

Financing Innovation in Health Care and Social Tension

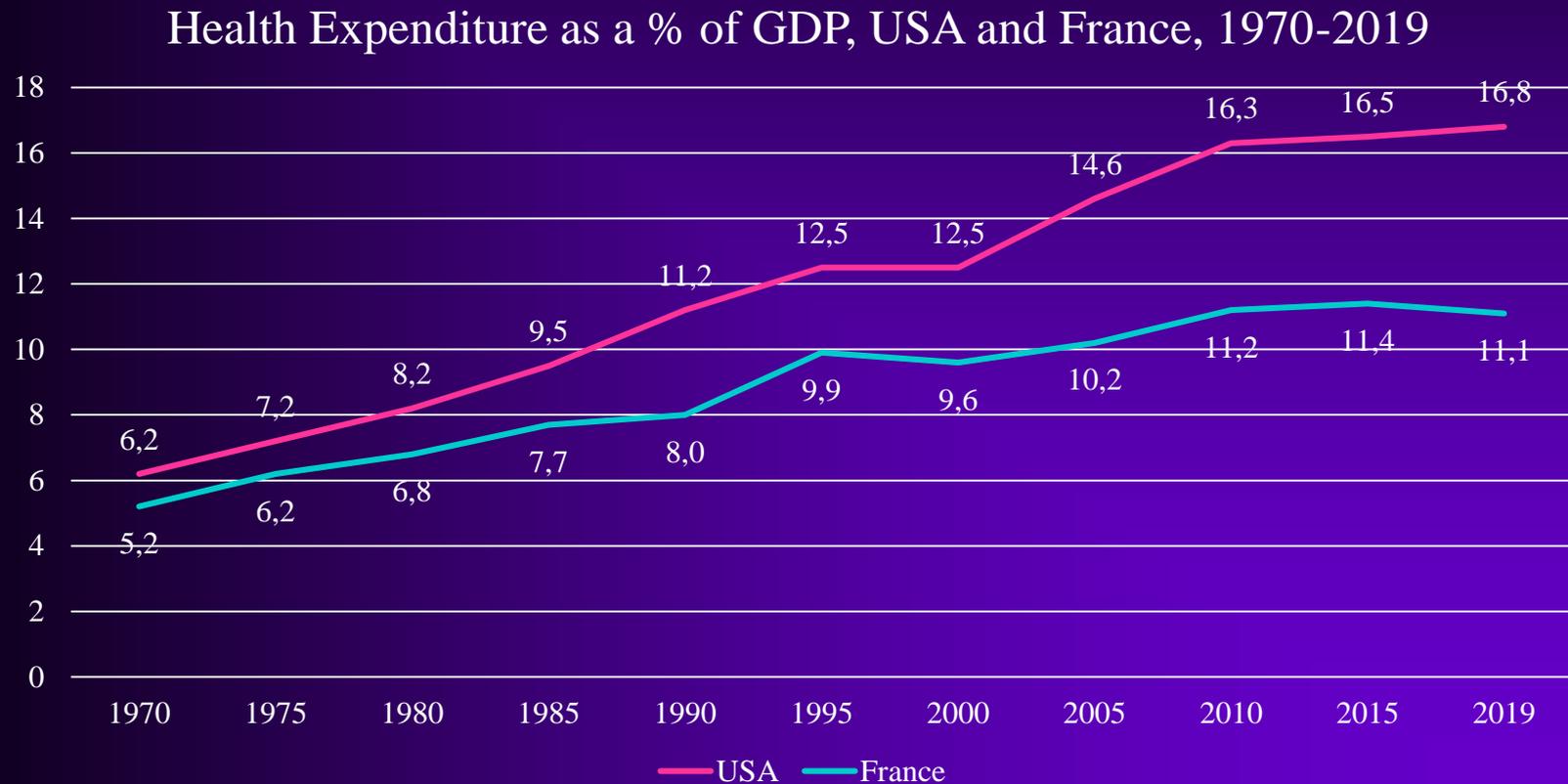
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December 2, 2021

Outline of Talk

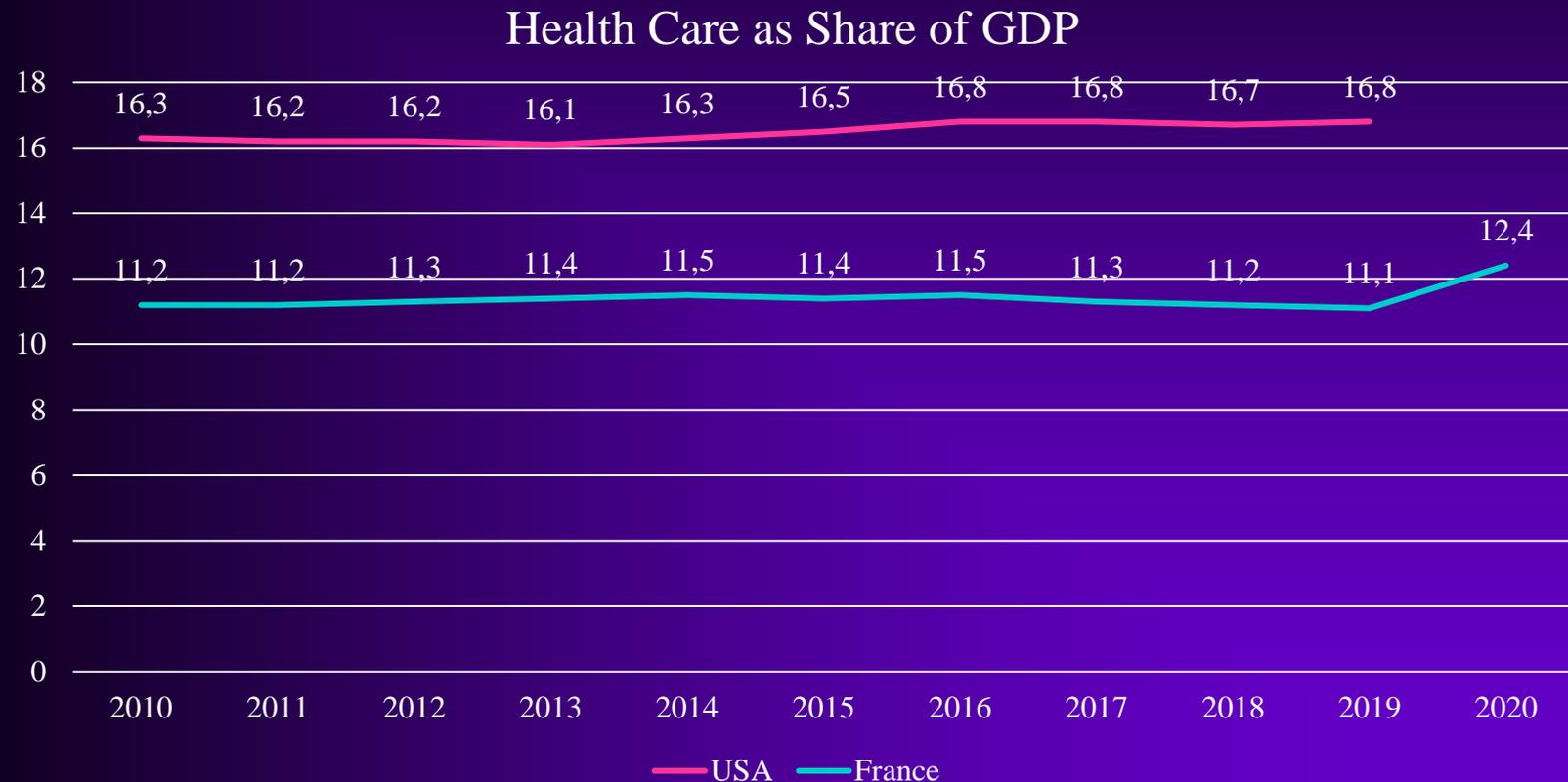
- Drivers of health care cost growth
- Health care innovation is proceeding apace, and much of it isn't cheap
- Financing innovation, especially for public programs and the resulting social tensions

The Half Century Rise in Health Care Cost Is Well Known *



*Source: <https://stats.oecd.org/Index.aspx?DataSetCode=SHA#>. OECD data differ from US National Health Accounts data on Total Health Care spending, but approximately equal Health Consumption Expenditures in the US Nat'l Health Accounts data.

But Recently Cost as % of GDP Has Been Stable in the US and France*



Because of Covid I am not sure what to make of the 2020 figure for France, which is “estimated.” US data for 2020 are not in the current OECD data set

*Source: <https://stats.oecd.org/Index.aspx?DataSetCode=SHA>. The US 0.5 percentage point increase from 2014-2016 is likely from the insurance expansions of the Affordable Care Act (“Obamacare”).

% Growth in GDP Share in Other High-Income Countries*

	2010	2019
Australia	8.4	9.4
Canada	10.7	10.8
Germany	11.1	11.7
Italy	8.9	8.7
Japan	9.2	11.0
Netherlands	10.2	10.2
Norway	8.9	10.5
Switzerland	9.9	11.3
UK	9.8	10.2

The share only fell in one country (Italy).

What About the Future?



As Yogi Berra, an American baseball player who was noted for malapropisms said,
“It’s hard to make predictions, especially about the future.”

What Has Driven This Growth in Health Care Spending?

