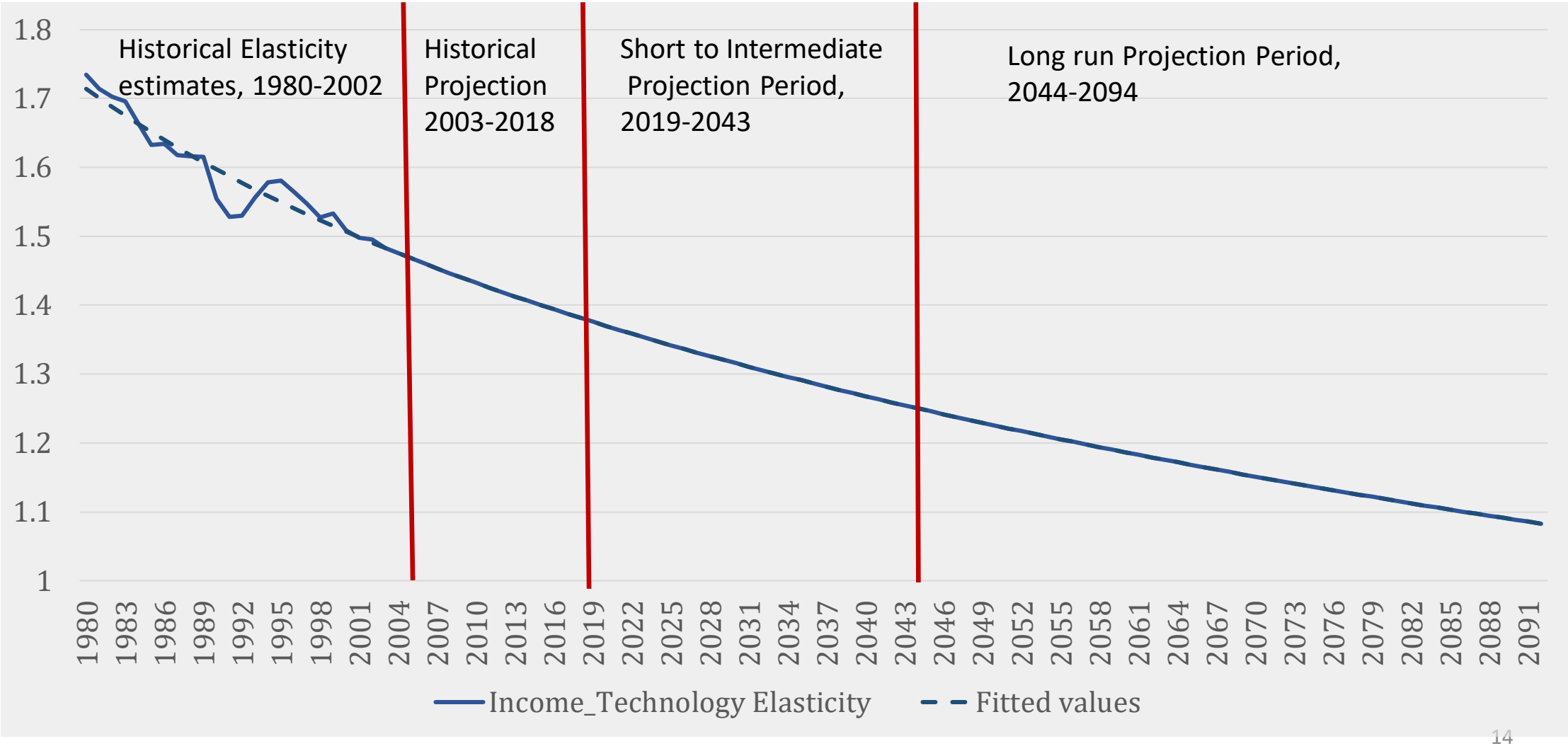
- The income-technology elasticity captures the relationship between health care spending and GDP
- Health care spending is constrained by growth in GDP
- Estimate the relationship between real per capita health spending and GDP based on pooled cross-country time-series data
- In the long run, the health share of GDP approaches a steady state: Elasticity with respect to GDP must converge to 1.0.
- How to estimate the change in this parameter over time?