- I have highlighted income and technology*
- But technological adoption is endogenous and depends on willingness to pay/income
- In 2009 two colleagues and I decomposed health cost growth drivers**
 - ◆ We relied on an analog to the Solow decomposition of growth, which comes from differentiating $Y_t = A_t f(K_t^\beta L_t^{1-\beta})$ *** wrt t

*Newhouse, *Journal of Human Resources*, Winter 1977, Newhouse, *Journal of Economic Perspectives*, Summer 1992.

Smith, Newhouse, Freeland, *Health Affairs*, September 2009. *Solow, *Review of Economics and Statistics*, August 1957.

What Has Driven This Growth, cont.?

- Letting H_t = health care spending in year t ,

$$\frac{\dot{H}}{H_t} = \varepsilon_Y \dot{Y}/Y_t + \varepsilon_I \dot{I}/I_t + \varepsilon_D \dot{D}/D_t + \varepsilon_P \dot{P}/P_t + \frac{\dot{A}}{A_t}$$

where \dot{H}/H_t = growth of real per capita health care spending, \dot{Y}/Y_t = growth of real GDP/capita (income), \dot{I}/I_t = change in % out-of-pocket, \dot{D}/D_t = change in demographics (age-sex), \dot{P}/P_t = change in the relative price of health care, $\frac{\dot{A}}{A_t}$ = the technological change residual, and the ε 's are weights to be estimated (except ε_D is definitionally 1.0*)

* \dot{D}/D_t is the change in the age-sex distribution weighted by relative spending in each age-sex group.

Accounting for Technological Change

- We used OECD panel data to estimate the above equation adding country fixed effects
- Like \dot{A}/A in the Solow equation, the effect of technology and any interactions with it equals the residual after accounting for changes in real per capita income, insurance, demography, and relative medical prices
- Since technology is endogenous, it should interact with income growth

Measuring the Technology-Income Interaction

- The key step in Smith, Newhouse, and Freeland (SNF) was to specify a second equation that added year fixed effects
- SNF assumed the effect of technological change was common across the OECD countries so that the year fixed effects measured the main effect of technological change and the omitted interaction with income was in the residual

Accounting for Technological Change, cont.

- SNF specified an equation without year fixed effects, the “expenditure equation,” and one with year fixed effects, the “income equation”

Using the omitted variable theorem, the omitted income*technology interaction effect =

$$\left[\hat{\epsilon}_{YExp\ equation} - \hat{\epsilon}_{YInc\ equation} \right] * \frac{\frac{\dot{Y}}{\bar{Y}_t}}{\frac{\dot{H}}{\bar{H}_t}} - \text{other}$$

omitted interactions of P, I, and D with Y

Accounting for Technological Change, cont.

- In the 2009 paper SNF assumed the omitted interactions of the change in real income with the changes in insurance (I), demography (D), and the relative price of medical care (P) were small and that the omitted interaction term was primarily attributable to an income - technological change interaction*

*There is an error in Exhibit 1 of the SNF paper; the technology-income interaction is overstated by 5.5% and the residual is understated by 5.5%.

We Have Now Re-estimated Using 1960-2019 Data

- The following slide gives the % of the change in US health care cost growth accounted for by the above decomposition

Both the $\Delta\text{Income} * \Delta\text{Technology}$ Interaction and $\Delta\text{Real Income}$ Matter

Rows 3-7 = % of the US change accounted for by various factors

1. Real GDP “income” elasticity	0.46
2. Real GDP “expenditure” elasticity	1.15
3. Income effects	23.6%
4. Relative medical price inflation	18.0%
5. Demographic effects	9.9%
6. Change in insurance coverage	10.7%
7. Sum of the main effect of technology and its interactions	37.8%
8. Interactions of technology with income, insurance, medical price	43.2%
9. Technology residual (main effect)	-4.9%

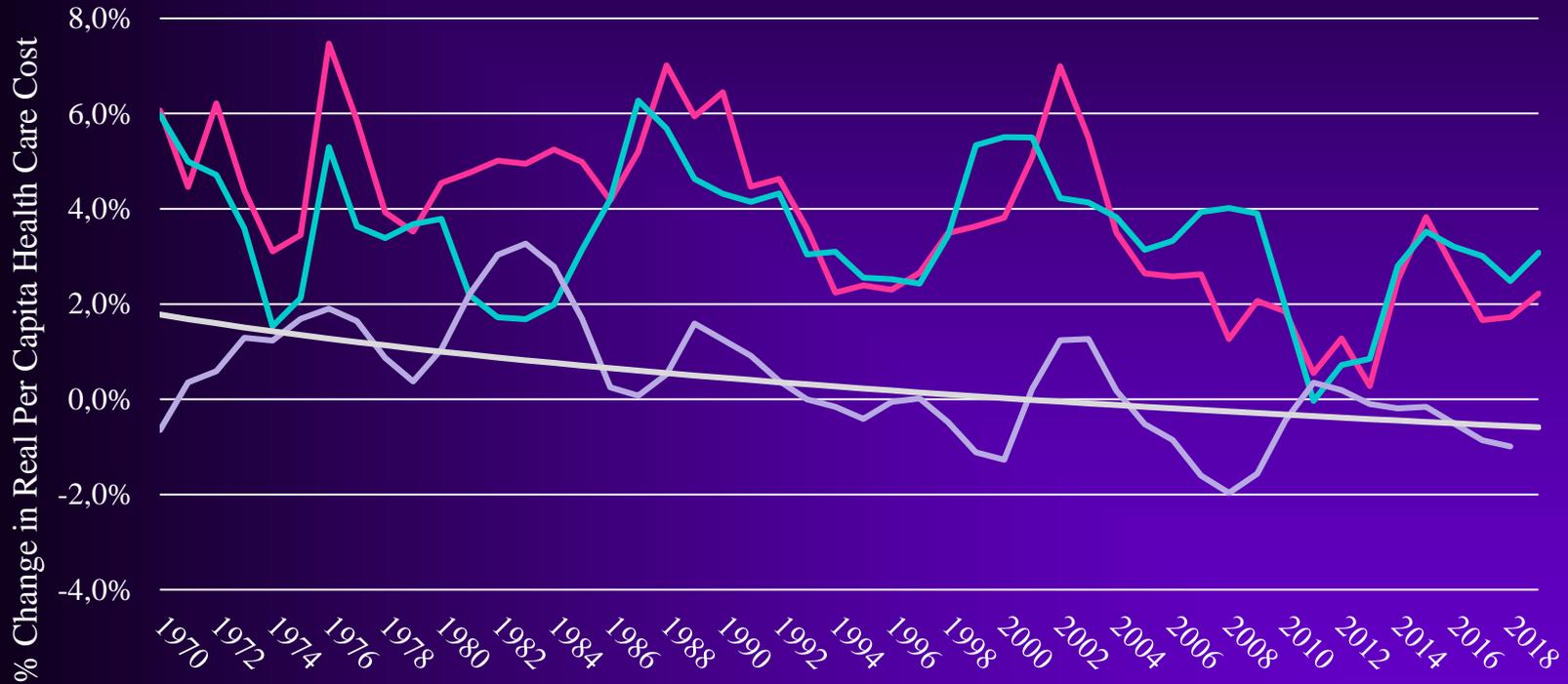
Row 7 is the residual after using the “income” equation to predict the change in the health care cost growth, or 100% minus the sum of Rows 3-6.

Row 8 is $(\epsilon_{\text{exp}} - \epsilon_{\text{inc}}) * \log(Y_{2019} / Y_{1960}) / \log(H_{2019} / H_{1960})$.

Row 9 = Row 7 – Row 8.

That Row 8 is larger than Row 7 means the omitted interactions when estimating $\epsilon_{\text{exp}} - \epsilon_{\text{inc}}$ exceed the main effect of technology in explaining changes in US health care cost growth.

US In-Sample Performance



- Growth in real per capita health care spending
- Predicted growth in real per capita health care spending
- Residual (centered moving average)
- Fitted trend for residual

That the residual is trending negative means the effects of omitted interactions with income are somewhat increasing.

We Can Estimate a Similar Table with French Data

- To do so we had to make some modifications because of data availability; e.g., we do not have a measure of P for France
- Because we do not have age-specific spending for France, D also differs from the US measure; we weighted by age-specific spending in 8 OECD countries*

The Main Results for France Are Similar to the US

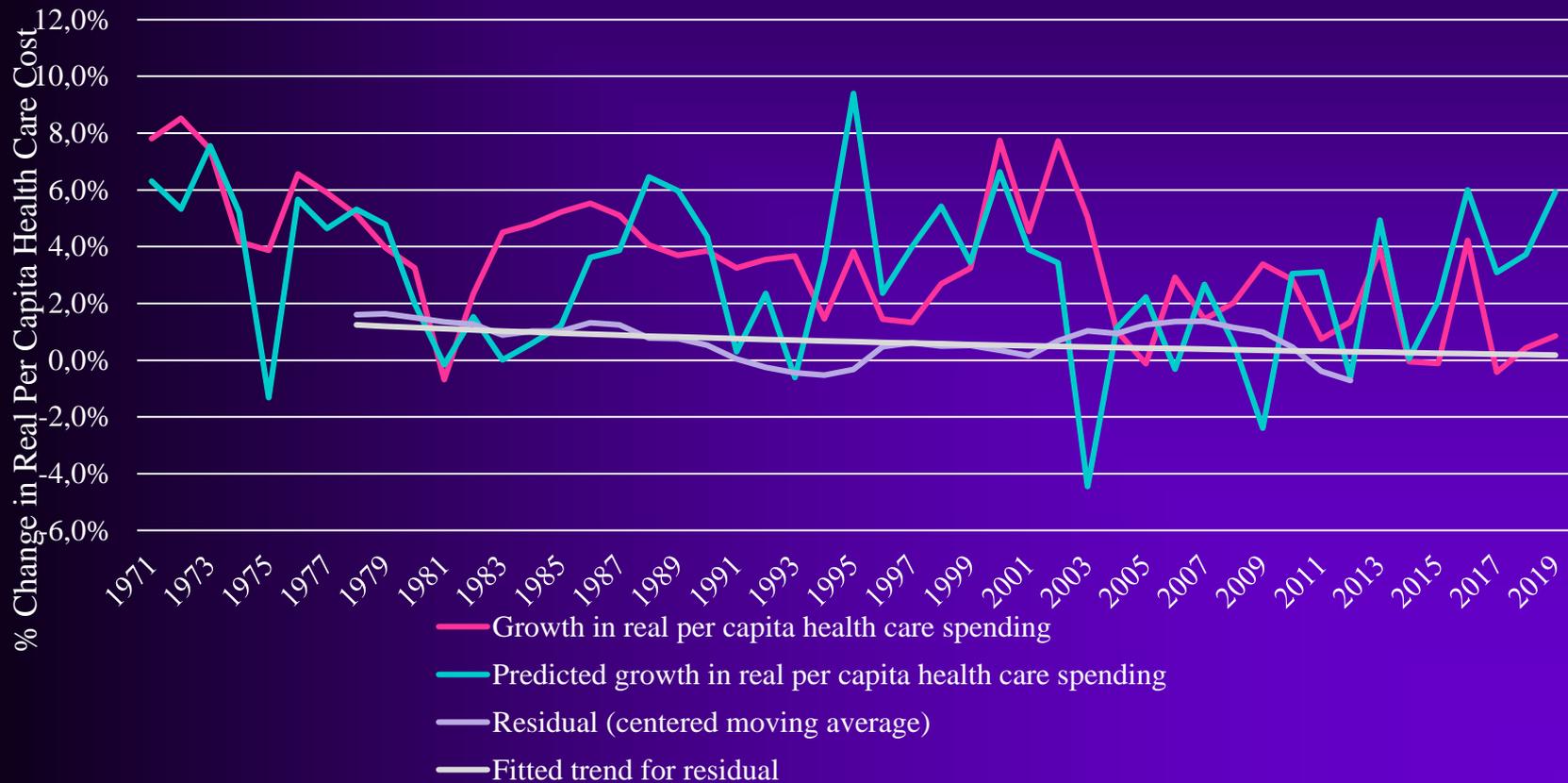
1. Real GDP “income” elasticity	0.58
2. Real GDP “expenditure” elasticity	1.26
3. Change in income	27.3%
4. Demographic effects	9.8%
5. Change in insurance coverage	7.1%
6. Change in technology and relative medical price (main effects plus interactions)	55.8%
7. Interactions of technology with income and relative medical price	38.0%
8. Technology and relative medical price residual (main effects)	17.8%

Row 6 is the residual after using the “income” equation to predict, or 100% minus the sum of Rows 3-5

Row 7 is $(\epsilon_{\text{exp}} - \epsilon_{\text{inc}})^* \log(Y_{2019}/Y_{1960}) / \log(H_{2019}/H_{1960})$.

Row 8 = Row 6 – Row 7.

In-Sample Performance, France



A Variant of This Model Is Used for Official US 10-year Projected Spending

- See Exhibit 7 in <https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/ProjectionsMethodology.pdf>, which also goes into more detail about methods and data details that I have skipped over

Back to (Predicting) the Future

- What do these results tell us about the future share of GDP devoted to health across the OECD?
- The key variables are real per capita GDP or income growth and the interaction of that growth with scientific advance

We Have Projections of Future GDP

- The main effect of income can give us a lower bound on future health care cost growth, but what can one say about scientific advance?
- I don't know how to quantify scientific advance, but it certainly does not seem to be slowing down

Science Seems to Be Moving Toward Personalized Medicine

- The promise of being able to edit the genome is that we will be able to repair genetic defects that are causing disease; already there are clinical trials in progress of gene therapy to repair the defect that causes sickle cell disease using CRISPR technology

And Immunotherapies for Cancer Are Advancing

CAR (chimeric antigen receptor)-T therapies genetically engineer T-cells to attach to a specific protein or antigen on a tumor cell and kill it

Cancers with FDA-approved CAR T-cell therapies

The FDA has approved five CAR T-cell therapies:

- Abecma (idecabtagene vicleucel)
- Breyanzi (lisocabtagene maraleucel)
- Kymriah (tisagenlecleucel)
- Tecartus (brexucabtagene autoleucel)
- Yescarta (axicabtagene ciloleucel)

In the US CAR-T Therapy Is Very Expensive*

OCTOBER 14, 2021

Hospitals Still Grappling With \$1 M+ Price Tag for CAR-T Rx

Getting the payments right is critical, given the unprecedented clinical gains reported with the treatment. A recent study of 74 patients with B-cell lymphoma, for example, found that real-world outcomes for axicabtagene ciloleucel (Yescarta, Kite/Gilead) or tisagenlecleucel (Kymriah, Novartis) were similar to those in the trials that led to the drugs' approval, with a relapse-free probability of 60.4% at 24 and 30 months among 61 patients with an initial response (ASCO 2021 abstract e19500; bit.ly/3hFPpsJ).

But those outcomes came at a high price, the investigators reported. Although the median drug cost alone was \$411,278, the median total cost of care for CAR-T therapy was \$610,999—and in 12% of cases, the total cost of care exceeded \$1 million.

*From Pharmacy Practice News <https://www.pharmacypracticenews.com/Clinical/Article/10-21/Hospitals-Still-Grappling-With-1-M-Price-Tag-for-CAR-T-Rx/64913>

Even Outside the US CAR-T Therapy Is Expensive*

- Novartis will be the first pharmaceutical company to bring a CAR-T cancer therapy to market in the U.K., as the country's National Health Service announced Wednesday it had reached a funding deal for the Swiss drugmaker's Kymriah.
- As part of the agreement, the U.K. list price for the cancer therapy will be nearly a quarter cheaper than its \$475,000 U.S. price tag. NHS said the full list price is £282,000 per patient, or roughly **\$365,000**.

Note that in the US the drug is only about 2/3 of the full cost of treatment (prior slide)

More Is on the Horizon

NEWS | IN DEPTH

BIOMEDICINE

Gene editor injected into the body treats disease

In a first, CRISPR components infused into patients' blood shut down mutant gene in liver

More Is on the Horizon, cont.

By Jocelyn Kaiser

The gene editor CRISPR excels at fixing disease mutations in lab-grown cells. But using CRISPR to treat most people with genetic disorders requires clearing an enormous hurdle: getting the molecular scissors into the body and having it slice DNA in the tissues where it's needed. Now, in a medical first, researchers have injected a CRISPR drug into the blood of people born with a disease that causes fatal nerve and heart disease and shown that in three of them it nearly shut off production of a toxic protein by their livers.

Although it's too soon to know whether the CRISPR treatment will ease the symptoms of the disease, known as transthyretin amyloidosis, the preliminary data reported last week are generating excitement about what could be a one-time, lifelong treatment. "These are stunning results," says gene editing researcher and cardiologist Kiran Musunuru of the University of Pennsylvania, who was not involved in the trial. "It exceeds all my expectations."

The work also marks a milestone in the race to develop treatments based on messenger RNA (mRNA), the protein-building instructions naturally made by cells. Synthetic mRNAs power two COVID-19 vaccines being given to millions of people to fight the coronavirus pandemic, and many companies are working on other mRNA vaccines and drugs. The new treatment includes an mRNA encoding Cas, a DNA-cutting enzyme that is one of CRISPR's two components.



A new CRISPR-Cas9 system encodes the enzyme

3 out of 6

It "begins the convergence of the fields of CRISPR and mRNA," says cardiovascular researcher Kenneth Chien of the Karolinska Institute, a co-founder of Moderna, which makes one of the COVID-19 vaccines and is also developing mRNA drugs.

The study paves the way for modifying the liver with CRISPR to treat other diseases, either by knocking out a gene or—more challenging—modifying it with the help of a DNA template. The latter approach could also be used to turn the liver into a factory for making an enzyme needed elsewhere in body.