Estimate Income-Technology Elasticity

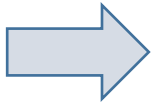
- Estimated based on pooled cross-sectional time series data for 21 OECD countries

- Estimate change in income elasticity over time
  - Based on rolling regression sample intervals.
  - Include country fixed effects (institutional variation)
  - Exclude time period fixed effects (technological change)
  - Project income elasticity over 75-years based on log-linear trend fitted to historical time series

Project Income-Technology Elasticity



Growth in NHE is a function of relative price

- Demand for health care is reduced by rising relative medical prices
- Theory implies that the price elasticity – the sensitivity of health care demand to rising relative prices - will increase as health care accounts for a growing share of consumption
- Restraining effect on real health care spending (volume)
- Price elasticity < |-1|  rising relative medical prices are a net positive for nominal growth and health care share of GDP

Price Elasticity: Estimation and projection

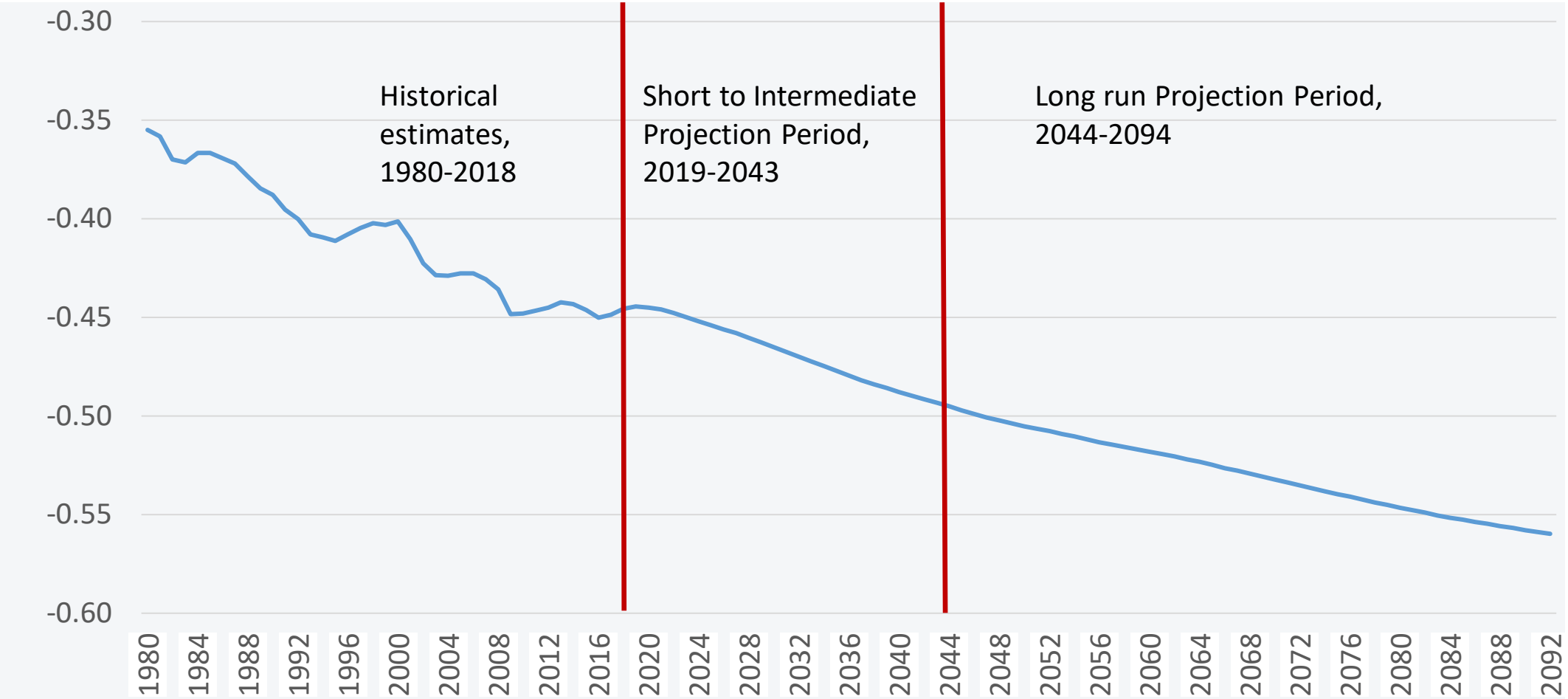
Price elasticity= Income effect + Substitution Effect

- Income effect: The larger the health share of GDP, the greater the effect of rising health care prices on real income
- Substitution effect: Higher relative price shifts demand away from health care (RAND HIE (-0.2))

- Historical price elasticity:
  - Substitution effect: Rand HIE † = -0.2
  - OACT/CMS NHE Projections Model = -0.4
- Long Range (last 50 years of annual 75-year projections):
  - Substitution effect remains constant = -0.2
  - Income effect = f (health share of GDP) → -0.6

†RAND Health Insurance Experiment (HIE): Experimental study from 1974 to 1982. Randomized controlled trial of the effects of out-of-pocket price (cost-sharing) on demand for health care. Assigned participants randomly to insurance plans to avoid selection effects.