Jennifer Doudna of the University of California, Berkeley, who shared a Nobel Prize last year for developing the gene editor CRISPR from a bacterial immune system and co-founded Intellia, sees even bigger prospects. The new work, she says, is "a critical first step in being able to inactivate, repair, or replace any gene that causes disease, anywhere in the body." ■

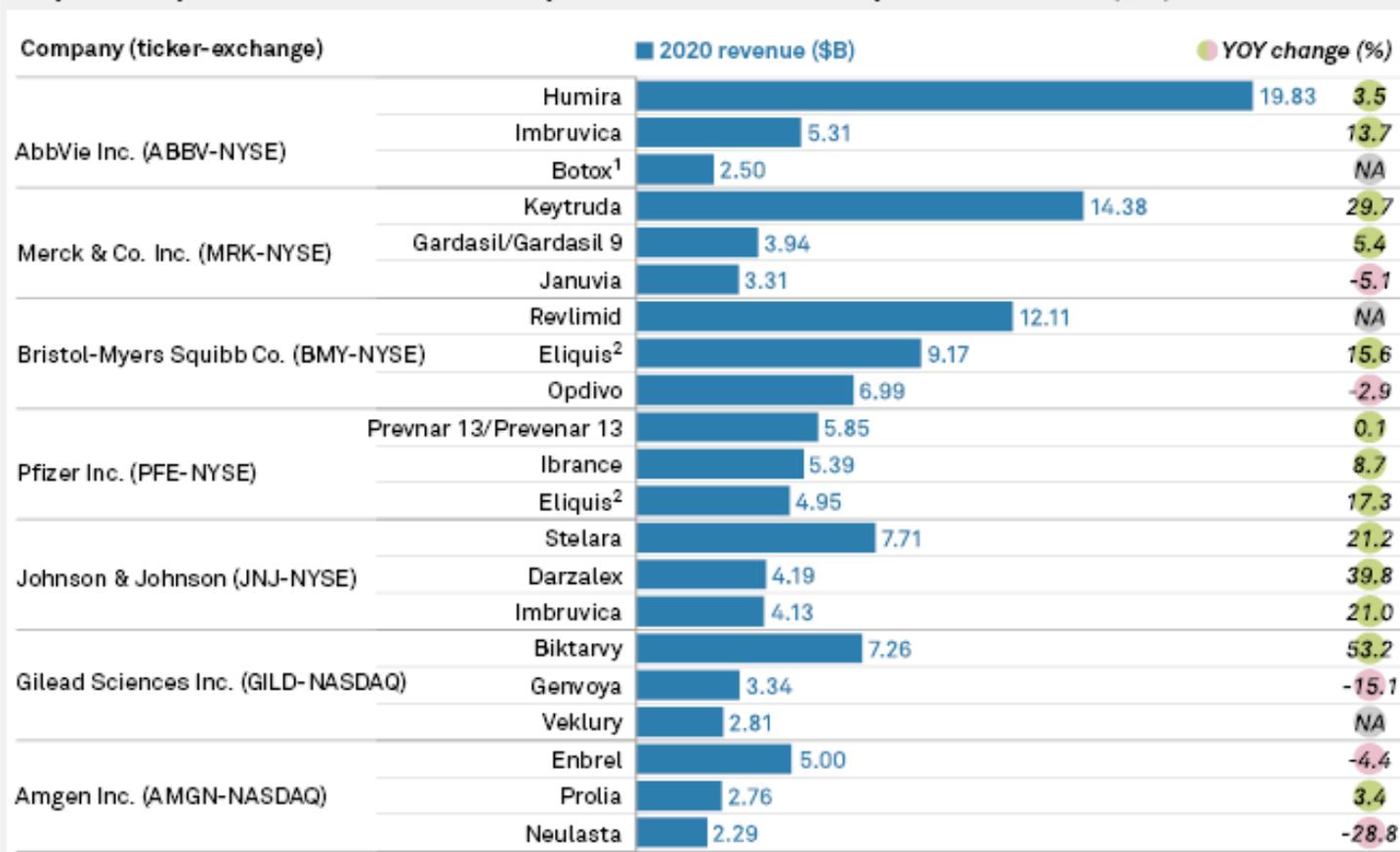
These excerpts are from *Science*, July 2, 2021, based on a study published in the *New England Journal of Medicine*, July 1, 2021.

Many Targeted Therapies Are Already on the Market

- There are many monoclonal antibodies and small molecule inhibitors on the market that target particular receptors or signaling pathways; their generic names end in –mab or –nib
- The next slide lists the brand names of several of them and their \$ sales in 2019

These Advances Are Coming at a Cost

Top three product sales of select pharmaceutical companies in 2020 (\$B)



*<https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/cancer-drugs-show-big-sales-rise-in-2020-abbvie-s-humira-again-tops-list-63249898>

Most Drugs on the Slide Above Have High Unit Costs

- Most of them are targeted at diseases that relatively few people have
 - ◆ Humira for example is a Tumor Necrosis Factor alpha blocker that is used in autoimmune diseases such as rheumatoid arthritis and ankylosing spondylitis
 - ◆ Keytruda is a Programmed Death (PD-1) inhibitor that allows T-cells to attack cancer cells and is used to treat some cancers*

*In 2015 Jimmy Carter revealed he had been diagnosed with melanoma, which had metastasized to his brain and liver. He thought he had only a few weeks to live. He was treated with Keytruda and is still alive at 97.

The Economics of Targeted Drugs

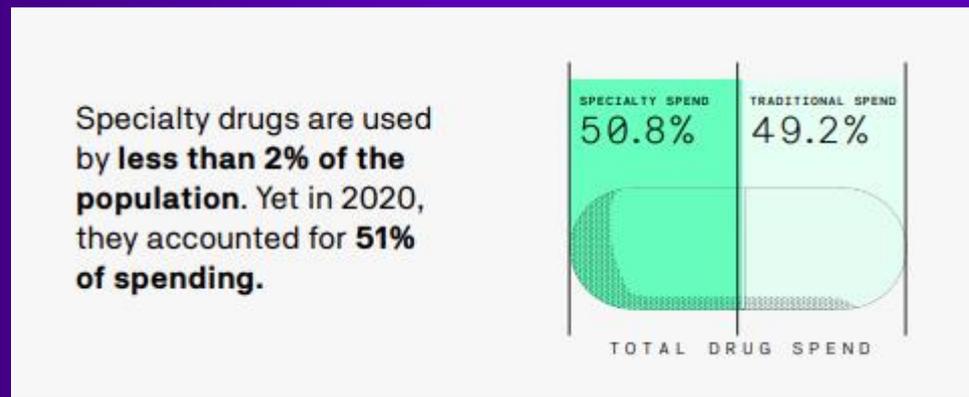
- If only a few patients are expected to take these drugs, unit cost must be high enough to recover the fixed costs of bringing them to market
- If the manufacturer does not expect to cover the fixed costs in the global market, the drug will not get to market

The Economics of These Drugs, cont.

- Unlike small molecule drugs, whose price falls precipitously when they go off patent, many of these drugs are biologics, and their price does not fall as much when they go off patent

There Has Been a Huge Growth in “Specialty Pharmacy”

- Specialty pharmacy in the US consists of high-priced drugs, especially biologics
- In 2015 specialty pharmacy accounted for 38% of US commercial drug spending* – a large share, but just 5 years later that share had grown to 51%**



*<https://corporate-site-labs-dev.s3.amazonaws.com/2019-09/Express%20Scripts%202015%20Drug%20Trend%20Report.pdf>;

**<https://d17f9hu9hnb3ar.cloudfront.net/s3fs-public/2021-03/Evernorth>

[%202020DrugTrendReport%20ExecutiveSummary_0.pdf](#)

Spending on Such Drugs in US Medicare Has Been Rising Too

Chart 10-2. Change in Medicare payments and utilization for separately payable Part B drugs, 2009–2019

	2009	2019	Average annual growth 2009–2019
Total payments: Separately payable Part B drugs (in billions)	\$11.9*	\$37.1*	12.1%
Total payments: All Part B drugs excluding vaccines (in billions)	\$11.7	\$35.8	11.9
Number of beneficiaries using a Part B drug (in millions)	2.6	4.1	4.6
Average total payments per beneficiary who used a Part B drug	\$4,420	\$8,639	6.9
Average number of Part B drugs per beneficiary	1.39	1.36	-0.2
Average annual payment per Part B drug per beneficiary	\$3,182	\$6,343	7.1

“Separately payable Part B drugs” are almost entirely specialty drugs; they are injected or infused. Needless to say, GDP is not growing at 12.1% per year.

Specialty Oral Drugs (Part D) Grew in US Medicare Too*

TABLE 2-1 Specialty-tier drugs increasingly drove Part D spending, 2007–2017

	2007	2012	2017	Average annual growth rate	
				2007-2012	2012-2017
All Part D–covered drugs					
Total gross spending (in billions)	\$62.1	\$89.8	\$154.9	7.7%	11.5%
Total prescriptions (in millions)	969.1	1,216.9	1,498.8	4.7	4.3
Spending per prescription	\$64	\$74	\$103	2.9	7.0
Drugs on specialty tiers*					
Total gross spending (in billions)	\$3.4	\$10.1	\$37.1	24.1	29.7
Total prescriptions (in millions)	3.0	4.1	8.3	6.6	15.2
Spending per prescription	\$1,151	\$2,462	\$4,455	16.4	12.6
Specialty-tier drugs as a share of total Part D spending and use					
Gross spending	5.5%	11.2%	24.6%	N/A	N/A
Prescriptions	0.3%	0.3%	0.6%	N/A	N/A
Part D enrollment (in millions)	26.1	33.8	45.2	5.3	6.0

Those on specialty tiers are very high priced; 0.6% of scripts and 25% of \$ in 2017.

*http://medpac.gov/docs/default-source/reports/jun19_ch2_medpac_reporttocongress_sec.pdf?sfvrsn=0

Looking Forward

- Assuming scientific advance and GDP growth continue, the drivers of the future cost impact will be:
 - ◆ What are the growth rates of GDP and scientific advance, and what will be the willingness to pay for specific advances?
 - ◆ What proportion of the advances are one-time cures versus drugs that persons are on for life?
 - ◆ In either case what is the increase in survival?

Social Stresses: Who Should Get These Advances?

- In addition to the size of the spending increase and who pays what of that, there is an allocation question: Should or will everyone get these expensive medical advances?
- In the US context one already sees treatment differences between those on Medicaid (tax financed) and those on commercial insurance and Medicare

Sovaldi and US Public Programs, Medicare vs Medicaid*

MEDICARE

1. Any hepatitis C infection
2. No consideration of interferon eligibility
3. No limits on life expectancy
4. Treatment available even if actively using alcohol/opiates
5. Re-treatment approved

ILLINOIS MEDICAID

1. Must be Metavir class 4 or greater**
2. Must be interferon ineligible
3. Life expectancy >12 months
4. No evidence of substance abuse in the last 12 months
5. “Once in a lifetime”*** restriction

*Slide courtesy of Troyen A. Brennan. **Metavir class 4 means one has cirrhosis of the liver.

***”Once in a lifetime” means if one is reinfected, he or she will be denied the drug.

Sovaldi and Medicaid*

Nearly Half of Hepatitis C Patients on Medicaid Denied Coverage for Life-Saving Drugs, Penn Researchers Report

First Data to Report on Denial and Delay Rates for Hepatitis C Antiviral Agents

SAN FRANCISCO — Nearly 50 percent of Medicaid patients infected with chronic hepatitis C whose doctors had prescribed newer, life-saving antiviral drugs were denied coverage to the therapies because they weren't considered “a medical necessity” or because the patients tested positive for alcohol/drugs, among other reasons, according to new Penn Medicine research. The data was revealed through a prospective analysis of prescriptions submitted to a specialty pharmacy that services patients in Pennsylvania, New Jersey, Delaware and Maryland.

A total of 377 (16 percent) received an absolute denial, the researchers report. In the Medicaid group, 46 percent received a denial, while 5 percent who had Medicare received a denial, and 10 percent who had private insurance did.

The most common reasons for denial by Medicaid were “insufficient information to assess medical need” (48 percent), “lack of medical necessity” (31 percent), and positive alcohol /drug screen (4 percent).

The team also found that those who did receive therapy through Medicaid had to wait ten days longer to have prescriptions filled compared to privately insured and Medicare patients.

Another Drug Rationed by Medicaid, cont.*

WSJ examines Arkansas Medicaid denial of expensive drug for cystic fibrosis

Posted By Max Brantley on Thu, Jul 17, 2014 at 10:05 AM

The Wall Street Journal examines in depth today a federal lawsuit in Arkansas over the state Medicaid program's denial of coverage for an expensive drug to treat three plaintiffs with a rare strain of cystic fibrosis.

The drug, Kalydeco, costs \$300,000 a year. A coming improved version might cost more. Arkansas has said the patients denied the drug coverage first must prove that older therapies are ineffective, a requirement that their lawyers say is contrary to recommended protocols and a denial of their civil rights.

*Source: <http://www.arktimes.com/ArkansasBlog/archives/2014/07/17/wsj-examines-arkansas-medicaid-denial-of-expensive-drug-for-cystic-fibrosis>

It Isn't Just Drugs: Cancer Centers and Marketplace Plans*

It's unclear the extent to which these cancer centers, which are often but not always affiliated with large academic institutions, are included in the provider networks of marketplace plans nationwide. A survey by Avalere Health and NCCN in 2015 found that three quarters of NCI-designated cancer centers said they participated in at least some exchange plans, and 13 percent said they were included in all exchange plans in their state. However, of the 25 percent of centers that didn't participate in any exchanges, many were in states with large numbers of exchange enrollees, including Texas and New York, the survey reported.

Does it matter if someone with a cancer diagnosis gets treatment at one of these centers rather than at a community hospital or some other site? Research suggests that it may. A study found that adult patients between the ages of 22 and 65 who were newly diagnosed with several types of cancer — breast, colorectal, lung, pancreatic, gastric and bile duct — were 20 to 50 percent more likely to die from it if they were initially treated at a non NCI-designated comprehensive cancer center. The study, which analyzed the 5-year survival

Redistribution

- The haves must finance much of the medical care for the have nots
- The increasing cost of care changes both the intensive and extensive margins of this redistribution
- The American political system tends to resist redistribution

Tensions

- As effective drugs become available for serious diseases, the dilemma of either paying for them for all, denying them for some, or denying them for all will surely create social tension

Tensions, cont.

- It is likely the “haves” will be willing to pay for insurance that covers many of these treatments for themselves; in the US, given the track record with Medicaid, it is reasonable to think that they may not be willing to pay to make them universal

France

- I am even more loath to speculate about these issues for a country I do not know well
- But I suspect the issues will surface in France as well; if there are important therapeutic advances that are not available because of cost, there will surely be political pressure to make them available or possibly some will go elsewhere to gain access; at least *égalité* will be tested

Takeaways

- The rate of income growth and the nature and extent of scientific advances will be key determinants of future health care cost growth
- Rapid, costly innovation could create social tensions both in the US and elsewhere



A Caveat: We Assumed Constant Elasticities

- Assuming constant elasticities seems reasonable for predicting over 5 to 10 years because changes are small, but over a 60 year period it is not so reasonable because of general equilibrium effects; that is, we expect growth in health care spending as a share of GDP to slow down because of higher opportunity costs

The Economics

- If health care were to grow faster than GDP, opportunity costs would rise
 - ◆ In predominantly publicly financed systems such as France, this would require tax increases or crowding out of other public spending, both of which would likely engender resistance
 - ◆ US financing is about 40% private,* consisting of employer-paid premiums, which are financed from lower cash wages, and out-of-pocket payments by households

*There is a large tax subsidy for employer-paid premiums, which I am counting as a public expenditure. If I ignored the tax subsidy, the private share would be about 50%.

The Economics, cont.

- So in the US as well, a continued rise in the GDP devoted to health care would lead to some mix of tax increases and/or crowdout of other public spending, higher out-of-pocket payments, and lower (*ceteris paribus*) cash wages

This Is a Busy Chart, Focus on the Deep Orange Bars*

TREND AND SPEND OVERVIEW

COMMERCIAL

UTILIZATION TREND

↑ 0.8%

UNIT COST TREND

↓ 0.4%

TOTAL TREND

↑ 0.4%

INFLAMMATORY CONDITIONS TREND was driven by continuing brand inflation and some market share shift to Stelara® (ustekinumab), given a 2016 additional indication for Crohn's disease.

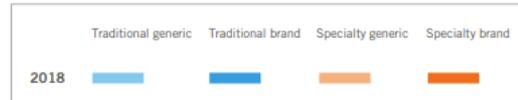
UNIT COSTS FOR DIABETES DRUGS remained low, due in part to a -1.5% unit cost trend for insulins, while insulin utilization rose 1.8%.

UTILIZATION OF NEWER THERAPIES for lung and breast cancer drove oncology trend, as these therapies have higher costs than older treatments. Expanded indication approvals for multiple higher-cost therapies also drove trend.

UNIT COSTS DECREASED for classes dominated by generics, including high blood pressure/heart disease, high blood cholesterol and pain/inflammation. Lower opioid use also drove declines in spending for pain/inflammation.

HEPATITIS C dropped out of the top therapy classes due to a 46.7% decline in PMPY spend from lower utilization and unit cost trend.

KEY



Show 2017

COMPONENTS OF PMPY SPEND



Show table

COMPONENTS OF TREND FOR TOP 15 THERAPY CLASSES

Ranked by 2018 PMPY spend for commercial plans

Show chart

THERAPY CLASS	PMPY		TREND		
	SPEND	ADJUSTED RXs	UTILIZATION	UNIT COST	TOTAL
1 Inflammatory conditions	\$174.45	0.09	3.6%	10.5%	14.1%
2 Diabetes	\$114.85	1.00	2.3%	1.8%	4.1%
3 Oncology	\$80.24	0.05	4.4%	13.7%	18.1%
4 Multiple sclerosis	\$55.81	0.01	-7.8%	3.0%	-4.8%
5 HIV	\$49.07	0.03	5.4%	6.3%	11.7%
6 Pain/inflammation	\$37.96	0.94	-4.2%	-6.9%	-11.1%
7 Attention disorders	\$32.45	0.27	2.0%	-10.2%	-8.2%
8 Asthma	\$28.55	0.45	1.2%	-8.5%	-7.3%
9 High blood pressure/heart disease	\$26.56	2.46	1.9%	-15.3%	-13.4%
10 Depression	\$22.52	1.04	4.5%	-8.3%	-3.8%
11 Skin conditions	\$21.72	0.14	1.7%	3.1%	4.8%
12 Contraceptives	\$19.39	0.62	0.9%	-10.5%	-9.6%
13 High blood cholesterol	\$18.96	1.07	2.0%	-29.0%	-27.0%
14 Anticoagulants	\$18.56	0.09	3.9%	7.8%	11.7%
15 Seizures	\$18.41	0.24	0.1%	5.9%	6.0%
All other classes	\$333.89	5.16	-0.9%	-3.7%	-4.6%
Total for all therapy classes	\$1,053.38	13.64	0.8%	-0.4%	0.4%