Project Health Care Price Elasticity



Insurance Elasticity: Estimation and projection

- Assume insurance coverage can be approximated by out-of-pocket (OOP) share of health spending: rising coverage implies declining OOP price
- Insurance elasticity is based on the Rand HIE†= -0.2
- Historical declining trend in OOP share assumed to level out by year 25 of projection
- Net positive effect of growth from expansion of insurance coverage approaches zero.

†RAND Health Insurance Experiment (HIE): Experimental study from 1974 to 1982. Randomized controlled trial of the effects of out-of-pocket price (cost-sharing) on demand for health care. Assigned participants randomly to insurance plans to avoid selection effects.

Effects of Demographic Change

- Index of contribution to health care spending from shifts in the demographic composition of the population

Population share by age and time-to-death (TTD) * base year spending per capita by age and TTD

- Health care spending increases with age and with proximity to death.
- The Age-TTD demographic index captures the effect on spending of shifts in population across age cohorts as projected by SSA
- Projected improvements in the mortality rate by age determine shifts in the composition of the population by TTD

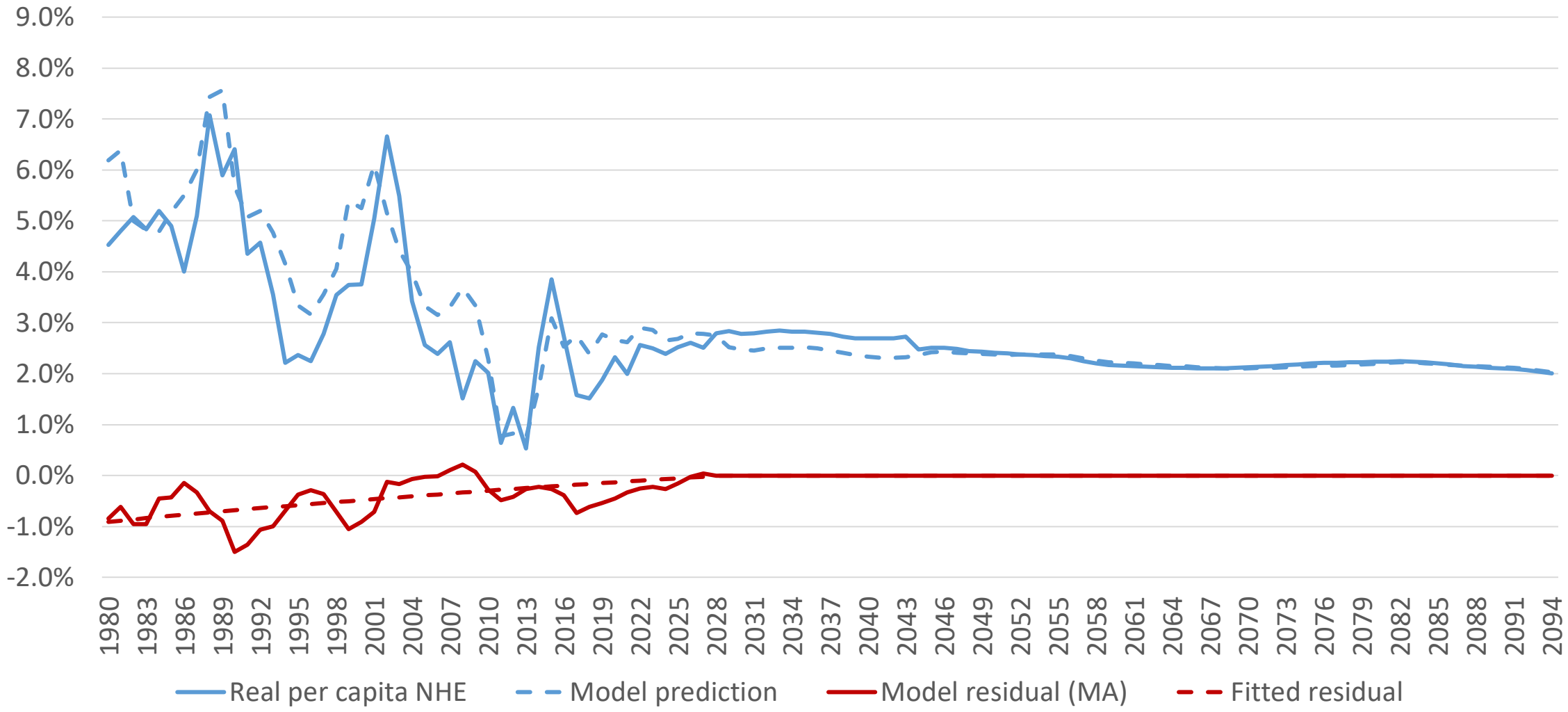
Factors Model Residual

- The Factors Model residual is variation that is unexplained:

Residual = Actual growth – Predicted growth

- Attributed primarily to exogenous effects of technological change
- Historical contribution to growth is a small negative, positively trended towards zero over time
- Negative contribution is attributed to measurement error

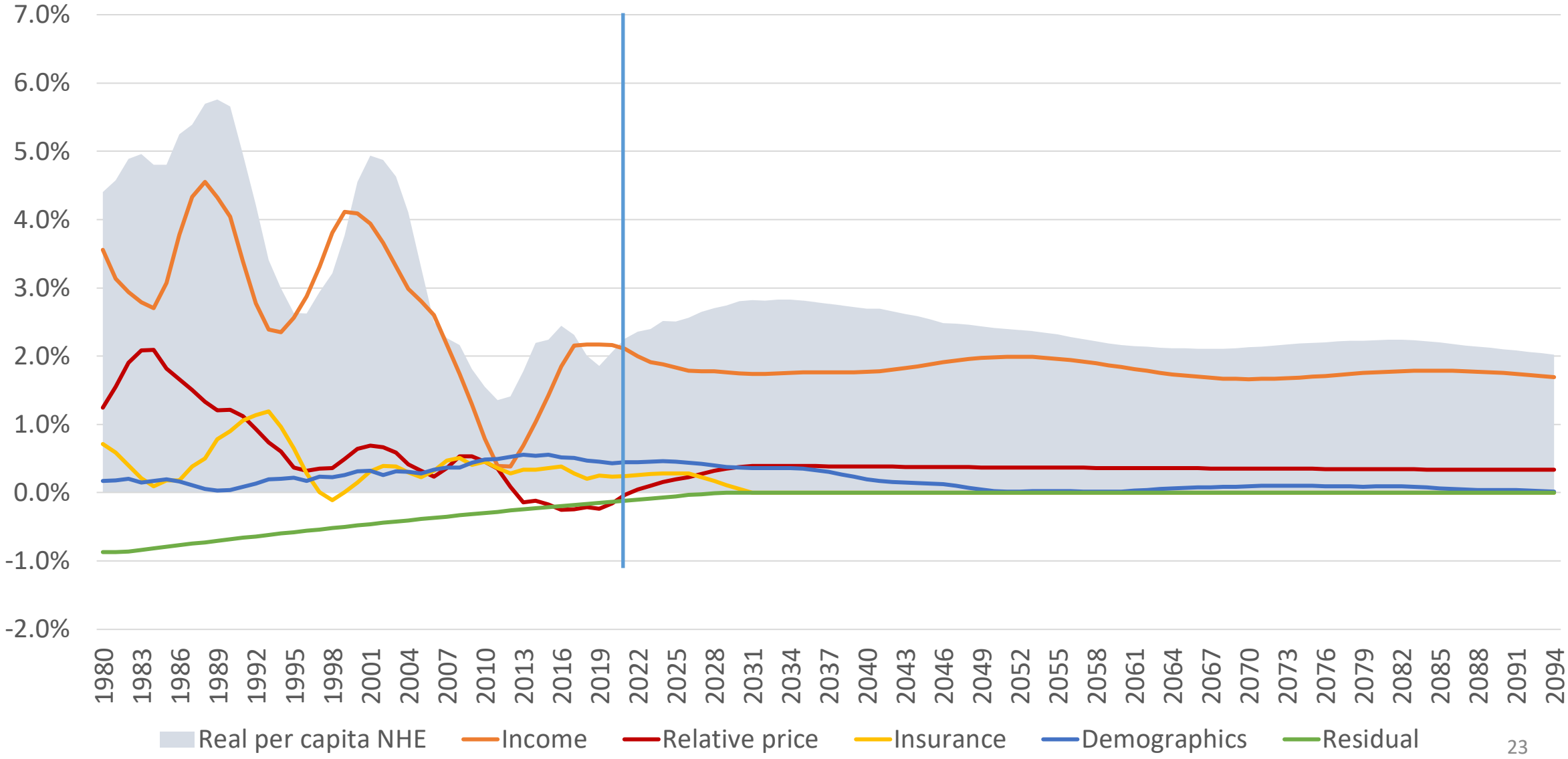
Factors Model: Actual, Predicted, and Residual



Projections of National Health Expenditures based on the Factors Model

NHE Projection to 2094: Factor Contributions

(Centered 5-year moving average percent change)



NHE Projection to 2094: NHE share of GDP