The Story in 2017 Was Very Similar

TREND AND SPEND OVERVIEW FOR

Commercial

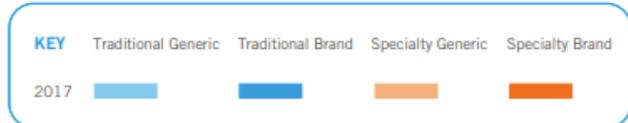
Total per-person spending increased 1.5%, with inflammatory conditions leading all classes

UTILIZATION TREND
↑0.7%

UNIT COST TREND
↑0.8%

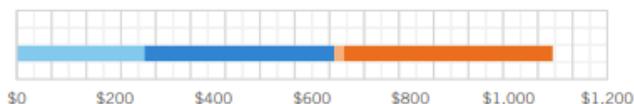
TOTAL TREND
↑1.5%

Show 2016



COMPONENTS OF PMPY* SPEND

Show table



COMPONENTS OF TREND FOR TOP 15 THERAPY CLASSES

Hide table

Ranked by 2017 PMPY* spend for commercial plans

RANK	THERAPY CLASS	PMPY SPEND	TREND		
			UTILIZATION	UNIT COST	TOTAL
1	Inflammatory conditions	\$157.49	3.9%	11.4%	15.3%
2	Diabetes	\$116.23	4.2%	-2.1%	2.1%
3	Oncology	\$70.66	4.3%	13.2%	17.4%
4	Multiple sclerosis	\$60.20	-3.4%	6.4%	3.0%
5	HIV	\$45.20	2.5%	11.1%	13.7%
6	Pain/inflammation	\$44.06	-2.1%	-12.9%	-15.0%
7	Attention disorders	\$36.12	2.9%	-3.2%	-0.3%
8	Asthma	\$33.40	2.6%	-1.9%	0.7%
9	High blood pressure/ heart disease	\$31.41	0.6%	-7.6%	-7.1%
10	High blood cholesterol	\$26.82	0.3%	-30.9%	-30.6%
11	Depression	\$23.68	4.4%	2.4%	6.8%
12	Skin conditions	\$21.80	2.2%	1.9%	4.2%
13	Contraceptives	\$21.44	2.6%	2.9%	5.5%
14	Hepatitis C	\$17.90	-40.4%	9.2%	-31.2%
15	Anticoagulants	\$17.67	3.0%	13.9%	16.9%
	Other therapy classes	\$365.63	-0.9%	0.6%	-0.3%
	TOTAL FOR ALL THERAPY CLASSES	\$1,089.75	0.7%	0.8%	1.5%

By 2018 the Percentage Had Risen to 45%*

TREND AND SPEND OVERVIEW

COMMERCIAL

UTILIZATION TREND **↑0.8%** UNIT COST TREND **↓0.4%** TOTAL TREND **↑0.4%**

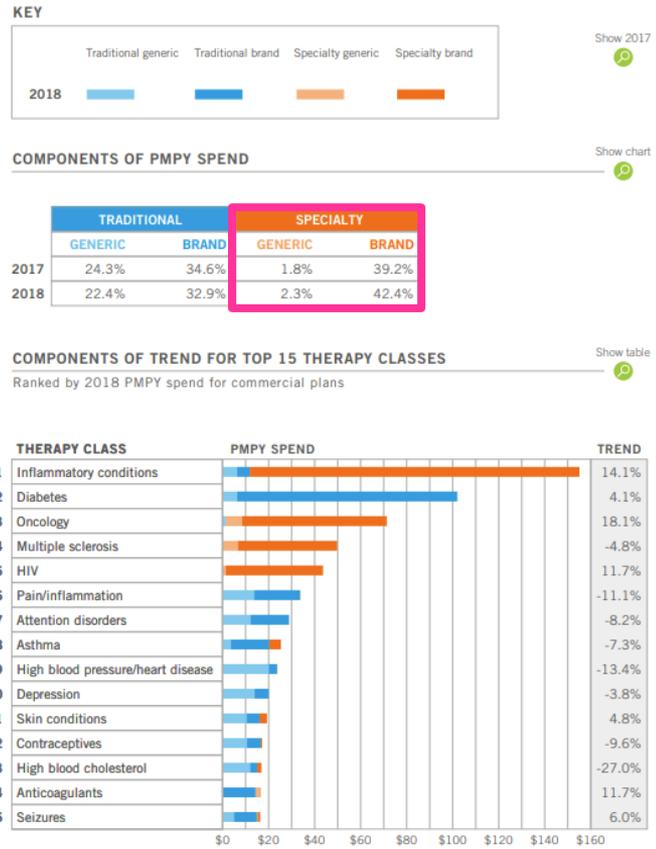
INFLAMMATORY CONDITIONS TREND was driven by continuing brand inflation and some market share shift to Stelara® (ustekinumab), given a 2016 additional indication for Crohn's disease.

UNIT COSTS FOR DIABETES DRUGS remained low, due in part to a -1.5% unit cost trend for insulins, while insulin utilization rose 1.8%.

UTILIZATION OF NEWER THERAPIES for lung and breast cancer drove oncology trend, as these therapies have higher costs than older treatments. Expanded indication approvals for multiple higher-cost therapies also drove trend.

UNIT COSTS DECREASED for classes dominated by generics, including high blood pressure/heart disease, high blood cholesterol and pain/inflammation. Lower opioid use also drove declines in spending for pain/inflammation.

HEPATITIS C dropped out of the top therapy classes due to a 46.7% decline in PMPY spend from lower utilization and unit cost trend.



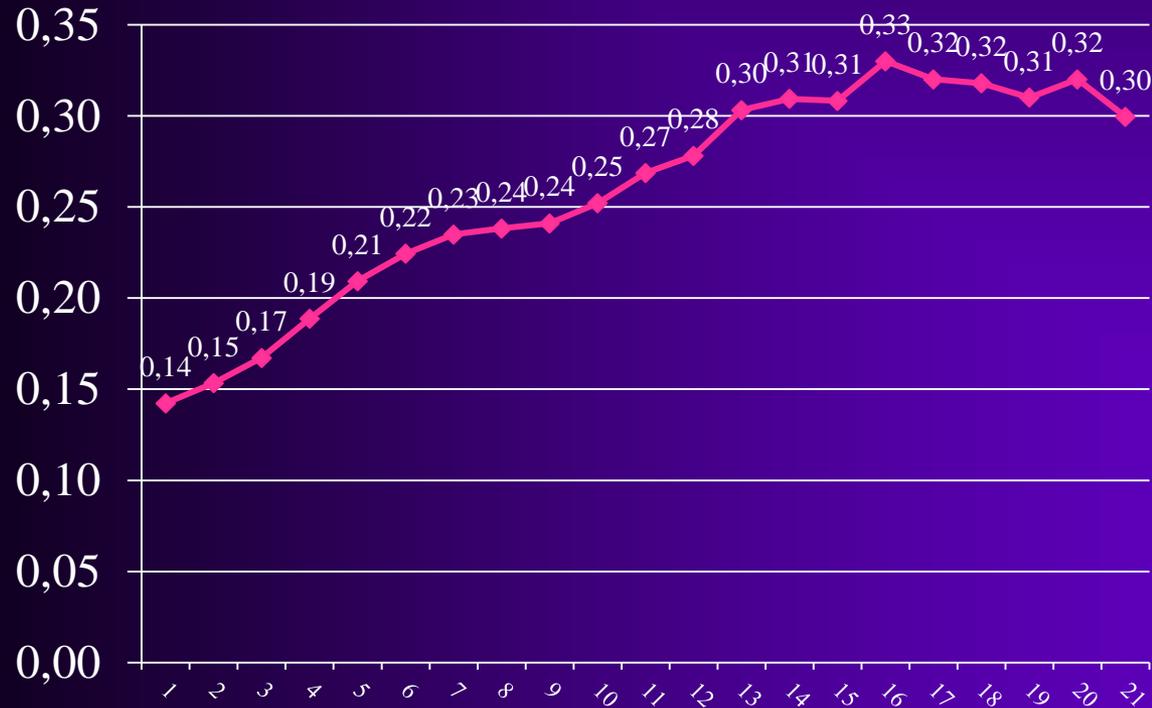
*https://corporate-site-labs-prod.s3.us-east-2.amazonaws.com/2019-09/Express%20Scripts%202018%20Drug%20Trend%20Report%282%29_0.pdf

88% of Personal Health Care \$ Are Third Party Financed*

- Inefficiencies are well known
 - ◆ Public sector: deadweight loss from taxes, including tax expenditure to finance employer subsidies
 - ◆ Private sector: labor market distortions from employment-based insurance such as job lock, marriage lock, possible decline in entrepreneurial activity

Family Premium Has Been $\geq 30\%$ of Median Household Income Since 2011*

Premium for a Family Policy/Median Household Income



“Premium” is the sum of employer and employee payments.

◆ Family Premium/Median Household Income

*Sources: See notes to slide.

Federal Budget Stresses Are Well Known but Real

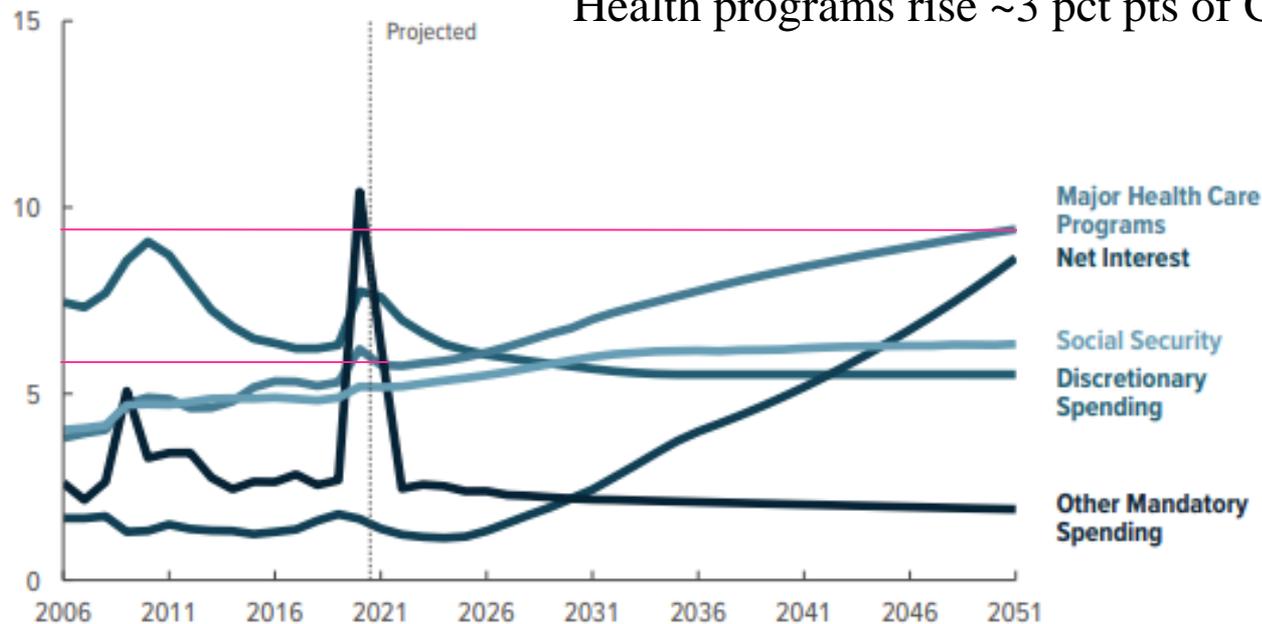
- Over the next 10 years, health care, Social Security, and net interest are projected to rise ~4 percentage points as a share of GDP, from ~12 to ~16% (next slide)
- But Americans have been remarkably resistant to allocating more than 20% of GDP to the federal government
 - ◆ CBO thinks that will continue (next two slides)

CBO Projections for Federal Spending (% of GDP)

Spending

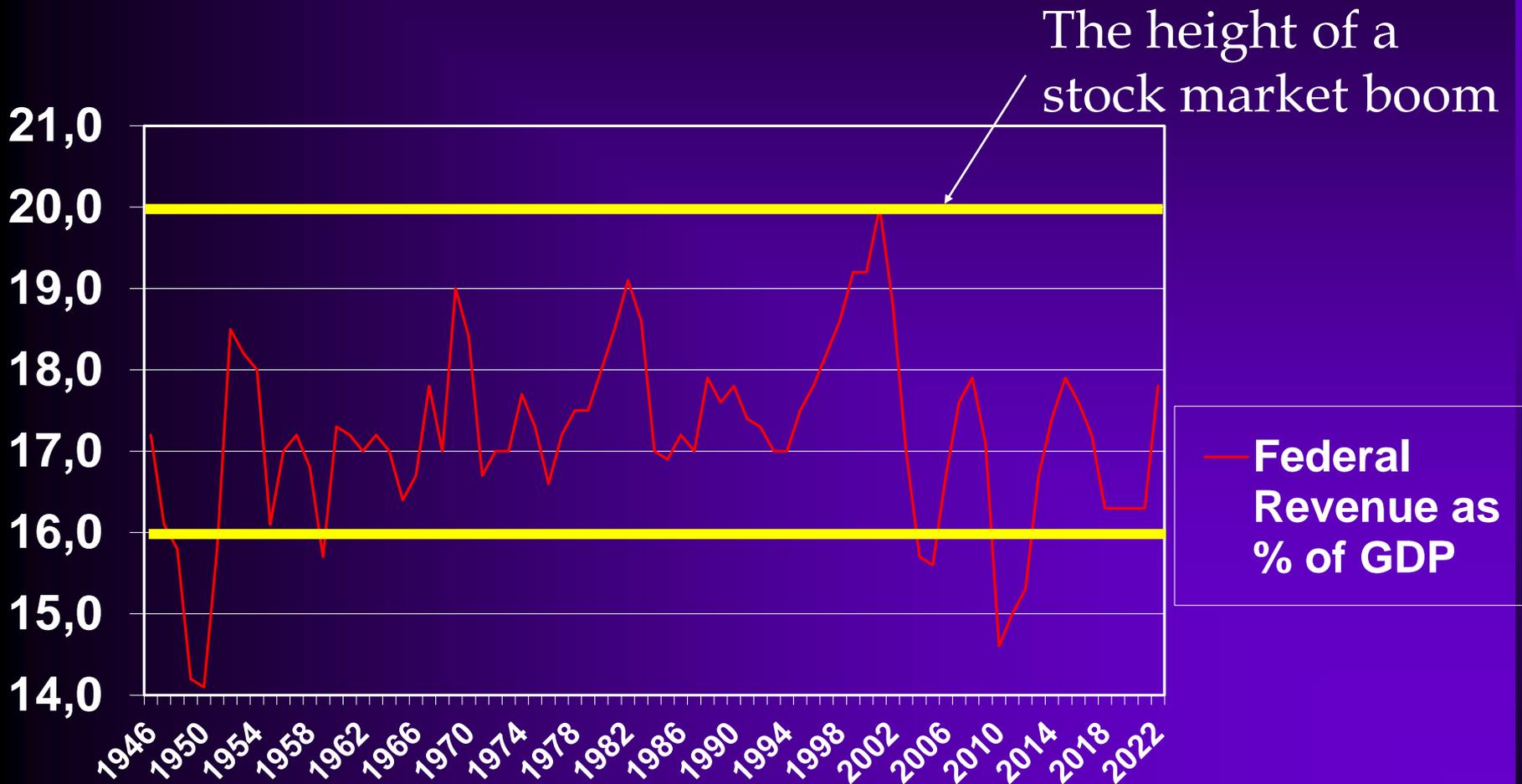
Federal spending grows from an average of 21.3 percent of GDP over the 2010–2019 period to an average of 29.7 percent over the 2042–2051 period in CBO's projections.

Percentage of Gross Domestic Product



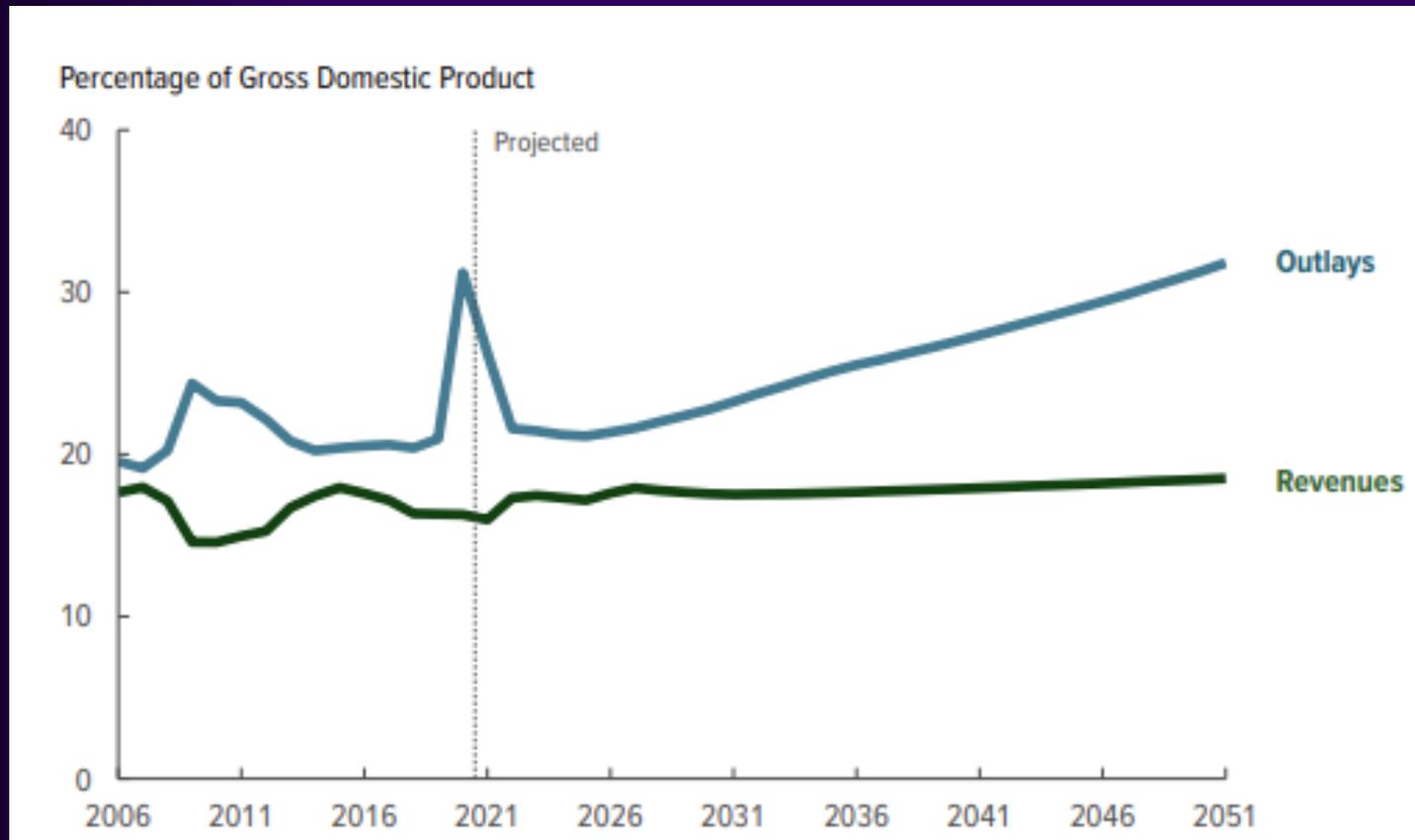
Net spending for interest, measured as a share of GDP, begins to increase in 2025 and more than triples over the last two decades of the projection period. Spending for the major health care programs and Social Security increases in almost every year of the period.

Federal Revenue Never Has Been >20.0% of GDP, 1946-2022*



Source: <https://www.whitehouse.gov/omb/historical-tables/>, Table 1.2. 2021 and 2022 estimated. The year 2001 was the peak, when federal revenues hit 20.0% of GDP.

Federal Revenue Is Projected to Stay ~18% of GDP*



This projection assumes current law.

How About Financing This Spending with Higher Taxes?*

Figure 1-3.

[Return to Reference](#)

The Size of Policy Changes Needed to Make Federal Debt Meet Two Possible Goals in 2046

If lawmakers aimed for debt in 2046 to equal . . .

39% of GDP
(Its 50-year average)

75% of GDP
(Its current level)

Each year, they would need to **increase revenues** or **reduce noninterest spending** by . . .

2.9% of GDP,
which is equal to a

16%  increase in revenues
or a
14%  cut in spending

1.7% of GDP,
which is equal to a

9%  increase in revenues
or an
8%  cut in spending

In 2017, that would amount to . . .

\$560 billion, which is equal to **\$1,700** per person

\$330 billion, which is equal to **\$1,000** per person

*Source: <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51580-ltbo-one-col-2.pdf>

What Do 14% and 8% Spending Cuts Mean?*

If lawmakers aimed for debt in 2046 to equal . . .

39% of GDP
(its 50-year average)

75% of GDP
(its current level)

If the changes were cuts (of equal percentage) in all types of noninterest spending, one effect in 2017 is that **initial Social Security benefits** would be lower than under current law by . . .

\$2,600

\$1,500

Values are averages for people in the middle fifth of the lifetime earnings distribution who were born in the 1950s and who would claim benefits at age 65. Under current law, their benefits are projected to be \$18,700.

How about debt financing? CBO projects debt/GDP to rise to 89% in 2027 and 122% in 2040; this could mean a vicious spiral**

*Source: <https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51580-ltbo-one-col-2.pdf>

**CBO assumes health care cost growth roughly 1 pct pt above GDP.

As for the 12% That Is Not Third Party Financed*

Among nonelderly individuals, both recently diagnosed (31.6%) and previously diagnosed (27.9%) cancer survivors were more likely to report any change in prescription drug use for financial reasons than those without a cancer history (21.4%), with the excess percentage changes for individual measures ranging from 3.5% to 9.9% among previously diagnosed survivors and from 2.6% to 2.7% among recently diagnosed survivors ($P < .01$). Elderly cancer survivors and those without a cancer history had comparable rates of changes in prescription drug use for financial reasons.

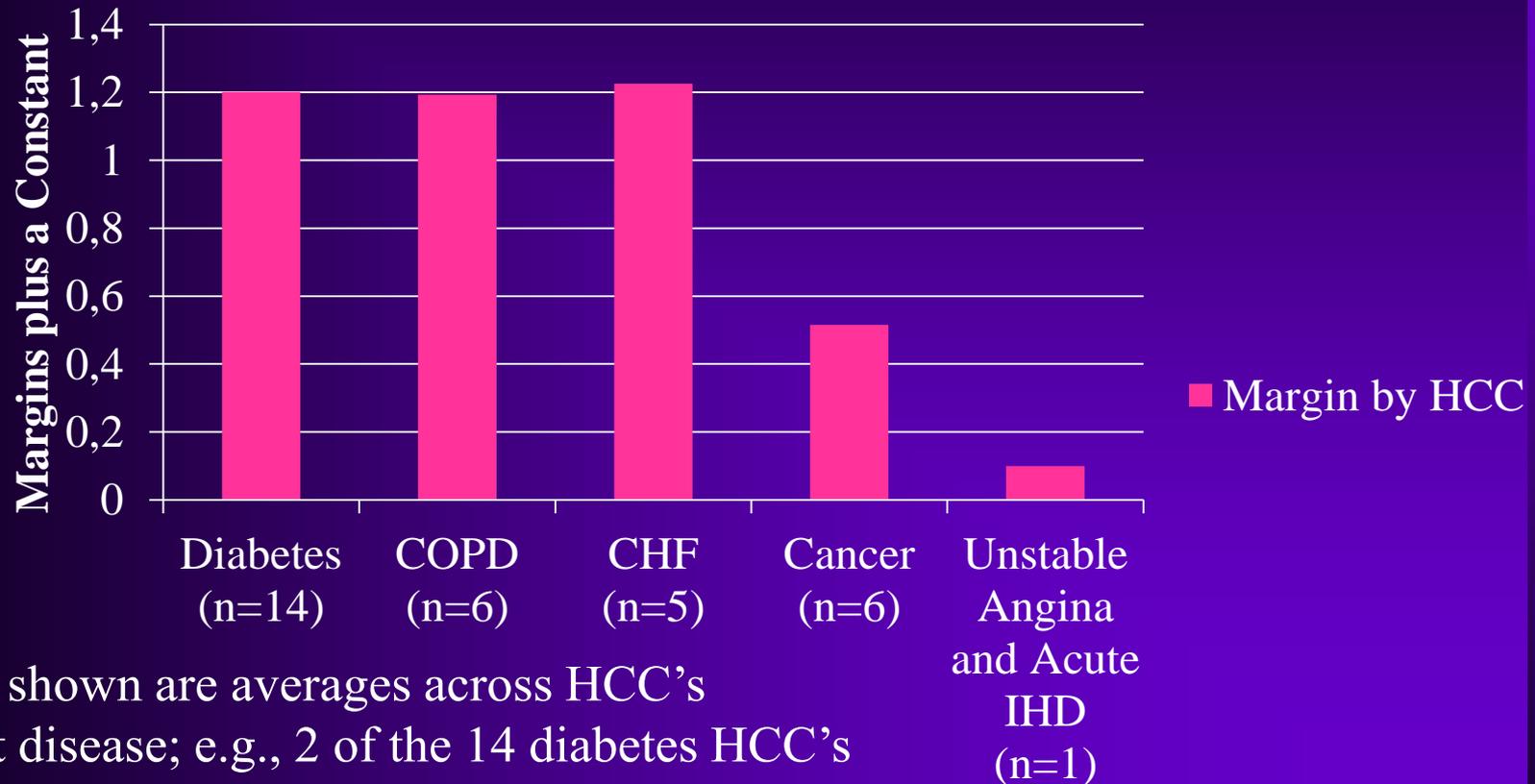
*Source: Zheng, et al., on line February 2017.

<http://onlinelibrary.wiley.com/doi/10.1002/cncr.30560/abstract;jsessionid=F6CF03039362D2742B0C1EDE9A9E36F3.f04t01>

Innovation and Risk Adjustment

- Risk adjustment is now set looking backward; as a result, diseases with new costly treatments are relatively undercompensated*
- Perhaps that is why cancer is less profitable in Medicare Advantage (next slide)
- Adding reinsurance helps;** also CMS has some discretion to make adjustments

Margins Plus a Constant by HCC Category



Margins shown are averages across HCC's with that disease; e.g., 2 of the 14 diabetes HCC's are "diabetes without complications" and "diabetes and polyneuropathy."

*Source: Computed from Newhouse, et al., 2013. Margins for diabetes, COPD, and CHF each differ significantly from both Cancer and Unstable Angina, $p < 0.01$. Data come from 48 common HCC's or combinations of HCC's.

Innovation and Risk Adjustment, cont.

- It doesn't seem administratively possible to adjust for every expensive advance at the time new products or procedures enter the market
- And it is not just new products; in principle one would adjust in cases of drugs on the market that are found to be useful for other diseases

Reimbursement

- The US is increasingly moving away from a disaggregated fee-for-service system toward bundled payments for an episode or full capitation, so-called “value-based purchasing”
- In such a system a health care delivery system or provider organization

Value-Based Purchasing Shifts Some Risk to Providers

- Provider organizations, however, have less scale and therefore higher variance in mean spending than do traditional insurers
- Moreover, it is arguably less costly for a provider organization to select than for an insurer with arms length contracts with provider organizations assuming guaranteed issue and renewability

Value-Based Purchasing

- So provider organizations at risk could be slower to introduce costly innovations, and they may discriminate more in the allocation of advances within various populations; reinsurance helps here
- Depending on compensation arrangements of individual physicians, however, there could be pushback